The Development of the Theories of Perfect Competition
and Monopoly in the History of Economic Thought: 1700-1926

submitted for Ph.D. degree in 1977 by Roger Clarke

UMI Number: U430819

UMI

Dissertation Publishing

ProQuest®

Summary of Thesis.

This thesis is concerned to trace the development of the theories of perfect competition and monopoly in the history of economic thought, from 1700 to 1926. It is shown that in the process of this development the concepts of competition and monopoly were to undergo a number of transformations as they developed from essentially crude beginnings in the pre-Smithian era to a much more fully worked out form at the end of our period.

In particular we stress the distinction between the Classical view of competition and monopoly and that of the French mathematical economist, Augustin Cournot. The Classical economists, following Adam Smith (1776), were concerned to analyse free competition, the mechanism by which economic resources move between trades in order to equalise profit differentials. In their analysis monopoly was treated as the opposite of free competition and used to denote cases where barriers to such movement exist. In contrast, Cournot (1838) analysed the notion of unlimited or pure competition, a market structure under which producers are so numerous that each acts as a price-taker. In his analysis, monopoly is defined as the case of a single producer, and pure competition and monopoly represent polar cases in a classification of market structures based on the number of producers in the market.

The modern theories of perfect competition and monopoly are seen as evolving from a synthesis of these two strands of thought, pre-eminently in the work of Marshall (1890). In this synthesis, Cournot's analysis was integrated with the earlier Classical ideas as far as competition was concerned, whilst the Classical analysis of monopoly was abandoned in favour of Cournot's treatment. This compromise gave rise to a number of conceptual problems which were to be instrumental in calling into question the traditional belief that competitive analysis was generally applicable to capitalist economies.

CONTENTS

1.

Chapter 1

Introduction

This thesis is concerned with the development of the theories of
perfect competition and monopoly in the history of economic thought
from 1700 to 1926. During this period these concepts developed
from crude beginnings into fairly refined and complex theories.
This development was not, however, linear, and we shall find that
there were a variety of different treatments of the concepts as
between different authors and different schools of thought. It will
be our task in this thesis to trace this development and investigate
the various notions held by economists with respect to competition
and monopoly, and the inter-relationship of these concepts.

An important theme of this thesis concerns the role played by
'Mathematical Economists' in the theoretical developments in the
period. As has been noted by Stigler in his classic article on
the history of perfect competition theory,[1] the Classical economists
tended to treat the concept of competition casually. Only in the
mid-19th century were "the first steps in the analytical refinement
of the concept of competition... made by the mathematical economists".[2]
Whilst literary economists had great difficulty in formulating even
simple concepts such as the demand curve, the field was open for
important clarificatory advances by the judicious use of a little
algebra or geometry. Many of the developments we shall discuss in
the second half of this thesis were just such developments, and we
may mention the names of Cournot, Jenkin, Edgeworth and Marshall
as examples of economists with the mathematical technique to make such
a contribution.

---

1. George J. Stigler, 'Perfect Competition, Historically Contemplated'
Journal of Political Economy, vol. 65, 1957, pp. 1-17.

2. Ibid., p. 5.

Mathematical techniques do not merely enable the clarification of confused ideas, however, they also provide a theoretical impetus of their own, turning ideas in new directions. The best illustration of this is in the work of Augustin Cournot, which may be singled out as being the most important contribution to the development of competition and monopoly theory in our period. Cournot demonstrated with the aid of some elementary calculus that it was possible to distinguish models of price according to the number of producers operating in the market; ranging from unlimited competition at one extreme to monopoly at the other. This demonstration which follows directly from his mathematics would have been difficult, if not impossible, to analyse using a non-mathematical approach. Moreover, as we shall see in a moment, it presented a view of competition and monopoly which was radically different from the Classical view, and which gave rise to a new dimension in the discussion of these concepts.

It seems desirable at the outset to distinguish our terms in this thesis. By perfect competition I shall refer to that model of price whereby not only are producers treated as price-takers, but also only normal profits are earned in a particular trade. The condition that producers are price-takers will then be simply referred to as pure competition, following Chamberlin;[1] whilst free competition is the mechanism which equalises profits between trades.[2] Monopoly, or sometimes pure or perfect monopoly, will be used to refer to a single producer selling at a single price.

---

1. Edward H. Chamberlin, The Theory of Monopolistic Competition (Oxford University Press, 1962), p. 6.

2. This usage seems in accord with most modern usages of these terms. For a different suggested terminology, however, see Stigler, op. cit., pp. 14-15.

If one takes a broad view of a competitive economy, one can imagine it as an hydraulic system wherein the principle of gravity determines the level of water in each part of the system. The injection of additional water at some point will raise the level throughout the system bringing about a new equilibrium solution.[1] In this physical analogue, if each chamber of the system represents an industry, whilst economic resources are the fluid in the system, then the principle of free competition ensures the attainment of equilibrium. Economic resources will move between industries in response to differences in rates of return, and equilibrium will be attained when these differences, just like the differences in the water level, have been eradicated. On this broad view, therefore, free competition is the mechanism which brings about the equilibrium allocation of resources in a capitalist economy.

It was such a broad view of the concept of competition that was introduced by Adam Smith in the Wealth of Nations in 1776, and which became the basis of the Classical treatment of competition. The Classical economists were concerned to analyse the operation of the entire economy in terms of a limited number of aggregate economic variables. In this general analysis they invoked the principle of free competition as a means of simplifying the problem to manageable proportions. In like manner, Leon Walras when he presented his much more sophisticated analysis of general equilibrium in the 1870s, also relied on the principle of free competition to simplify his analysis. By assuming the operation of free competition, it was possible with one broad stroke to deal with the problem of resource allocation and so solve the complex problem of general equilibrium.. The idea was thus an extremely powerful one, and it is no wonder that it was to have such a tremendous influence on economic thought from the time of Adam Smith.

---

1. I believe it was Irving Fisher who actually built such a machine in order to demonstrate the workings of general competitive equilibrium.

We shall see in chapters 2 and 3 that Adam Smith adapted the concept of free competition from the Mercantilist notion of <u>freedom of trade.</u> This concept implied the absence of restraints on the movement of labour and capital between trades. In contrast exclusive privileges which gave rise to restraints on such freedom of movement were called "monopolies" by the Mercantilists. This juxtaposition of freedom of trade and monopoly became the distinction of competition and monopoly which was such an important part of the Classical doctrine. Moreover, the Classical economists retained the Mercantilist notion of monopoly as involving barriers to the movement of resources in their treatment of the case. In their view, trades could be divided into two classes: those subject to the rule of free competition, and those in which new entry was restricted. As is well known they thought of the former as the general rule and the latter as the exception which was to be condemned.

Whilst it would be a misrepresentation to treat the Classical economists as having a single view of competition and monopoly, we may present an idealised view of their conception of these ideas. Reduced to its bare essentials, the Classical view of competition and monopoly can be interpreted as distinguishing the cases in terms of the elasticity of supply. Free competition to the Classical economists was a means to an end (the representation of equilibrium in the economy) so that it is not surprising that it did not receive explicit and systematic treatment in their work. Nevertheless, we can interpret their discussions of it as referring to the case of infinitely elastic supply (Figure 1.1).

<u>Figure 1.1</u>
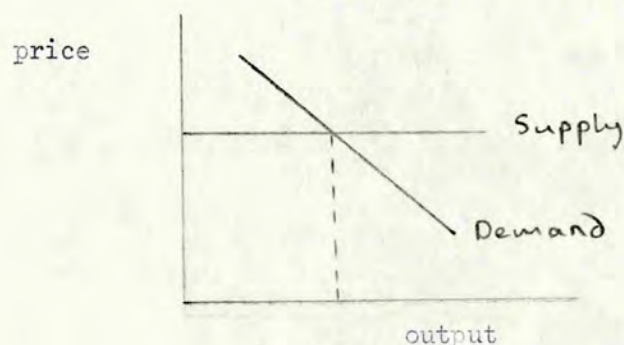
The natural price is that price, (according to Smith) which is just
sufficient to pay the rent of land, the wages of labour, and the
profits of stock, all at their natural rates. Such a price is
invariant to the effects of changes in the demand for the product.
Implicitly, therefore, a competitive industry in Classical economics
is a constant cost industry, free competition ensuring the equality
of price and cost of production.

The Classical analysis of monopoly in contrast envisaged, in
the extreme case, no new entrants to a trade, and hence a fixed
supply. The supply curve under Classical monopoly was then perfectly
inelastic (Figure 1.2).

Figure 1.2
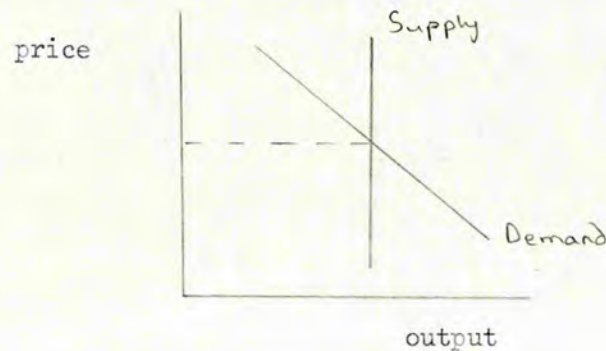
output

In this case, it was not price but output which was invariant to
changes in demand. Price under monopoly is not fixed by cost of production,
but varies with the level of demand. Clearly, there are problems with
this dichotomisation, not least how to deal with increasing and decreas-
ing returns, and we shall see in this thesis how various authors
attempted to deal with these problems.

For the moment, however, let us contrast this notion of free
competition and monopoly with the concepts of pure competition and
pure monopoly. The concept of free competition as we have seen is
relevant to the problem of inter-industry equilibrium when one takes
a broad view of the whole economy. Pure competition, on the other
hand, describes a market situation in which a large number of
producers maximise profits taking market price as given. That is,
pure competition is a model of intra-industry equilibrium, and the
focus of analysis in this case is the much more narrow one of a
particular industry.

In his Foundations of Economic Analysis Paul Samuelson has stressed the logical separation of these ideas.[1] Under the assumption of pure competition, the internal conditions of equilibrium for the model are defined by the assumption of profit maximisation. Subject to the condition that in the "long run" net revenue cannot be negative, profit maximisation implies a set of marginal equalities which represent the internal equilibrium conditions of the model. The assumption of free competition gives rise to an external condition of equilibrium, which is of an entirely different nature from the first. It is an "arbitrary assumption or hypothesis" that net revenue will not only be non-negative but also that it will be non-positive.[2] Such a condition need not be imposed on the pure competition model or, conversely, it may be associated with alternative, including oligopolistic, models of price determination. In Samuelson's opinion

"this classification cuts across that of pure and impure competition. Thus defined, free entry is a condition to be looked for empirically, rather than one imposed upon the data a priori."[3]

There are nevertheless strong reasons for linking the logically distinct ideas of pure and free competition. Such an integration gives rise to an equilibrium solution which, as is well known, has certain desirable welfare properties. If one can assume that all prices in the economy are parametric and, moreover, that all resources are free to take advantage of the opportunities available, subject only to technological constraints, then setting aside the thorny question of the optimal distribution of income, and ignoring externalities, one can assert that perfect competition gives rise to a social optimum in the sense of Pareto.[4] Despite all the ifs and buts this conclusion is a tremendously important one, and would alone justify the link of the concepts of pure and free competition.

---

1.   Paul A. Samuelson, Foundations of Economic Analysis (Cambridge: Harvard University Press, 1947) chapter 4.

2.   ibid., p. 88.

3.   ibid., p. 87.

4.   See, for example, J. de V. Graaf, Theoretical Welfare Economics (Cambridge University Press, 1957).

From a purely positive viewpoint, however, there are also strong reasons for such a link. When the question of general equilibrium is raised, it is clearly necessary to take some view on entry conditions. Reference to empirical data on new firms and bankruptcies clearly rule out the "arbitrary assumption" that no entry and exit would be an appropriate general rule for _any_ model. When one considers the pure competition model in particular, it is difficult to conceive of any barriers to entry which would limit resource mobility, and still be consistent with there being a large number of small producers in the market. Certainly the traditional barriers (economies of scale, large capital requirements, advertising) are all ruled out by the assumption of pure competition. Moreover, the problem of superior resources is overcome by the imputation of quasi-rents to them in the long run. It thus appears that there is a strong case for integrating the logically separate ideas of pure and free competition into the composite notion of perfect competition from both a positive and a normative point of view.

The historical counterpart of these arguments will be discussed in detail in this thesis. We shall see that it was in Cournot's work that the first treatment of the pure competition model was to be found. And, moreover, we shall see that Cournot analysed solely the problem of intra-industry equilibrium and made no mention of the Classical idea of free competition. The post-Cournot period of competitive analysis saw a gradual fusion of the ideas of Cournot and the Classical economists into the perfect competition model. This fusion gave rise to a number of problems around the turn of the century, which as we shall see centred around the classic synthesis of Classical thought with that of Cournot in Marshall's Principles of Economics. It was only at the very end of our period that the perfect competition model became well understood by the mainstream economist, and with it, its limitations and weaknesses.

Also the modern theory of monopoly dates, both in conception and, in large part, in realisation, from the work of Cournot. Cournot ignored the Classical notion of the limitation of supply, and instead analysed the case of a single producer determining price according to the assumption of profit maximisation. So successful was his work that practically all the major economists after him took over his analysis of monopoly in its entirety. Thus in contrast to the synthesis which was the feature of post-Cournot work on competition, the second half of the 19th century saw a replacement of the vague

and imprecise Classical ideas on monopoly with the modern monopoly
model. Again we shall see that Marshall's Principles had a central
role in bringing Cournot's work to the attention of the general
economist.

The modern theories of competition and monopoly it will be
contended in this thesis are the result of a synthesis of two
different strands of thought on these subjects. On the one hand
this synthesis took the Classical notions of free competition and
monopoly as opposites, and on the other it took Cournot's notions
of pure competition and pure monopoly as the poles in a spectrum. The
resulting sysnthesis was to leave both views of competition and monopoly
(as opposites or as polar cases) as inadequate. Rather, a somewhat
complex and unsure structure was to remain as the general treatment
of price determination. That this structure was not to survive
unchallenged for long was the inevitable result of this attempt to
synthesise these different ideas.

It is not my intention in this introductory chapter to present a
complete discussion of the modern theories of perfect competition and
monopoly. The reader is referred to any of a number of excellent
textbooks for such a discussion.[1] Nevertheless several concepts and
ideas associated with these models are best dealt with here in order
that we may take a general view on them. We shall consider three such
topics: the assumptions of the competition model, the notion of supply
and demand, and (only briefly) some weaknesses of perfect competition
and monopoly. This discussion will be followed by an outline of the
scope and limitations of this thesis.

1. A particularly useful treatment of Marshallian competitive analysis
is given in C.A. Tisdell, Microeconomics: the theory of economic
allocation (Sydney: Wiley International, 1972).

In his essay on 'The Methodology of Positive Economics', Milton Friedman makes a distinction between the "assumptions" of a model and its abstract content:-

"a hypothesis or theory consists of an assertion that certain forces are, and by implication others are not, important for a particular class of phenomena and a specification of the manner of action of the forces it asserts to be important. We can regard the hypothesis as consisting of two parts: first, a conceptual world or abstract model simpler than the "real world" and containing only the forces that the hypothesis asserts to be important; second, a set of rules defining the class of phenomena for which the "model" can be taken to be an adequate representation of the "real world" and specifying the correspondence between the variables or entities in the model and observable phenomena."[1]

These two parts are very different in character. Whilst the model itself is abstract and complete, the set of rules for applying the model must by their very nature be "concrete and in consequence incomplete".[2] It is these latter rules, which specify the correspondence of the model to the real World, which we shall first consider.

Standard textbook treatments of perfect competition give various lists of these "rules" or "assumptions". Thus a typical list might include the assumptions that there be many producers, a homogeneous product, a perfect market, and free entry and exit to and from the market.[3] These assumptions describe an environment to which the model of perfect competition is thought to be applicable, and as such they fulfill an important function by providing an economical way of presenting the theory and indicating its applicability. Moreover, they provide important insights into the ideas on competition held by various writers. For these reasons they are of interest in a history

---

1. Milton Friedman, 'The Methodology of Positive Economics' in Essays in Positive Economics (University of Chicago Press, 1966), p. 24.

2. ibid., pp. 24-5.

3. See, for example, James M. Henderson and Richard E. Quandt, Microeconomic Theory: A Mathematical Approach (New York: McGraw-Hill, 1958) pp. 86-7.

of competitive analysis, and so receive attention as appropriate in the chapters below.[1]

However, given that their role is to relate the abstract model to reality, it follows that it is not possible to draw up a complete list of them. In other words, it is not possible to draw up a list of "necessary and sufficient descriptive conditions" for the perfect competition model to hold. Such an endeavour, whilst it may be of clarificatory use, must in principle be doomed to failure. Of several economists who attempted such a task, this fact is nowhere better illustrated than in Frank H. Knight's Risk, Uncertainty and Profit published in 1921.[2] In this work, Knight lists eleven assumptions in all, of which the first eight are "the conditions necessary to perfect competition".[3] We can do no better than list these assumptions to illustrate, regardless of their other strengths and weaknesses, the fundamental impossibility of such an attempt. They are:-

"1. The members of the society are supposed to be normal human beings... a "random sample" of the population of the industrial nations of today.

2. We assume the members of the society act with complete "rationality."... they are supposed to "know what they want" and to seek it"intelligently".... They are supposed to know absolutely the consequences of their acts when they are performed, and to perform them in the light of the consequences.

3. The people are formally free to act as their motives prompt.. ... each controls his own activities with a view to results which accrue to him individually.

---

1. For a more detailed discussion of the role of "assumptions", see Friedman, op. cit., pp. 23-30. Friedman's view that a theory can only be tested on its predictions will be investigated in more depth in Chapter 10 below.

2. Frank H. Knight, Risk, Uncertainty and Profit (University of Chicago Press, 1971).

3. ibid., p. 79.

....4.   We must also assume complete absence of physical obst-
acles to the making, execution, and changing of plans at will; that
is, there must be "perfect mobility" in all economic adjustments, no
cost involved in movements or changes. To realize this ideal all
the elements entering into economic calculations... must be continu-
ously variable, divisible without limit.

....5.   ... There must be perfect, continuous, costless inter-
communication between all individual members of the society. Every
potential buyer of a good constantly knows and chooses among the
offers of all potential sellers, and conversely.

....6.   Every member of the society is to act as an individual
only, in entire independence of all other persons. .... Individual
independence in action excludes all forms of collusion, all degrees
of monopoly or tendency to monopoly.

7.   We formally exclude all preying of individuals upon each
other.

....8.   The motives for division of labour and exchange must
be present and operative. .... The principal condition is diversifica-
tion of wants associated with specialization of productive capacities
or dispositions, or with physical restrictions on the range of
productive activity.

....9.   All given factors and conditions are .... to remain
absolutely unchanged. They must be free from periodic or progressive
modification as well as irregular fluctuation.

....10. .... Every productive agency or capacity is an
inseparable part of the personal endowment of some member of the
society.

....11. .... each individual produces a single commodity."[1]

These eleven assumptions represent a formidable attempt to
describe a perfectly competitive economy. However, even setting
aside assumptions 9 through 11, it is clear that Knight has adopted
a very broad framework of discussion. Indeed his framework is so
broad that specific assumptions usually connected with perfect
competition, such as large numbers of traders, and product homogeneity,
do not even recieve explicit attention. Moreover, when we come to
consider individual assumptions we find often vague or over-general

---

1.   ibid., pp. 76-80.

statements. Thus Knight assumes the members of society are "normal human beings" (assumption 1), and that they don't prey on each other (assumption 7). Or again, resources are assumed to be infinitely divisible and costlessly mobile (assumption 4). Clearly, statements at this level of generality paint a picture with broad brush strokes but leave much of the detail hidden.

In his essay 'Perfect Competition, Historically Contemplated', George Stigler singles out Knight's work as providing the complete formulation of the concept of perfect competition.[1] He admits, however, that Knight's list "is by no means a statement of minimum requirements". Assumption 5, for example, that there be complete knowledge, is over-sufficient since

"If each seller in a market knows any n buyers, and each seller knows a different (but overlapping) set of buyers, then there will be perfect competition if the set of n buyers is large enough to exclude joint action. Or let there be indefinitely many brokers in any market, and let each broker know many buyers and sellers, and also let each buyer or seller know many brokers - again we have perfect competition".[2]

Similarly, mobility of resources need not be complete:-

"If one resource were immobile and all others mobile, clearly the retruns of all resources in all uses could be equalized. .... Even in the general case in which mobility of resources is required, not all the units of a resource need be mobile. If some units of each resource are mobile, the economic system will display complete mobility for all displacements up to a limit that depends upon the proportion of mobile units and the nature of the displacement."[3]

Stigler agrees with us that it is not possible to list the minimum assumptions of the perfect competition theory. However, he does so for a different reason:-

---

1. George J. Stigler, op. cit., pp. 10-14.

2. ibid., p. 12.

3. ibid., p. 13. For further examples, see ibid., pp. 11-14.

"The minimum assumptions for a theoretical model can be stated with precision only when the complete theory of that model is known. The complete theory of competition cannot be known because it is an open-ended theory; it is always possible that a new range of problems will be posed in this framework, and then, no matter how well developed the theory was with respect to the earlier range of problems it may require extensive elaboration in respects which previously it glossed over or ignored."[1]

Stigler's position, however, appears to be refuted by Friedman's argument. It is not the fact that a theory is open-ended which makes it impossible to list its minimum assumptions, but rather that these assumptions of their very nature cannot be fully listed. Stigler's view that the perfect competition model is open-ended (as presumably are all theories) is beside the point. Rather, the point is that given their role, the idea of "necessary and sufficient" assumptions for a theory is a non-sequitor.

The practical implication of this argument is that in our view the listing of assumptions of perfect competition is less important than in Stigler's. Whilst accepting a complete listing is not possible for all time, Stigler's view is that such a listing at a given time can be carried out to some degree of fulfillment. This contrasts with our view that attempts at such a listing are ill-conceived. Stigler's general emphasis on the "assumptions" of perfect competition theory in his essay culminates in his emphasis on the American writers, J.B. Clark and Frank Knight, as providing the complete formulation of the theory. In this thesis, we shall treat the assumptions of the theory as only one component of it, and on this view the works of Knight and Clark become much less important than in Stigler's view.[2]

---

1. ibid., p. 14.

2. For reasons of time limitation a planned appendix on the American contribution has not been incorporated in this thesis. Our general view, however, is that even on Stigler's own terms, the works of Clark and Knight, and in particular the latter, suffer from over-generality in their treatment of the problem. Their works provide useful insight, but certainly not any outstanding contribution to perfect competition analysis.

Next consider the notion of supply and demand. Again consider
Friedman's distinction between the two elements which comprise a theory:
a system of tautologies or "language" by which concepts and ideas
are organised into a consistent filing system; and a set of substantive
hypotheses designed to abstract essentials from complex reality.[1] The
idea of supply and demand has been, and still is, used in both of these
ways. Friedman, himself, notes its role as a means of classifying
economic forces according to whether they act through the buyers or
sellers in a market:-

"Viewed as elements of the language of economic theory, these are
the two major categories into which factors affecting the relative prices
of products or factors of production are classified.... In a (consumer
good) market there is a clear and sharp distinction between the
economic units that can be regarded as demanding the product and those
that can be regarded as supplying it..... In these cases the simple
and even obvious step of filing the relevant factors under the headings
of "supply" and "demand" effects a great simplification of the
problem and is an effective safeguard against fallacies that otherwise
tend to occur."[2]

As a classificatory system, the criteria by which the idea of supply
and demand should be judged are ones of usefulness, comprehensiveness,
etc. Used in this sense, the phrase supply and demand has no substan-
tive content, and, as long as this is recognised, no harm is done by
using this classificatory system where appropriate.

The phrase supply and demand does, however, have a more restrictive
use, which does have substantive content. This usage is irrevocably
bound up with the competitive model. In the pure competition model
the equality of supply and demand, when these are taken as functions
of price, determines the competitive price as indicated in Figure 1.3.

_____

1. Friedman, op. cit., p. 7. The relationship between this division
and that noted above is not clear in Friedman's work.

2. ibid., pp. 7-8.

Figure 1.3
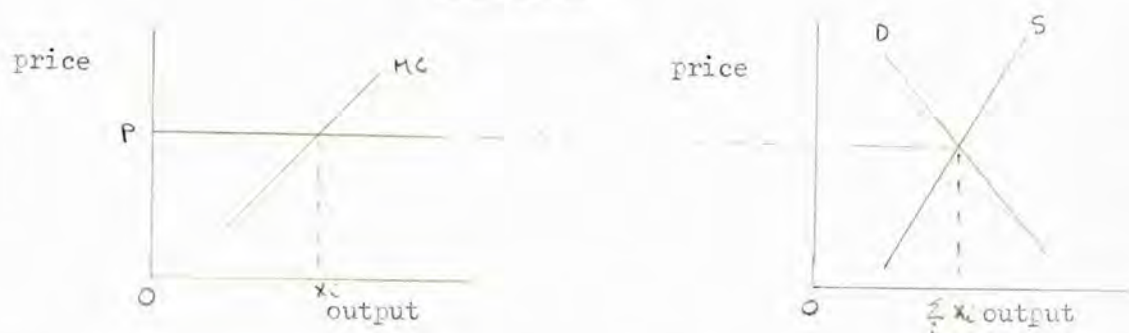
Formally, if there are n firms (i = 1...n), then under pure competition, their n output rates are determined by the n equations that price, p, equals marginal cost, $c'_i(x_i)$:-

$$p = c'_i(x_i) \tag{1.1}$$

whilst market price is determined by a further equation expressing the equality of demand, $D(p)$, and supply, $S(p)$:-

$$D(p) = S(p) \tag{1.2}$$

Equation (1.2) is thus an integral part of the pure competition model. Moreover, such an equation does not appear in the monopoly model, or many of the other models put forward as explanations of the price phenom-enon. In its substantive sense, then, the idea of supply and demand should be applied only to cases where the competitive model is in view.

That it is necessary to stress this distinction in the usage of the phrase supply and demand even today, gives a strong indication that historical confusion over this point has been pervasive. Inevitably, in a period when concepts and ideas about competition were often vague and confused, economists spoke loosely of price being determined by supply and demand, without realising that to have substantive content this idea involved the operation of competitive theory. Malthus expressed the general Classical view when he said:-

"probably not a single instance of a change of price can be found, which may not be satisfactorily traced to some previous change in the state of the demand and supply."[1]

---

1. T.R. Malthus, Principles of Political Economy, 2nd edition (Tokyo: Kyo Bun Kwan, 1936), p. 62.

The fact that such a view finds sympathisers today, even given our much more advanced analysis of price theory, should make the reader beware of falling into the trap of confusing these two notions of supply and demand.

The concept of supply and demand as we shall see in this thesis occupied a central position in the attempt to synthesise the free and pure competition treatments of price theory. We have seen that the equality of supply and demand was not only an equation in Cournot's model of pure competition, but was also a feature of Classical competition (and monopoly) analysis. On the one hand, Cournot's narrow view of the pricing problem, and on the other, the Classical inter-industry view, both employed supply and demand analysis to determine price. In the fusion of these ideas in the second half of the 19th century, supply and demand analysis was to act as the bridge between these developments. In effecting this integration, however, we shall see that a number of refinements had to be made to the concept of supply and demand before the modern analytic structure could be erected.

Lastly let us briefly consider the relative merits of perfect competition and monopoly analysis. An obvious difference between the models arises over the problem of increasing returns. If producers in an industry are price-takers, then it will not pay them to limit their production if their marginal costs are decreasing. Hence, in an industry with falling costs, firms will grow in size so that the assumption that they are too small individually to affect price will be violated. The theory of perfect competition is thus inconsistent with falling marginal costs. Such a problem does not, however, arise under monopoly where the size of the firm is determined as long as marginal costs fall less sharply than marginal revenues. This latter eventuality is ensured at some stage on the plausible assumption that marginal costs are non-negative.

Formally, if the monopolist faces an inverse demand function $p = p(x)$, where p is price and x is output, and his total costs are $c = c(x)$, then he will maximise profits by equating marginal revenue and marginal cost

$$p + x \frac{dp}{dx} - c'(x) = 0 \qquad\qquad (1.3)$$

and the sufficient condition for equilibrium is that marginal cost is less negatively sloped than marginal revenue

$$2 \frac{dp}{dx} + x \frac{d^2 p}{dx^2} - c''(x) < 0 \qquad\qquad (1.4)$$

These conditions are clearly met in Figure 1.4(a) where production is limited to output x_1 even though marginal costs are falling. If we now assume equations (1.3) and (1.4) relate to a firm under pure competition, then taking price as a parameter we have

$$p - c'(x) = 0 \qquad\qquad (1.5)$$

and

$$-c''(x) < 0 \qquad\qquad (1.6)$$

In Figure 1.4(b) the firm will not limit production to output x_1 but expands indefinitely.

Figure 1.4

(a) price

P_1

MC

MR   AR

0   x_1 output

(b) price

P_1 price

MC

0   x_1 output
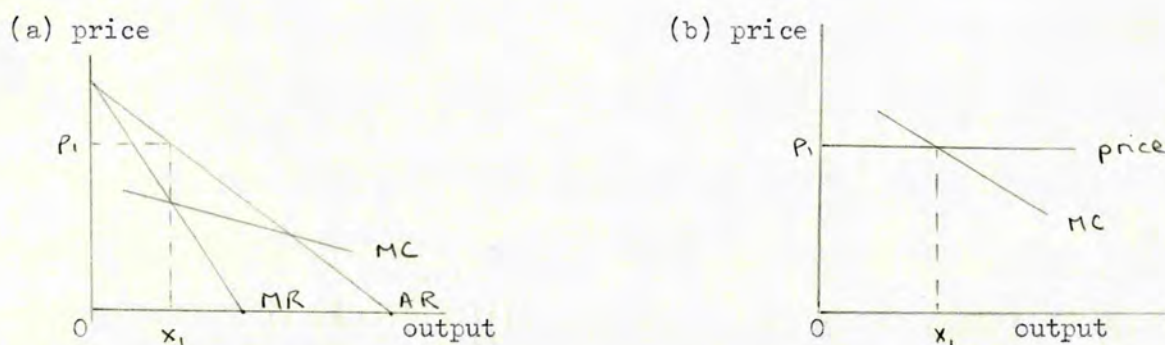
The implications of these simple results are far-reaching. In the advanced technological economies of the West, industries are rare in which rising marginal costs set in at low output rates relative to total industry size. But if this is not the case, the theory of pure competition cannot be appropriate. This conclusion would seem to apply to most manufacturing industries, the industries which, as we shall see, were most widely believed to be competitive by the Classical economists. Since monopoly theory is not so hampered by falling costs it would thus appear to be superior to perfect competition in this respect. We shall see that towards the end of our period of study a number of economists were beginning to become aware of this point as

the precise nature of these theories came more clearly into view.

A major weakness of the theory of monopoly, on the other hand, as has been pointed out by Hicks amongst others, is its inability to unambigously sign the effect of a rise in demand on price.[1] Whilst the comparative static effects of changes in cost are more or less the same in both the perfect competition and monopoly models, the simple competitive result that a rise in demand will raise price is not repeated in the monopoly model.[2] Rather one can only say generally that price may rise or fall following the demand increase. Since this problem is touched on by several authors in this thesis (although none were to give a definitive treatment of it) we shall investigate this "weakness" further here.[3]

Formally, we can write the monopolist's demand function $x = x(p,\alpha)$ where x is output, p is price, and α is a shift parameter. Then the monopolist will set price to satisfy the equilibrium condition

$$x + p \cdot x_p - c'(x) \cdot x_p = 0 \qquad (1.7)$$

where $x_p \equiv \frac{\delta x}{\delta p}$. Using the implicit function rule, the effect of a change in α on price is then given by

$$\frac{\delta p}{\delta \alpha} = -\left[\frac{x_\alpha + \{p - c'(x)\}x_{p\alpha} - x_p \cdot x_\alpha \cdot c''(x)}{2x_p + \{p - c'(x)\}x_{pp} - x_p^2 \cdot c''(x)} \right] \qquad (1.8)$$

---

1.   J.R. Hicks, Value and Capital (Oxford: Clarendon Press, 1968), pp. 83-5.

2.   A rise in demand will, of course, only lead to a rise in price in long run competitive equilibrium in increasing cost industries. However, in so far as markets are competitive (and here I am thinking particularly of agricultural markets) the increasing cost assumption seems reasonable. See Tisdell, op. cit., ch. 8.

3.   The standard reference for this problem is Joan Robinson, The Economics of Imperfect Competition (London: Macmillan, 1969), chapter 4. The results discussed below can be found in Robinson's work although she conducts her argument in terms of geometry which is a rather cumbersome tool for this particular problem.

Since the denominator of equation (1.8) is negative by the second order conditions, the rise in demand will raise price if the numerator is positive. Generally, however, the numerator is unsigned, the crucial unknowns being the way in which the demand curve shifts and the slope of the marginal cost curve. It would appear therefore that monopoly theory does suffer a crucial weakness in this respect.

Two particular cases are, however, worthy of note. Firstly, an iso-elastic shift in demand at the old price implies that

$$x_\alpha + \{p - c'(x)\} \; x_{p\alpha} = 0\text{[1]}$$

Thus the numerator of equation (1.8) simplifies to

$$- \; x_p \cdot x_\alpha \cdot c''(x)$$

In this case, therefore, the direction of price change will be the same as the slope of marginal cost: rising if marginal cost rises and falling if marginal cost falls. Conversely, if marginal cost is constant, price rises if the demand shift is less than iso-elastic, and falls if it is more than iso-elastic. In Figure 1.5 we illustrate the intermediate case of an unchanged price with an iso-elastic demand shift and constant costs.

---

1. An iso-elastic demand shift implies that

$$\frac{\delta}{\delta\alpha}\left(\frac{p}{x} \, x_p\right) = 0$$

$$\therefore \; - \frac{x}{x_p} = - \frac{x_\alpha}{x_{p\alpha}}$$

By the first order conditions

$$p - c'(x) = - \frac{x}{x_p}$$

On substitution

$$p - c'(x) = - \frac{x_\alpha}{x_{p\alpha}}$$

$$\therefore \; x_\alpha + \{p - c'(x)\} \; x_{p\alpha} = 0$$

Figure 1.5
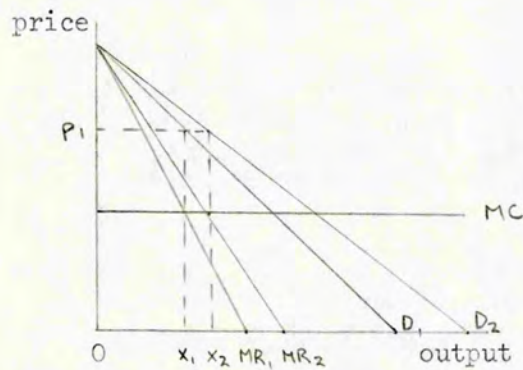
In contrast to an iso-elastic demand shift, a parallel demand shift would imply that

$$\{p - c'(x)\}.x_{p\alpha} = 0$$

so that the numerator of equation (1.8) becomes

$$x_{\alpha} - c''(x).x_{\alpha}.x_{p}$$

In this case, the rise in demand will raise price even when marginal costs are falling as long as the marginal cost curve is less steeply sloped than the demand curve. Again, we have drawn the intermediate case in Figure 1.6 where the parallel rise in demand leaves price unchanged because the marginal cost curve is parallel to the demand curves.

Figure 1.6
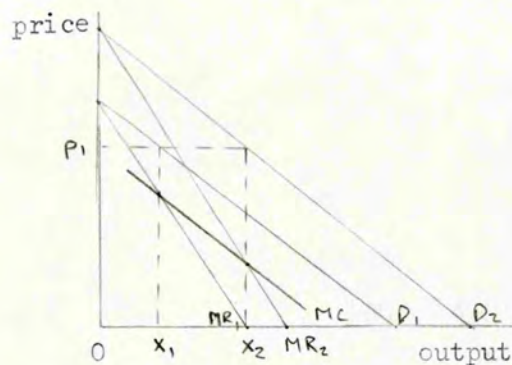
In the case of a parellel demand shift it is clear that only in industries with very sharply falling costs will a rise in demand cause price to fall.[1]

---

1. The case may occur, however, since the second order conditions only constrain the marginal cost curve to be less steeply sloped than the marginal revenue curve, so that it may be more steeply sloped than the demand curve.

It may be reasonable to take the two cases discussed above as limiting cases for a shift in demand.[1] The demand curve will shift iso-elastically if the demand curve of the new buyers is identical to that of existing buyers; whilst a parallel shift involves the addition of a completely inelastic demand curve. Hence, it might not be unreasonable to assume that the additional demand is somewhat less elastic than existing demand, causing a less than iso-elastic shift. If this is the case then the rise in demand will lead to a rise in price if marginal costs are constant or increasing, and also if they are decreasing, as long as sharply falling costs are not in evidence. There thus seems to be a presumption that price will rise, and we shall see below that both Edgeworth and Sraffa supported this conclusion.[2] We shall argue in chapter 10 that there is a need for further research on this problem of shifting demand under monopoly, but it is hoped that we have at least made a case here for suggesting that this problem of monopoly theory is not so formidable as at first sight it appears.

In considering the merits of monopoly analysis relative to perfect competition theory, we do not mean to imply that we believe that we can treat each industry as having but a single seller. Such an assertion is clearly grossly incorrect. A much better approximation might be that groups of producers sell related products so that the demand function of any single producer depends on his rivals' prices as well as his own. Thus, if there are n related products, the demand curve for producer 1 would be

$$x_1 = x_1(p_1 \ldots \ldots p_n) \qquad (1.9)$$

As is well known, in a problem of this sort it is necessary to make some assumption concerning "conjectural variation" terms in order to derive determinate results. We shall see in chapter 10, however, that on Cournot type assumptions this more general problem reduces to one which has many of the features of the analysis of perfect monopoly. In this context, we shall argue that the merits and weaknesses of the monopoly model are an important problem for the analysis of capitalist economies.

---

1. See Robinson, op. cit., pp. 70-75.

2. Marshall, however, thought that there was a presumption that a rise in demand would lower monopoly price. See chapter 9 below.

The concept of competition as has been noted by Stigler is "as pervasive and fundamental as any in the whole structure of classical and neoclassical economic theory".[1] This being so, there is a danger that a study of the history of competition (and monopoly!) theory might become a study of the whole of economic theory. In order to make my task manageable, therefore, I have restricted myself to a fairly narrow view of competition and monopoly as follows.

In the first place, we shall be concerned to examine the views of different writers in our period as to the theories of competition and monopoly. That is, we shall consider their attempts to explain economic reality via competitive or monopoly analysis rather than their attempts to describe economic reality as competitive or otherwise. Clearly, there is much to be learned from descriptive accounts of the capitalist environment from the point of view of economic history of the period. Whilst being of great interest, such accounts usually offer little analytical insight into the workings of the economy, and as a general rule will be ignored in what follows.

In the second place, and perhaps more controversially, this thesis does not concern itself with the ideological aspects of the ideas of competition and monopoly. Following Joseph Schumpeter's excellent discussion of ideology in economics[1], we may agree that certain writers in our period accepted the competitive theory of price determination for ideological reasons, i.e. for reasons coloured by the desire to see things as they would like them to be. Such motivations were presumably fairly common amongst the bulk of essentially conservative economists we shall meet in this thesis. But, as has been stressed by Schumpeter, such considerations of ideological influence are irrelevant as far as the truth or falsity of a particular piece of analysis is concerned. It is not logically admissable to condemn a piece of analysis by imputing an idological bias to its author. Awareness of the possibility of such a bias should make us doubly vigilant with respect to the consistency and appropriateness of the analysis, but in the end from the point of view of science (the point of view adopted in this thesis) the analysis must be evaluated as itself, and independently of its source.

---

1. Joseph A. Schumpeter, History of Economic Analysis (New York: Oxford University Press, 1954) pp. 34-43.

This limitation extends to the closely related issue of value judgements and welfare economics. As Schumpeter has noted,[1] value judgements often reveal a writer's ideology, but they are separate from that ideology. Nevertheless, ideological bias and value judgements often go together, and this is particularly the case with respect of competition and monopoly analysis. Throughout our period of study, writers constantly held the position that competition was good and monopoly was bad. Whilst, frequently, such judgements were no more than articles of faith, several writers towards the end of the period did attempt to base their judgements on explicit pieces of analysis. Such embryonic attempts at welfare economics are not given emphasis in thesis, partly for reasons of space and time limitation. In addition, however, it was felt that it was important to distinguish competition and monopoly as positive as opposed to normative theories of price. Too often, modern textbooks move quickly from a basic positive discussion of these models to their normative properties. In doing this, sight is often lost of the basic scientific task of evaluating a theory as an explanation of reality. In this thesis, we shall endeavour to concentrate on the positive theories of competition and monopoly in order to facilitate such an evaluation of these theories.

The third limitation we should mention is the restriction of our discussion to perfect competition and monopoly, to the exclusion of other models of price. Thus, models such as bilateral monopoly, price discrimination and oligopoly do not receive systematic attention in what follows. Again, reasons of space limitations, plus the desire not to turn this thesis into a compendium of alternative models, are behind this decision. However, it was felt in certain cases, notably the discussion of Cournot's work in chapter 5 and Sraffa's work in chapter 10, that such alternative models should be discussed in so far as they have bearing on these writers' ideas on competition and monopoly. In these cases, therefore, the writer has exercised his prerogative of bending his own rules, since, as will be made clear below, not to do so would involve important misrepresentation of the views of these writers.

_____

1. ibid., p. 37.

Chapter 2

Competition and Monopoly Prior to Adam Smith

The purpose of this chapter is to outline some of the ideas
and concepts of competition and monopoly current in the economic
literature prior to the publication of Adam Smith's Wealth of Nations
in 1776. For reasons of space a detailed discussion is not possible,
and I have endeavoured to give more weight to post-1700 work.
Section I discusses ideas of monopoly; while sections II-V deal
with competition; and section VI draws some conclusions. Analysis
of monopoly was negligible prior to 1776, and in section I
I have not stuck rigidly to my planned emphasis on 18th century work.
In the case of competition, section II reviews the development
of a number of important concepts by 1700, while sections III-V
review the work of three important 18th century writers on competition:
Cantillon, Turgot and Steuart.

I. Monopoly Theory[1]

The term, monopoly, differs from competition in that the latter came late to economic writing, whilst the former was from the beginning used in an economic sense.[2] Monopoly, and the equivalent words of other Western European countries, are adapted from the late Latin, monopolium, which in turn derives from the Greek, μονοπώλιον. formed on μονο (one) and πωλ-εῖν (to sell). Thus, literally, monopoly means one seller, and has been used to mean this since Aristotle's time.

The term has, however, been applied to a much wider range of economic situations than just the literal one seller. Indeed by 1700 it had been used in connection with a great number of restrictive practices, and different situations. In particular, it was widely used to cover the case of a few sellers. Sir Edwin Sandys supported this usage in the House of Commons in 1604:

"The name of monopoly, though taken originally for personal unity, yet is fitly extended to all improportionable paucity of the sellers in regard of the ware which is sold. If ten men had the only sale of all the horses in England, this were a monopoly.[3]

---

1. For a more detailed discussion of some of the points touched on in this section, see Raymond de Roover, 'Monopoly Theory Prior to Adam Smith: A Revision,' Quarterly Journal of Economics, 65 (November 1951), pp. 492-524.

2. Monopoly is of course used today outside of the economic context, e.g. a monopoly of knowledge, but this figurative use dates only from the 17th century. See The Oxford Dictionary.

3. Quoted in Alfred E. Bland, P.A. Brown and Richard H. Tawney, ed., English Economic History: Select Documents (London: Bell, 1914), p. 446.

This usage of _monopoly_ ignored the earlier suggestion by Sir Thomas More that _oligopoly_ be used to represent the case when sellers are few.[1] But it was widely adopted by Mercantilist writers, who also used monopoly to denote cases where entry into a trade was not free. Likewise, monopoly was extended to cover a whole series of situations, which are still today called monpolistic practices. For example, Althusius, or Johann Althaus (1557-1638), a German political theorist, lists nineteen forms of monopoly.[2] Similar comprehensive usage of the term can be found in Peri's work.[3]

This widened economic usage of the word, is largely explained by the emotional content which it developed. Monopoly was regarded as _bad_ from early days. It was outlawed by a number of Roman laws, and also the Codex. Scholastic thought condemned it as inconsistent with the principle of equality laid down by commutative justice; while Mercantilists argued that it infringed the natural right of every person to practise the trade of his choice. In England it was illegal in common law, and the laws of many European nations prohibited it. Inevitably this universal condemnation of monopoly in thought and law, meant that the word itself became a term of

---

1. Sir Thomas More, _Utopia_ (1516), ed. by Edward Surtz, and J.H. Dexter, Vol. 4 of the _Complete Works of St. Thomas More_ (New Haven; Yale University Press, 1965), pp. 68-9. This term, _oligopolium_ in the Latin original (1516), was omitted from the first English translation of 1551.

2. Johannes Althusius (Althaus), _Politica Methodice Digesta_, ed. Carl Joachim Friedrich, pp. 306-308, cited by de Roover, op.cit., pp. 513-4.

3. Giovanni Domerico Peri, _Il Negotiante_ (Venice, 1707), pp. 74-5, cited by de Roover,op cit.,p. 516.

opprobrium: it was "a word odious all the World over".[1] But once
a word has gained a negative (or positive) emotional value, people
endeavour to capitalise on this fact by applying it as widely as
possible. Hence it was used, particularly by attackers of
restrictive policies, to cover all kinds of restrictive practice.[2]

These semantic points, the widened use and the negative emotional
value of the term monopoly, are important factors which worked against
the analytical development of the concept before 1700. Indeed the
analytical progress of the concept was meagre, to say the least,
prior to Smith.[3] We shall glean some points from the pre-1700
literature, before moving on to a number of specific treatments of
monopoly.

Firstly, Aristotle's treatment of monopoly deserves mention for
its simplicity in contrast to the complexities we shall encounter
below. He relates how Thales the Milesian sets out to show that
philosophers can become rich if they set their minds to it.[4]

---

1. Anon., A Discourse consisting of Motives for Enlargement and
Freedome of Trade ... (1645), as quoted in William Cunningham, The
Growth of English Industry and Commerce, 6th ed., 2 vols. (Cambridge
University Press, 1921), Vol. 2   p. 231 n.2.

2. Defenders of particular restrictions, of course, tried, by adopting
a narrow literal definition of monopoly, to argue that the interests
they spoke for were not monopolies. See, for example, John Wheeler,
A Treatise of Commerce (1601), Facsimile Text Society, series 5, no.2
(New York: Columbia University Press, 1931).

3. We shall see in the next chapter that Smith failed to improve on
this state of affairs.

4. Aristotle, Politica, trans. by Benjamin Jowett, vol. 10 of The
Works of Aristotle, ed. W.D.Ross (Oxford: Clarendon Press, 1921),
I, 11.

Learning from the stars that the coming year would produce a bumper olive harvest, he hired all the olive presses in Chios and Miletus at a low price. When after the harvest the demand for presses was great, he was in a position to charge the price he chose, and consequently grow rich. Aristotle saw clearly the principle behind his story: Thales device for getting rich "is of universal application" and "is nothing but the creation of a monopoly". It is clear from this passage that Aristotle used the term, monopoly, literally.[1] He treated it as a familiar occurrence of real life, in particular "an art often practised by cities".[2] He clearly saw that when a man is the only seller of a good, he is able to choose the price he charges freely. But he did not go further than this and analyse the optimum price which the monopolist would charge. Such a solution had to wait for the work of Cournot.[3]

We shall pass quickly over the Scholastic Doctors, who approached monopoly, as other subjects, from an ethical viewpoint. They tended to give it a broad meaning, to cover all practices which prevented the attainment of the just price. More specifically, it was chastised for raising price above the just price; for restricting supply and so a nation's prosperity; and for involving exploitation.

---

1. Aristotle also relates how a man of Sicily gained a monopoly of iron: "he was the only seller", ibid., I, 11.

2. He indeed recommends it as a means by which a city may raise revenue.

3. See below, chapter V.

In his discussion of early monopoly theory, de Roover was particularly concerned to rehabilitate Scholastic monopoly theory.[1] Nevertheless, on his own evidence it is clear that whilst the Scholastic doctors had much to say on monopoly doctrine, their analytical contribution was negligible. Rather than go over a subject which has received excellent treatment at the hands of de Roover, the reader is recommended to verify for himself from de Roover's essay that as far as monopoly theory was concerned there was very little in the Scholastic literature.[2]

Moving on to the Mercantilist literature, we find a voluminous discussion of monopoly. This largely reflects the prevailing economic trends, of which we will mention three. Firstly, at the local level of agriculture and production, monopoly, in the sense of the restriction of the free entry of individuals into a trade, was still perpetrated by the medieval craft gild system. More important, however, in terms of the quantity of literature devoted to it, was the rise of large scale enterprise from the 14th century in Italy, the 15th century in Germany, and the 16th century in England. This tended to be concentrated in the commercial and financial spheres, rather than in manufacturing prior to 1776.[3] Such big commercial

---

1. R. de Roover, op. cit., passim.

2. Whilst we have purposely excluded the Scholastic discussion of competition from our study, we may hazard a guess that explicit analysis of this case was also negligible. See, however, Joseph A. Schumpeter, History of Economic Analysis, Part 2, chapter 2.

3. Most writers up to the middle of the 19th century tended to treat manufacture as typically being carried out on a small scale.

enterprises as the East India Company, or the Merchant Adventurers, could not fail to attract the attention, and alarm, of economic writers, and, particularly in England, a fierce popular debate was carried on over these "monopolies". Thirdly, an important factor, again in England, was the large number of monopolies (in the strict literal sense), created by royal decree in the reigns of Elizabeth I and James I.[1] These legal monopolies were the subject of intense Parliamentary and popular debate, which did not die down till the 1623/4 Statute of Monopolies made many of them void.[2] Nevertheless, they had evoked such a strong feeling in the country, that in the English mind for many years, "monopolies" were to be associated with the royal prerogative.[3]

The popular discussion of monopoly in the 16th and 17th centuries, like its counterpart today, was interminable, but not of great theoretical interest. An idea of the arguments used can be gleaned from the report on the debate in Parliament in 1604,[4] which leans on the anti-monopoly side, and from Wheeler's treatise of 1601, which is on the defensive side.[5] Nothing would be gained by recounting these arguments. However, it is possible to distinguish two trains of thought concerned with the structure of trades, which are of interest. These may be loosely associated with the distinction between attackers and defenders in the monopoly debate.

---

1 . A list of such monopolies granted by Elizabeth can be found in Bland, Brown and Tawney, op.cit., pp. 440-3. It reveals a very wide range of monopoly rights, typically given to one person for a specific number of years.

2 . The statute is reprinted in Bland, Brown and Tawney, ibid., pp. 465-8. A further declaration was passed in 1639, ibid., pp. 472-5.

3 . Adam Smith believed that monopoly was the result of government regulation, although he may have been following Pufendorf here, rather than a specifically English line of thought. See chapter 3, section 3.

4 . Reprinted in Bland, Brown and Tawney, op.cit., pp. 443-53.

5 . John Wheeler, op.cit., part 2.

On the one hand, was the idea that the ideal system was one in which all trades were regulated, so that everybody earned a comfortable subsistence, neither more nor less. This idea was an integral part of medieval thought, and the basis of the gild system. If this view were adopted, then both monopoly and freedom of trade were evils of a well-conducted society. Becher, for example, put this view forward.[1] On the one hand monopolium was an evil since it robbed many people of their proper subsistence, whilst the monopolist received too much profit. On the other hand, polypolium was an evil since it meant that a great number of people would receive less than their proper subsistence, in the overcrowded trade. The ideal was a happy medium, a regulated trade. The idea that a governed trade was conducive to stability and prosperity, was used by many of the defenders of the trading companies. Whilst denying their company was a monopoly on the one hand, on the other, they supported its restrictions and regulations in the name of order. Misselden, representing the interests of the Merchant Adventurers, was particularly explicit in distinguishing a trade that was monopolised from one which was governed.[2] The same idea continues today in business circles where the fear of "cut-throat competition" is used as an argument for restriction.

On the other hand, attackers of "monopoly" tended to give the term a broad and practical meaning, and to include within it all situations where there was restraint on freedom of trade. It was argued that a fundamental principle of law and nature was the freedom of a man to practise the trade of his choice.[3] This is

---

1. Johann Joachim Becher, Politische Discurs ... (1668), cited by Eli F. Heckscher, Mercantilism, trans. by Mendel Shapiro, 2 Vols. (London: Allen and Unwin, 1935), Vol. 1: p. 271.

2. Edward Misselden, Free Trade or the Meanes to make Trade Florish, 2nd ed. (London: n.p., 1622), pp. 53-87.

3. This argument rested on a misinterpretation of the medieval concept of liberty, which implied rather a set of privileges and duties for specified groups, than a set of rights applicable to all.

the first argument listed in favour of the enlargement of trade,
in the synopsis given of the Commons' debate on free trade of 1604:

"Natural Right - All free subjects are born inheritable ... to
the free exercise of their industry in those trades whereto they
apply themselves and whereby they are to live... it is against the
natural right and liberty of the subjects of England to restrain it
(merchandise) into the hands of some few".[1]

Supporters of freedom of trade classed all restraints on trade as
monopolies, and necessarily evil. As time progressed, and medieval
society gave way to a capitalist one, this view came to be dominant
in the public mind. Adam Smith was to do little more than support
a strengthening position when he made it the central principle of
his Wealth of Nations in 1776.

One result of this latter train of thought which is important
for us is the association of the term, monopoly, with conditions of
entry into a trade. Whereas freedom of trade implied no entry
restrictions, monopoly implied some restrictions on entry, the actual
strength of these being left vague. This categorization of the problem
tended to take the emphasis away from the single seller criterion of
monopoly.[2] Even those writers who used the single seller definition
of monopoly, however, failed to make any analytical advance before
1700.[3] The best of the pre-1700 ideas are probably summed up in
Misselden's definition of monopoly:-

---

1. Instructions touching the Bill for Free Trade (1604), reprinted
in Bland, Brown and Tawney, op.cit., pp. 443-4.

2. Which is not to say that it did not have operational advantages
at the time.

3. See, for example, Wheeler, op.cit., and Sir William Petty,
Economic Writings, ed. by Charles Henry Hull, 2 vols, Reprints of
Economic Classics (New York: Augustus M. Kelley, 1963), vol. I:
pp. 74-7.

"Monopoly is a kinde of commerce, in buying, selling, changing
or bartering usurped by a few and sometimes but by one person, and
forestalled from all others, to the gaine of the monopolist and the
detriment of other men. The parts then of a monopoly are twaine: the
restraint of the liberty of commerce to some one or a few; and the
setting of the price at the pleasure of the monopolian to his
private benefit and the prejudice of the publique. Upon which two
hinges every monopoly turneth."[1]

This statement expresses the best of pre-1700 state of thought on
monopoly with great clarity, whilst at the same time showing little
analytical advance on Aristotle.

Before moving on to 18th century discussion of monopoly, we
shall discuss briefly the work of Pufendorf, not because of any
outstanding contribution he made, but rather because it seems likely
that his work had some influence on Smith's views on monopoly.[2]
Pufendorf starts from the position that "the name itself is odious",
injustice being synonymous with the term monopoly.[3] He then goes
on to link the word with government patronage:-

---

1. Misselden, op. cit., p. 57. The first sentence is a direct
translation of Althusius.

2. Samuel von Pufendorf, De Jure Naturae et Gentium (1672), 2 vols.,
The Classics of International Law (New York: Oceana Publications
Inc., 1934), Vol. 2: pp. 738-40.

3. Hugo Grotius, De Jure Belli ac Pacis (1625), trans. by Francis W.
Kelsey et al, 3 vols., The Classics of International Law (New York:
Oceana Publications Inc., 1964), Vol. 2: p. 353, however, argues
that "not all monopolies are contrary to the law of nature". He
goes on to say that only monopolies which set an unfair price are
unjust, and so should be penalised in law.

"a monopoly means that if one man has secured for himself alone
the power to sell certain goods, no others may have the same powers...
But a monopoly in the proper sense of the term cannot be established
by private citizens, because it has the force of a privilege".

No private person has the right to forbid others to enter a trade,
so that for a monopoly to exist, it strictly must be under government
patronage. From this line of argument it would be logical to declare
all monopolies due to patronage illegal. Pufendorf, however,
showing himself to be influenced by the arguments of the merchant
companies, becomes a pragmatist at this point, and argues that in
certain cases such monopolies may be desirable, although they should
be restricted to the trading of luxuries with remote places. [1]
Turning to trade carried on without government interference, Pufendorf
argues that private persons can "only carry on spurious monopolies...
maintained by clandestine frauds and conspiracies". Such practices are
indeed unjust, and should be punishable in law. But the existence of
a single seller in a trade is not evidence of a monopoly, and should
not be condemned, unless he has actively worked to restrict the freedom
of entry of others to that trade -

"a man who is the only one to import certain merchandise from
some remote region does not exercise a monopoly, provided no other men
are forbidden to secure the same merchandise from that place".

Pufendorf was a jurist and as such was concerned to distinguish
justice from injustice. In his attempt to do this with regard to
monopoly, he tried to expound a set of principles which would at the
same time be consistent with classical teaching, popular prejudice,
and the vagaries of the law. The result, not surprisingly, of such

---

1. The ad hoc arguments he uses in favour of trading companies include:
the need to insure against risk; economies of large scale operation;
and the relative advantage of a large company as a tax source.

an attempt, was a complex and not very consistent argument, which contrasts markedly with that of Aristotle. It would probably not be worth mentioning it, but for the influence Pufendorf's book probably had on Smith. For this reason we may distinguish certain features of Pufendorf's analysis: namely, his single seller definition; his association of monopoly with government; and his acceptance of the mercantilist idea that monopoly refers to restraint of the freedom of persons to enter a trade. These ideas we shall meet again in Smith. But, as to analysis of monopoly, in a positive sense, there is none.

Treatment of monopoly by economic writers between 1700 and 1776 was sparse indeed. However, Postlethwayt in his Universal Dictionary of Trade and Commerce has an article on it.[1] This article is mainly concerned with a practical description of "monopolies" in England, and the state of the law to deal with them. However, he does give a definition, or rather two definitions, of monopoly:

"Monopolies are allowances of the King by grant, or otherwise, for the sole dealing in any thing, by which others are restrained from any freedom they had before. Though a monopoly may be more truly defined a kind of commerce usurped by a few, and sometimes but by one person, to his or their private gain, and to the detriment of others".[2]

The first definition is a typical 17th century mercantilist one, linking monopoly to royal patronage and restraint of trade; while the second gets closer to the older idea of a single seller, although the

---

1. Malachy Postlethwayt, The Universal Dictionary of Trade and Commerce, Translated from the French of the celebrated Monsieur Savary... with large additions, 2 vols. (London: J. & P. Knapton, 1751-5), Vol. II, pp. 290-2. Adam Smith possessed a copy of the third edition of this work, published in 1766.

2. This definition has been copied out word for word from Gerard de Malynes, Consuetudo vel Lex Mercatoria, or, the Ancient Law Merchant (London: n. p., 1622).

possibility of a few sellers is also included. After giving his
definitions, Postlethwayt makes no further use of them, however, in
the article. But he does make two points, the second of which is
of some interest to us. Firstly, he classes monopolies as reasonable,
unreasonable or indifferent, depending on whether the commodity
concerned is a luxury, a necessity or in between. Secondly, in a
discussion of the East India Company, he says:

"It is not the interest of the East-India company to increase
the quantities of the woollens they export, but rather to contract
them... for at all markets where there are any demands for goods,
the smallness of the quantity naturally enhances the price;"

He goes on to argue that if the same profit can be earned by selling
5,000 cloths or 10,000, the lesser quantity will be preferred as
involving less capital and risk. Although he does not develop these
thoughts, other than to argue that they mean production, employment
and prosperity are lower under monopoly, and although they are just
practical observations, no doubt also made by others,[1] they are
nonetheless suggestive. Postlethwayt fails to pose the crucial
question of how far sales should be contracted in the best interests
of the company. And even if it had occurred to him, it is unlikely
that he could have given a satisfactory answer.

A slightly better performance can be attributed to Sir James
Steuart. In his model of double competition, discussed in section V
below, he assumes a continuous oscillation of price due to the
vibration of competition from side to side of the contract.[2] When
competition is on the side of demand, prices rise; but at some price
peak "competition changes sides, and takes place among the sellers",

---

1. Postlethwayt was a notorious plagiarist.

2. Sir James Steuart, An Inquiry into the Principles of Political
Oeconomy (1766), edited and with an introduction by Andrew S. Skinner,
2 vols. (Edinburgh: Oliver and Boyd, 1966) Volume 1: pp. 172-8.

and price falls to a trough, before it again rises. But if the sellers
are all of one interest, the high price will not induce them to
compete; what then will happen to it? Steuart gives the answer to
this question in his discussion of the openings of trade with a new
country by traders "all in one interest".[1] A company is free to set
its own price, and it will do this according to the state of demand.[2]
Steuart delineates three possible price policies the company may
follow, depending on the state of demand.[3] The third policy which
is "perhaps the most familiar", is one of price discrimination.
The monopolist encourages as many as possible to buy at a high
price, before bringing price down by degrees "in proportion as demand
sinks". "By this operation, the traders will profit as much as
possible, and sell off as much of their goods, as the profits will
permit." The other two monopoly policies are more important to us,
however, since they involve only a single price. The first policy,
is to maximise profits by maintaining the high price established by
the competition of the natives. In discussion of this policy,
Steuart has a very inadequate conception of demand. He says "no
check can be put on their raising their prices, as long as the
prices they demand are complied with". This suggests that Steuart
is here assuming a very inelastic demand. On this interpretation,
he is on the right track towards solving the price determination
problem under monopoly. The interpretation is further backed up
by his association of the second policy, lowering price, with an
elastic demand. If when price is lowered the door is opened to a

---

1. Steuart, ibid., pp. 166-71. See also ibid., pp. 161-5 and pp.
388 ff. Steuart does not use the term monopoly in these passages,
but it is clear that this is what his analysis is of.

2. Companies "are masters of their price, and can regulate their
profits by the 'height' of demand; whereas they ought to keep them
constantly proportioned to the real value of the merchandize".
Steuart, ibid., p.390.

3. Steuart, ibid., pp. 170-1.

great demand, then profits per unit sold may be less, but overall, "the profits may be greater". Steuart here clearly sees that the nature of the demand function affects the profit-maximising price of a monopolist; and further that the optimal price will be lower, the more elastic demand.[1] This is, at least, some advance, if not a great one, compared to the barren analytical picture before Smith.

Other writers in the period 1700-76 provided nothing of interest for us. Some, like Galiani, who treated monopoly as essentially the same problem as the sale of a unique object, only added more confusion to an already confused subject.[2] Writers continued to use the term loosely, and typically in a derogatory way, but offered little analysis. And indeed, as the great debates over monopolies in England in the first half of the 17th century subsided, with the outlawing of many of the more notorious ones, less attention was given to the monopoly problem in the literature. Writers in the 18th century began to turn their attention to the fast changing sectors of the economy, agriculture and manufacture, where elements of monopoly were less in evidence. The study of these sectors was to lead to the development of new tools of analysis.

---

1. Steuart is, of course, neglecting complications introduced by taking costs into the picture.

2. Ferdinando Galiani, Della Moneta (1751), translated and reprinted in Arthur E. Monroe, ed., Early Economic Thought: Seclections from Economic Literature Prior to Adam Smith (Cambridge: Harvard University Press, 1951), pp. 279-99.

II. Elements of Competitive Theory in 1700

18th century writers on price determination were not without foundations upon which to build. By 1700 a number of ideas and concepts had been developed on price by various writers. As has been stressed by Bowley, these ideas on price were generally of secondary importance to the writers concerned.[1] In this section we shall look at three important ideas which were to have significance in the 18th century for competitive theory. Before we do this, however, it is necessary to make one or two general points.

In the first place, it should be noted that the actual term competition, or its French equivalent concurrence, had not appeared in the economic literature by 1700. The term, unlike monopoly, was not at first a purely economic one, but was adopted by economics from popular usage, where it was used to mean rivalry.[2] The first use of the term in an economic context appears to have been made in France. In his Spirit of the Laws (1748), Montesquieu argues in favour of general international trade that

"it is competition (concurrence) which sets a just value on merchandise, and establishes the relation between them".[3]

---

1. Marian Bowley, Studies in the History of Economic Theory before 1870 (London: Macmillan, 1973), chapter 2.

2. See Stigler, op. cit., p. 1.
   Even in common usage it appears to have been adopted only in the 17th century. The Oxford Dictionary dates its first written use as 1608.

3. Baron de Montesquieu, The Spirit of the Laws, trans. by Thomas Nugent (New York: Hafner Publishing Company, 1949), p. 322.

The term does not occur again in the book. However, it is used more
frequently by the Physiocrats, and from them it was taken over by
subsequent economists.[1]

Prior to the 18th century, economic writing used the expression
freedom of trade, or free trade as the opposite of monopoly. This
phrase stood for the policy of opening trade to all, whether it be
internal or external, in contrast to restraining trade. We have
already referred to the Mercantilist debate on free trade and monopoly.
This debate provides nothing of interest for competitive theory
directly. But it does provide a background against which theoretical
development took place. As we move to the 18th century, the idea of
freedom of trade gained ascendency in the popular and philosophical
debate. Smith's Wealth of Nations consolidated this trend, and formed
the basis of the 19th century doctrine of free trade and laissez-
faire. In the process, the term competition came to represent this
policy, and as such to gain positive emotive content as opposed to
the negative content of monopoly. This development has been a major
determinant of the theoretical developments in this field, and is so
even today.

Turning to specific elements of competitive theory developed
by 1700, we shall first consider what Marian Bowley has called the use/
scarcity formulation of the determination of value.

"It had been a commonplace since antiquity that any good having
exchange value must be capable of satisfying a want and be limited
in supply in relation to that want - usefulness or utility on the one
hand, scarcity on the other."[2]

---

1.   In English, Steuart appears to have been the first to use the term
in an economic sense; see section V below. For various examples of
Physiocratic usage see Ronald L. Meek, The Economics of Physiocracy:
essays and translations (London: Allen and Unwin, 1962).

2.   Bowley, op. cit., p. 65.

Bowley cites Plato as an early example of this formulation:-

"Only what is rare is valuable, and water, which is the best of all things... is also the cheapest."[1]

The use-value of an article does not determine its exchange value; its scarcity must also be taken into account. This observation can be found in most of the works which dealt with exchange value from Plato onwards. Malynes puts it thus:-

"things particularly are also deare or good cheape, according to the plentie or scarcitie of the things themselves, or the use of them."[2]

Thus the use/scarcity formulation was a commonplace solution of the paradox of value by 1700.

It is important, however, to note that this formulation was but a rudimentary beginning to demand and supply analysis, which was to be developed much later. Indeed by 1700 the conjunction of the terms supply and demand had not appeared in the literature even. Two developments in the formulation by 1700 deserve attention here. Firstly, Nicholas Barbon may be particularly noted for using the use/scarcity formulation of exchange value to assert the transitory nature of price.[3] Barbon was concerned to show that gold and silver, like all other commodities, do not possess intrinsic value. In the process of doing this he devotes a whole section of his Discourse on Trade (1690) to the transitory nature of price -

---

1. Plato, Euthydemus, (New York: Arno Press, 1973).

2. Malynes, Canker of England's Common Wealth, quoted by Bowley, op. cit., pp. 66-7.

3. Bowley, op. cit., pp. 73-5 also stresses this point.

"The Price of Wares is the present Value; And ariseth by Computing the occasions or use for them, with the Quantity to serve that Occasion...

There is no fixt Price or Value of any thing for the Wares of Trades; The Animals, and Vegetables of the Earth, depend on the Influence of Heaven, which sometimes causes Murrains, Dearth, Famine, and sometimes Years of great Plenty; therefore, the Value of things must accordingly Alter. Besides, the Use of most things being to supply the Wants of the Mind, and not the Necessitys of the Body; and those Wants, most of them proceeding from imagination, the Mind Changeth; the things grow out of Use, and so lose their Value...

Nothing in it self hath a certain Value; One thing is as much worth as another: and it is time, and place, that give a difference to the Value of all things."[1]

Here we see the rudiments of comparative static analysis of market price. Market price varies as use on the one hand, and scarcity on the other, vary. Barbon thus made an important contribution to the development of the use/scarcity formulation of price.

Barbon also made a semantic contribution by adopting the terms use and quantity in his explanation of price determination. John Locke, also writing at the end of the 17th century, used the term quantity as well. He, however, couples this term with the term vent:-

---

1.   Nicholas Barbon, A Discourse of Trade (1690) (Baltimore: John Hopkins Press, 1934), pp. 15-18. see also Nicholas Barbon, A Discourse concerning coining the new money lighter (1696) (Farnborough: Gregg International, 1971), for further emphasis of this point.

"that which regulates the price... is nothing else but their (the articles) quantity in proportion to their vent."[1]

This statement is incorrect if by _vent_ Locke meant _sales_. This point was quickly noted by John Law, who argued

"the Prices of Goods are not according to the Quantity in Proportion to the Vent, but in Proportion to the Demand".[2]

In refuting Locke, Law coupled the terms _quantity_ and _demand_ in explaining price:-

"Goods have a Value from the Uses they are applied to; And their Value is Greater or Lesser, not so much from their more or less valuable, or necessary Uses: As from the greater or lesser Quantity of them in porportion to the Demand for them. _Example_. Water is of great use, yet of little Value; Because the Quantity of Water is much greater than the Demand for it. Diamonds are of little use, yet of great Value, because the Demand for Diamonds is much greater, than the Quantity of them."[3]

---

1. John Locke, _Some considerations of the consequences of the lowering of interest and raising the value of money_ (1691), in vol. 4 of _The Works of John Locke_, 12th ed. (London: n.p., 1824), pp. 35-6.

2. John Law, _Money and trade considered, with a proposal for supplying the nation with money_. (1705) (New York: Augustus M. Kelley, 1966), p. 5.

3. Law, ibid., p. 4.

Thus by the start of the 18th century some substantive and semantic advance had been made in explaining price determination. The advance, however, was not great.

Our second point concerns the treatment of costs in the analysis of price. Mercantilist writers were primarily concerned with the determination of market price, and had little to say about the relation of market price to cost. Barbon, however, does make the point that the market price must cover costs for losses to be avoided. He distinguishes the costs of the merchant and the costs of the artificer. The costs of the merchant consist of "prime cost, charges and interest." The costs of the artificer are

"the Cost of the Materials, with the time of working them; the Price of Time... (being) according to the Value of the Art, and the Skill of the Artist".[1]

These respective costs are important

"for if the Price of their Wares, so alter by Plenty, or by Change of the Use, that they do not pay the Merchant Interest, nor the Artificer for his Time, they both reckon they lose by their Trade".[2]

Barbon intimates a deeper understanding of the relation of cost to price, when he suggests that cost may be used as an approximate measure of value, but he retreats at once to the position that "the Market is the best Judge of Value". Thus we are left with only a vague notion of the relation of cost and price in his work.

We must turn to another school of thinkers for a better discussion of market price and cost. The Scholastic Doctors concerned as they were with the Just Price, inevitably considered the question of the relation of costs to this price. Later Schoolmen held that account must be taken of utility, scarcity and cost in estimating the Just Price. Closely linked to this line of approach were the 17th century

---

1. Barbon, _Discourse of Trade_, p. 16.

2. Barbon, ibid., p. 16.

Philosophers of Natural Law. Of these, the most important for our purposes is Samuel von Pufendorf, and we shall confine ourselves to his discussion of market price and cost.[1]

Pufendorf starts his discussion by distinguishing the legal price, set by law, from the "common or natural price", which is fixed by the relation of its scarcity and the desire for it. The latter price, unlike the former, has some latitude for variation although "no general definition can be made so accurate as to establish the limits of this latitude".[2] At the same time, however, Pufendorf suggests that the common or natural price is the price which just covers cost. It is set "by the general valuation and judgement of men... who are sufficiently acquainted with both the merchandise and the market".[3] The well-informed merchants tend to establish a price which just covers costs

"merchants can include in their estimation the time they have spent, the plans they have formed, and the troubles they have met in acquiring, preserving, or distributing their merchandise, as well as all necessary expenses for the labour of their servants. And it would surely be inhuman, and likely to destroy the industry of men, to try to allow a man for his business, or any other sort of occupation, no more profit than barely permits him to meet his necessities by frugality and hardships".[4]

The merchants' efforts tend to set the cost price. However, "it is also well known how subject a market is to sudden and frequent changes" and these cause price variations. Scarcity of buyers causes price to fall, while scarcity of goods causes price to rise.

1.. Pufendorf, De jure naturae (1672), Book V, chapter 1.

2.. Pufendorf, ibid., p. 687.

3. Pufendorf, ibid., pp. 686-7.

4.. Pufendorf, ibid., p. 688.

Pufendorf's discussion of the relation of market price and cost
is not completely formulated. Although he strongly suggests in
examples that he regards price variations from cost as aberrations
due to particular circumstances, he nowhere explicitly says this.
Nor does he explicitly explain the mechanism by which the common or
natural price tends to just cover costs. Nevertheless, his work
contains the seeds of, using Smith's terms, the market price/natural
price distinction. This conceptual distinction, therefore, was at
least in embryo form in the literature by 1700. And associated with
it, due to its historical development, was the idea that the common
or natural price was a just price. Despite the embryonic nature of these
ideas, it is easy to see with hindsight the seeds of Smith's analytic
structure in Pufendorf's work and we may surmise that this work was
at least one of the sources of his competitive theory.

The third important idea which can be discerned in the pre-1700
literature is that the level of the market price is related to the
number of buyers and sellers in the market. The more buyers there
are relative to sellers, the higher the price; and vice versa. This
idea appears to have been accepted by most 17th century economic
thinkers. It was at the centre of the Mercantilist debate on monopoly
and freedom of trade. Becher,[1] for example, argues that free trade
(polypolium) in the labour market brings forth too many craftsmen, in
the sense that it induces increased rivalry to the advantage of
merchants and dealers, and so leads to the impoverishment of the
craftsmen. The more traders on one side of the market, the more is
their rivalry, and the greater the advantage to the other side.
He condemned freedom of trade, since by opening both sides of the
market to all, it impoverished both sides.

Pufendorf half integrates the idea that the number of traders
is important with the use/scarcity formulation of price determination.

---

1. See Heckscher, Mercantilism, Vol. I, p. 271.

"For a scarcity of purchasers and money... with an abundance of commodities decreases the price... On the other hand plenty of buyers and a scarcity of goods increase the price".[1]

Locke put the idea succinctly:

"All things, that are bought and sold, raise and fall their price, in proportion as there are more buyers or sellers. Where there are a great many sellers to a few buyers,... the thing to be sold will be cheap. On the other side, turn the tables, and raise up a great many buyers for a few sellers, and the same thing will immediately grow dear".[2]

Locke clearly regarded this explanation as equivalent to his quantity/vent formulation of market price determination. The idea that the number of buyers relative to sellers determines price is a simple one derived from common observation. It was to remain important in Smithian and classical developments of competition theory.

We shall now look in some detail at the work of three important contributors to competitive theory in the 18th century.

---

1.   Pufendorf, op.cit., p. 688.

2.   Locke, op.cit., p. 39.

III. Richard Cantillon

"Mr. Locke... like all the English writers on this subject, has looked only to Market Prices."[1]

The first 18th century predecessor of Adam Smith of interest to us is Richard Cantillon, a French banker of Irish extraction. He wrote his important work, Essai sur la nature du commerce en general, in the early 1730s, although it was only (posthumously) published in French in 1755.[2] The Essai contains a number of features related to competitive theory, which are also to be found in Smith's Wealth of Nations. This is particularly the case with the elements of what Adam Smith called the theory of natural price. Cantillon's work is less completely formulated than Smith's, but it seems likely that it had some influence on the ideas in the Wealth of Nations.[3]

Cantillon's Essai, like Smith's Wealth of Nations, is a prime example of the fact that early writers made no attempt to build a consistent model from which to derive their results. The Essai provides a wealth of real-life insight into the phenomenon of price determination, but does not attempt to bind this observation into a consistent whole. Consider the following, typical, loose description:-

"The Butcher keeps up his Price according to the number of Buyers he sees; the Buyers, on their side, offer less according as they think the Butcher will have less sale: the price set by some is usually followed by others. Some are more clever in puffing up their wares, others in running them down. Though this method of fixing Market prices has no exact or geometrical foundation, since

---

1.   Cantillon, Essai sur la nature du commerce en general... ed. with an English translation by Henry Higgs (London: Macmillan, 1931), p. 117.
2.   For further biographical details see the articles by W.S. Jevons and H. Higgs included in the Higgs edition of the Essai.
3.   Smith possessed a copy of the Essai, and indeed mentions Cantillon by name, (Wealth of Nations, p. 70), although in the context of computing the subsistence wage.

it often depends on the eagerness or easy temperament of a few Buyers or Sellers, it does not seem that it could be done in any more convenient way."[1]

Such a description is realistic, rather than analytical. It might be argued that it described a competitive situation, but this is only plausible by default, i.e. it does not describe a monopoly situation. Cantillon, like Smith, was only describing reality, and not constructing a model to underpin his theorems. Hence it would be incorrect to say that Cantillon was concerned with perfect competition as far as his descriptions of the market are concerned.[2]

Since Cantillon did not explicitly build a model, it is not surprising that he regarded his analysis as applicable to all sorts of market situation. Thus, in the quotation above, he describes a situation of price leadership by a few traders, or again, he suggests in a number of places that competition need not be only in price

"(Entrepreneurs) can never know... how long their customers will buy of them since their rivals will try all sorts of means to attract customers from them."[3]

Of particular interest is the fact that Cantillon regarded his analysis as applicable regardless of the number of traders. Whether there is one seller or twenty, Cantillon did not see a need to differentiate his theory. The only consequence of there being fewer sellers as opposed to more is that price will be higher. This is so even if the number of sellers be reduced to one:-

"Supposing two Tailors make all the cloaths of a village...

---

1. Cantillon, op.cit., p. 119.

2. Just as like descriptions of real-life price determination today do not describe perfect competition.

3. ibid., p. 51. See also p. 21.

If one dies, the other finding himself more pressed with work will
be able to raise the price of his labour,... till the Villagers find
it to their advantage to have their cloaths made in another Village,
Town, or City losing the time spent in going or returning, or till
some other Tailor comes to live in their Village and to share in the
business of it."[1]

Conversely, an increase in the number of sellers, reduces the sales and
revenue of each

"But if four Tailors are enough to make all the cloaths for a
Town and a fifth arrives he may attract some custom at the expense
of the other four; so if the work is divided between the five Tailors
neither of them will have enough employment, and each one will live
more poorly."[2]

This is the simple view of the relation of price to the number of traders
which we have already encountered in the preceding section. For the
present we only use it to show that Cantillon, (and Smith also),
did not think that the actual number of traders in a market might
make a qualitative difference to his price theory.[3]

Enough has been said of Cantillon's market descriptions. We
shall now examine his theoretical contributions, and in particular
his contributions to the analysis of cost-price. These fall into two
categories, which we shall take in turn: his analysis of intrinsic
value, and his analysis of resource allocation. Both elements are
important as precursors of Smith's natural price analysis, although
we shall argue that Cantillon failed himself to integrate these
elements into a single whole.

---

1. ibid.,p.21.

2. ibid., p. 25. Cantillon does not explicitly state that price will
fall in this case though he no doubt believed it would.

3. For Augustin Cournot, however, writing a century later, it was
the primary consideration. See chapter V below.

Cantillon's discussion of the concept <u>intrinsic value</u> occurs in Part one, chapter ten of the <u>Essai</u>. Following Petty, Cantillon believed that there were only two factors of production: land and labour.

"The Land is the Source or Matter from whence all Wealth is produced. The Labour of men is the Form which produces it: and Wealth in itself is nothing but the Maintenance, Conveniencies, and Super-fluities of Life."[1]

Commodities are produced using land and labour and the <u>intrinsic value</u> of a commodity is defined by Cantillon as the money measure of the physical inputs used in its production:-

"the Price or intrinsic value of a thing is the measure of the quantity of Land and of Labour entering into its production, having regard to the fertility or produce of the Land and to the quality of the Labour."[2]

We are not concerned here with Cantillon's attempts to make this conception numerically operative. Rather we shall assume that such a conception is useful and proceed from there. Given it, Cantillon argues that

"If two Acres of Land are of equal goodness, one will feed as many Sheep and produce as much Wool as the other, supposing the Labour to be the same, and the Wool produced by one Acre will sell at the same Price as that produced by the other."[3]

However, differences in physical inputs will give rise to different prices or intrinsic values

"If the Wool of the one acre is made into a suit of coarse

1. ibid., p. 3.

2. ibid., p. 29. A similar definition makes up the chapter heading (ibid., p. 27).

3. ibid., p. 27.

Cloth and the Wool of the other into a suit of fine Cloth, as the
latter will require more work and dearer workmanship it will be
sometimes ten times dearer, though both contain the same quantity
and quality of Wool."[1]

The above passages suggest that Cantillon assumed that goods
always exchange at their price or intrinsic value. This is not the
case, however. He also refers to price in the sense of actual market
price and we shall reserve this usage for the term. Market price is
fixed according to the usual use/scarcity formulation:-

"The Villagers come to Town on Market-Days to sell their produce
and to buy the things they need. Prices are fixed by the proportion
between the produce exposed for sale and the money offered for it."[2]

This price need not coincide with intrinsic value. On the one hand,
Cantillon argues that the market price diverges from intrinsic
value because of "the Humours and Fancies of men". If a man sells his
garden

"possibly no one will give him half the expense he has incurred.
It is also possible that if several persons desire it he may be
given double the intrinsic value, that is twice the value of the
Land and the expense he has incurred".[3]

---

1. ibid., p. 27.

2. ibid., p. 13.

3. ibid., p. 29.

On the other hand, variations in supply also cause divergences of price and intrinsic value

"If the Farmers in a State sow more corn than usual, much more than is needed for the year's consumption, the real and intrinsic value of the corn will correspond to the Land and Labour which enter into its production; but as there is too great an abundance of it and there are more sellers than buyers the Market Price of the Corn will necessarily fall below the intrinsic price or Value. If, on the contrary, the Farmers sow less corn than is needed for consumption there will be more buyers than sellers and the Market Price of corn will rise above its intrinsic value".[1]

Market prices are pictured as continually fluctuating, whilst intrinsic values are taken as fixed

"There is never a variation in intrinsic values, but the impossibility of proportioning the production of merchandise and produce in a state to their consumption causes a daily variation, and a perpetual ebb and flow in Market Prices."[2]

Nevertheless, Cantillon concludes that when situations are stable, market price and intrinsic value tend to coincide:-

"However, in well organised Societies the Market Prices of articles whose consumption is tolerably constant and uniform do not vary much from the intrinsic value; and when there are no years of too scanty or too abundant production the Magistrates of the City are able to fix the Market Prices of many things, like bread and meat, without any one having cause to complain."[3]

---

1. ibid., pp. 29-31.

2. ibid., p. 31.

3. ibid., p. 31. A similar assertion about the coincidence of market price and intrinsic value "in general" appears on p. 119.

It was this coincidence of market price and intrinsic value under
stable conditions which was the important result for Cantillon, for
it allowed him to proceed as if price and intrinsic value were the
same thing.

We shall make two points concerning Cantillon's analysis vis a vis
that of Adam Smith. Firstly, despite a superficial similarity in
their approaches, Cantillon's intrinsic value is a different concept
from Smith's natural price. In both cases, the concept is differentiated
from market price and treated as a fixed price around which market
price oscillates. But in contrast to Smith's view of natural price
as a cost price, for Cantillon intrinsic value was a money measure
of the quantities of land and labour used in production. In Cantillon's
view, the intrinsic value of a commodity could be evaluated from
knowledge of the production function, without recourse to the factor
market. Clearly such a procedure involves measurement problems, and
Smith in the Wealth of Nations circumvented these by defining the
natural price as the sum of the natural rates of wages, profit and rent.
We shall see in section IV below that this procedure was also adopted
by the Physiocrats. For the present we may note that it represented
an important simplification over Cantillon's concept of intrinsic
value.

The second point of comparison between Cantillon and Smith is
that, at least in his discussion of intrinsic value, Cantillon did
not invoke the mechanism of free competition to bring adjustment of
market price to intrinsic value. Rather, he argued that divergences
of market price are due to accidental circumstances, and under stable
circumstances they tend to disappear. Hence Cantillon's position
seems to have been little more than an act of faith that under stable
conditions commodities tend to exchange at their intrinsic values
"without any one having cause to complain". We shall see in chapter
3 below that Smith was to improve greatly on this view by his
explanation of the adjustment of market price to natural price by
the principle of free competition. In this analysis it was the movement
of resources in response to profit differentials which brought about
competitive equilibrium Cantillon, however, does not suggest such a
mechanism brings about adjustment to intrinsic value, so that an
important gap in his analysis of intrinsic value remained to be filled.

This is not to say that Cantillon nowhere discusses the idea of

resource mobility, however. Quite separate from his discussion of intrinsic value, he does, in fact, describe the mechanism by which resources are allocated in an economy. This arises out of his discussion of "les entrepreneurs" (translated as "undertakers") in Part one, chapter thirteen.[1] The function of the undertakers is to carry on the business of production and exchange in the State. Since they produce at a given cost, or buy at a given price, in order to sell at an uncertain price, they bear the risk inherent in business. Consequently, they are "as it were on unfixed wages",[2] in contrast to hired people who are on fixed wages. Undertakers may make a profit or a loss in a particular branch of trade but such an occurrence causes the movement of resources between trades to balance out these discrepancies.

"They proportion themselves in a state to the Customers or consumption. If there are too many Hatters in a City or in a street for the number of people who buy hats there, some who are least patronised must become bankrupt: if they be too few it will be a profitable Undertaking which will encourage new Hatters to open shops there and so it is that the Undertakers of all kinds adjust themselves to risks in a State".[3]

It is the movement of undertakers and resources between trades in response to profit and loss which adjusts production to consumption.

With the advantage of hindsight we can see that Cantillon here has grasped the essentials of the resource allocation function of the price system. And it may well be that it was from this or a similar passage that Smith took his concept of free competition. Cantillon himself, however, does not fully integrate his ideas on resource allocation with the rest of his system. And, in particular, the idea of resource mobility is not used to explain the adjustment of market price to intrinsic value. It may well be that Cantillon implicitly saw this link but if he did so he failed to make it explicit. Nevertheless, many of the elements of Smith's analysis are clearly present in Cantillon's discussion, and we must credit him as being an important precursor of Smith's competitive model.

---

1. See also Part I, chapter xiv. 2. ibid., p. 55.
3. ibid., p. 53.

IV. Turgot

Anne Robert Jacques Turgot, Baron de l'Aulne wrote his major work, Reflexions sur la formation et la distribution des richesses, in 1766.[1] This work is important for us, both as a means for discussing developments in French (particularly Physiocratic) thought by this date, and for Turgot's own contributions. We shall look at three aspects of Turgot's work: his treatment of the competitive mechanism, the current price (prix courant), and the fundamental price (prix fondamental).

As has been indicated above, the term competition (concurrence) came into common usage in economics in the work of the Physiocrats. Quesnay used it a number of times in his works to mean the rivalry of buyers (or sellers), and Turgot followed him in this usage.[2] Thus Quesnay speaks of "the competition of workers" or the "competition among farmers",[3] and similarly Turgot refers to "the competition among the workmen" and "the competition among the sellers of corn".[4]

In Turgot's work competition took up a central position as the mechanism by which theoretical results were established. Consider, for example, the proposition that the landlords procure the agricultural surplus in rent. Turgot states clearly that it is the competition of farmers for the use of land which fixes the rent:-

---

1. A.R.J. Turgot, Reflections on the formation and the distribution of riches (New York: Augustus M. Kelley, 1963). Although written in 1766, it was published (in the Physiocrats' Ephemerides du Citoyen) in three parts in 1769-70.

2. Quesnay also uses the phrase free competition (libre concurrence) to mean the unrestricted rivalry of nations in a situation of free external trade. See Chapter 3 below.

3. See Meek, Economics of Physiocracy, pp. 105, 107 and elsewhere.

4. Turgot, Reflections, pp. 8, 29.

"The competition of rich Undertakers in agriculture fixes the current price of leases in proportion to the fertility of the land and the price at which its products are sold, always according to the calculation the Farmers make, both of their expenses and of the profits they ought to draw from their advances: they cannot give the Proprietor more than the surplus."

When the number of competitors for the use of the land is such that competition is great, all the surplus will accrue to the landlord.

"But, when the competition among them is very keen, they give him all this surplus, the Proprietor only letting his land to him who offers the highest rent."[1]

Similarly it is the competition of workmen for jobs which procures them the subsistence wage

"(The employer) pays him as little as he can; as he has the choice among a great number of Workmen, he prefers the one who works cheapest. The Workmen are therefore obliged to lower the price, in competition with one another."[2]

Similar usage of competition to achieve individual theoretical results can be found in Quesnay's work.[3] However, it is in Turgot's Reflections that we first find in the literature a general conception of theoretical equilibrium determined by the competitive mechanism.

---

1.   ibid., p. 56.

2.   ibid., p. 8.

3.   For example, with reference to the subsistence wage,

"The level of wages, and consequently the enjoyments which the wage-earners can obtain for themselves, are fixed and reduced to a minimum by the extreme competition which exists between them."
Meek, op.cit., p. 194.

Some flavour of this conception can be gained from the following quotation from a letter from Turgot to Hume (25 March 1767)

"A kind of equilibrium establishes itself between the value of all the productions of the land, the consumption of the different kinds of commodities, the different sorts of works, the number of men employed at them, and the price of their wages.

Wages can be fixed and remain constantly at a definite point only in virtue of this equilibrium, and of the influence which all the parts of the society, all the branches of production and commerce, exercise upon one another. This granted, if you change one of the weights, a movement cannot but result from it in the whole of the machine which tends to restore the old equilibrium."[1]

Here we have a clear statement of the general equilibrium concept. It is clear throughout the Reflections that Turgot believed it was through competition that it was attained. Hence in Turgot's work we have the foundations of one of the most powerful ideas in the history of economic thought.

This general conception forms the background against which we must look at Turgot's more specific contributions to the competition model. In the first place, we shall look at his discussion of the current price. Turgot distinguishes two types of situation in an important passage for us:[2] the price formed in isolated exchange, which he associates by implication with the "birth of commerce", and the price formed in competitive exchange, which he takes to be the norm of his time. We shall look in more detail at each of these cases.

---

1. Turgot, op.cit., p. 108. The specific reference to wages arises because the correspondence concerned the effect of a tax on wages.

2. ibid., pp. 28-31.

In a rather modern vein, Turgot describes an exchange economy, in which reciprocal wants (besoins reciproques) are the basis of exchange. He assumes two parties bartering corn for wine. Each person aims "to receive as much and give as little as he can". For exchange to occur "it is necessary that the two parties should agree both as to the quality and the quantity of each of the things exchanged."[1]

"If the parties are not in accord, it will be necessary that they should approach one another by yielding a little on one side and a little on the other, offering more and contenting themselves with less."[2]

Suppose they agree on a price of one bushel of corn for six pints of wine. This price for them expresses the equivalence of corn and wine. But it is a price particular to them, and other prices will hold in other isolated exchanges. The conclusion Turgot draws from this reasoning is that under these conditions it is not possible to call any price "the true price" (le prix veritable) since

"so long as we consider each exchange as isolated and standing by itself, the value of each of the things exchanged has no other measure than the need or the desire and the means of the contracting parties, balanced one against the other, and it is fixed by nothing but the agreement of their will."[3]

This problem is solved when exchange becomes competitive. In this case

"The value of corn and of wine is no longer debated between two isolated Individuals in relation to their relative wants and abilities; it is fixed by the balance of the wants and abilities of the whole body of the Sellers of wine".[4]

---

1. ibid., p. 28.

2. ibid., p. 28.

3. ibid., p. 29.   4.   ibid., p. 30.

In this situation, a current price is established which Turgot
conceives of as a "mean price" and which is accepted by all traders:

"The price mid-way between the different offers and the different
demands will become the current price, whereto all the Buyers and
Sellers will conform in exchanges."[1]

At any given moment in a competitive economy every commodity will have
a "current price", thus determined in terms of every other commodity:-

"in a country where Commerce is very brisk, where there is
much production and much consumption, where there are many offers
and demands for all kinds of commodities, each kind will have a
current price relatively to each other kind; that is to say, a certain
quantity of one will be equivalent to a certain quantity of each of
the others".[2]

Thus, Turgot conceptualises a situation of general equilibrium in a
competitive economy.

Turgot nowhere uses the phrase competitive exchange or competitive
economy. However, it is an apt description of his ideas, and so has
been used here. This is not to say that Turgot in any but the
vaguest way laid down the conditions under which it could exist.
For him it did exist in the form of thriving, modern, capitalist
economies, and he did not see the need to go deeper than this.
In this, of course, he did only what all other economists of the time
did. However, his approach of contrasting competitive exchange with
isolated exchange did break new ground. It suggested , firstly, that
different explanations of price were appropriate for different
situations: an idea not to be fully exploited till much later. And,
secondly, by implication, it put the numbers of buyers and sellers as
the crucial distinguishing characteristic of each situation. Turgot
does not explicitly mention the number of traders involved in

---

1. ibid., p. 30.

2. ibid., p. 31.

competitive exchange, but his distinction based on numbers was to be the forerunner of later similar treatments.[1]

The current price is determined by _offer and demand_ (l'offre et la demande). This phrase appears to be due to Turgot,[2] and offers a semantic step within reach of the supply and demand phrase.[3] His actual analysis of offer and demand was not, however, closely related to modern supply and demand analysis. On one side, the sellers of an article offer it in competition with each other, while on the other, the buyers compete in their demand for it. Thus, for example, the price of land

"must vary according as there are more or fewer people who wish to sell or buy lands; just as the price of all other articles of commerce varies in accordance with the varying proportion between offer and demand".[4]

---

1. In his unfinished essay _Value and Money_, reprinted in Ronald L. Meek, _Precursors of Adam Smith_ (London: Dent, 1973). Turgot proceeds from the case of one seller, and one buyer, to two of each in much the same way as Edgeworth was to do over a century later (see chapter 8, below). Unfortunately this manuscript breaks off prior to the discussion of competitive exchange.

2. Hume uses the words in a letter to Turgot (undated, op.cit., p. 104), but he may have been following Turgot here. Certainly Turgot appears to have been the first economist to use the phrase widely and consistently.

3. Indeed, in the translation we have used, l'offre et la demande is in places rendered supply and demand. We have consistently used offer and demand in this section, however.

4. Turgot, _Reflections_, pp. 49-50.

62.

Price is established by a vague sort of balance of offer and demand
from which a "mean price" emerges. This "mean price" is such that in
some (unexplained) sense each side to the exchange gains equally from
it.[1] Turgot does not pursue these matters further, so that one must
conclude that his analysis of offer and demand left much to be desired.
Nevertheless, few economists were to go beyond it in the following
hundred years.

Turgot, following Quesnay, distinguished a fundamental price from
the current price

"One must distinguish two prices, the current price, which is
established by the relation of offer to demand, and the fundamental
price, which, in the case of a commodity, is what the thing costs
the workman".[2]

This price, for both Quesnay and Turgot, was the cost price. Quesnay
expresses this clearly

"The fundamental price of commodities is determined by the expenses
or costs which have to be incurred in their production or preparation."[3]

This cost price is a minimum price below which current price cannot
fall. Turgot, again:-

"although the fundamental price be not the immediate principle
of the current value, it is nevertheless a minimum below which it
cannot fall. For if a merchant loses by his trade, he ceases to sell
or manufacture; if a workman cannot live by his labour, he becomes

---

1.   This is made clearer in Value and Money which is a more com-
prehensive rendition of pp. 28-31 of the Reflections.

2.   Turgot, Reflections, p. 107. This and subsequent quotes are
from Turgot's letter to Hume (25 March 1767). He does not discuss
the fundamental price in the Reflections itself.

3.   Meek, Economics of Physiocracy, p. 93.

shock to the position of general equilibrium would bring about a new equilibrium in which the proportion between current and fundamental price was the same, although this might take time.

"You augment the fundamental value: the circumstances which have before fixed the proportion which the current value bears to this fundamental value cannot but cause the current value to rise until the proportion is re-established. I am aware that this result will not be sudden; and that in every complicated machine there are frictions which delay the results most infallibly demonstrated by theory. Even in the case of a fluid perfectly homogeneous, it is the same with the equilibrium of the values which we are examining."[1]

The close similarity of this discussion of fundamental value in Turgot's letter to Hume, with Smith's discussion of natural price in the Wealth of Nations, published nine years later, leads one to conjecture whether indeed there were further letters (perhaps between Turgot and Smith) on this subject.[2] The evidence available at present certainly points toward some connection between their ideas, and if this could be corroborated then it would seem that we must point to Turgot as being a very important precursor of Smith indeed. Note, however, that at least in his letter to Hume, Turgot does not explain the mechanism which re-establishes the proportion between the current value and the fundamental value. Like Cantillon, he simply asserts that equilibrium will be re-established, but does not invoke the idea of mobility of resources as Smith was to do. In the Wealth of Nations Smith was able to employ the principle of free competition to integrate his model of price determination into a consistent whole, and it appears that at least in this respect he was to go beyond the ideas of Turgot.

More generally, we may note the tremendous achievement of Turgot with respect to competitive analysis. Whilst the Reflections was but a sketch of a treatise on economics, that sketch was no less than a clear and consistent statement of the concept of general competitive equilibrium. In contrast to Smith who was to clothe his analysis in much descriptive detail, Turgot was able, in a few pages, to get down many of the essentials of the general competitive model in a fashion

---

1. ibid., p. 1 9   2. Unfortunately time limita-
tions have prevented me pursuing this line in depth. Schumpeter, however, says he knows of no cogent evidence of a direct dependence of Smith on Turgot's work. See History of Economic Analysis, p. 192.

which points directly to Walras. Whilst not agreeing completely
with Schumpeter that Turgot's analytic performance outranks Smith's,
it is clear that it must be ranked very high indeed. Nevertheless,
as Schumpeter himself notes, success in economics depends not only
on intellectual performance, but on finish, as well as elaboration,
application and illustration. Smith's work had such finish, and
whilst one must admire the clarity of Turgot's thought, one must
also conclude that despite its promise its scantiness was its
most important limitation.[1]

1.   See, however, Schumpeter, ibid., pp. 247-9. Our opinion of Turgot
differs from Schumpeter's in that he sees Turgot's work as a piece of
pure analysis analogous to a seminal one page article in physics. At
least as far as his competition analysis is concerned, our view is that
despite its importance, his work was only an outline and it is important
not to read more into it than is in fact there.

V. Sir James Steuart

Sir James Steuart's major work, An Inquiry into the Principles
of Political Oeconomy, was published in 1767, nine years before Smith's
Wealth of Nations.[1] Unlike the other writers we have considered,
Steuart's competition theory is of interest to us more for its
stark originality, than for its place as a precursor of Smith.
Steuart, perhaps more than any other writer of the eighteenth century,
was an individualist who developed his own concepts and theories.
His work is at the same time profound, original and confused. For
these reasons it failed to win over many supporters when it was
published, and was later completely overshadowed by Smith's book.[2]
Nevertheless, as we shall see, it contains much of interest to our
study of the development of competition theory.

In what follows we shall place our emphasis on Steuart's
originality, leaving the reader to note elements in common with other
treatments of competition. The first point worthy of mention is the
wide use of the term competition in the Inquiry. As has already been
noted, Steuart appears to have been the first economic writer in
English to use the term. He almost certainly translated it from
the French concurrence, and like the French writers he used it to
mean rivalry. But he also introduced new concepts of simple and
double competition which he gave a central role in his theory.
These concepts, as we shall see, made competition more than a simple
noun of action; it became the name of a particular model of economic
behaviour. This important development was not pursued by Smith, and
did not appear again till after the Classical period of economics.

---

1. In this section, I have used the edition, edited by his son,
which comprises the first four volumes of his Works (6 vols., 1805):
Sir James Steuart, Works, vols. 1-4, An Inquiry into the Principles of
Political Oeconomy (New York: Augustus M. Kelley, 1967).

2. Smith contributed to this by not once mentioning Steuart's
Inquiry in his Wealth of Nations.

Steuart was concerned to treat political economy in a scientific manner in the *Inquiry*. This led him to define and classify his terms at the outset of his argument, so as to prevent loose thinking. It is Book II of the *Inquiry*, *Of trade and industry*, which is the central section for us. Steuart starts from the proposition that trade is based on reciprocal demand, and goes on to define *demand* first, and later *competition*.[1] These concepts are closely related, the relation being brought out in the following extract from Steuart's summary of Book II:-[2]

"*Demand* and *competition* are both relative to buying and selling; but *demand* can be applied to *buying* only, and *competition* may be applied to *either*.

Demand marks an inclination to have, *competition* an emulation to obtain a preference.

Demand can exist without *competition*, but *competition* must constantly imply *demand*.

Demand is called *simple*, when there appears one interest[3] only on the side of the buyers.

Competition is called *simple*, when it takes place on one side

---

1. Steuart defines *demand* in op. cit., Book II, chapter ii, and *competition* in Book II, chapter vii.

2. op. cit., Volume 2, p. 219. In his earlier definitions, he gets into a tangle over the symmetry of his classifications due to the fact that demand applies only to the buyers in a contract, while competition may be applied to both sides of the contract. This tangle is almost avoided in his summary of the position, quoted above.

3. Steuart emphasised in the Inquiry that it was the number of separate interests rather than the number of separate people that was important. For example:-
"Twenty people demanding from the same determinate interest form but a simple demand; it becomes compound or high, when different interests produce a competition." ibid., Volume 1, p. 233.

of the contract only, or when the emulation is at least much stronger on one side than on the other.[1]

   Demand is called compound, when more interests than one are found among those who desire to buy.

   Competition is called compound, when an emulation is found to prevail on both sides of the contract at once."

   Steuart's work is notable for his distinction of simple and double (or compound) competition in itself. This distinction is a formalisation of the by now common idea that the number of parties on either side of the contract determines the price. But it is this formalisation which is important, for it replaces a vague proposition with distinct models of economic behaviour. The consequences, as we shall see, of postulating double competition are different from those achieved under simple competition. Steuart's formal approach to price determination makes him the objective forerunner of the approach which was only much later adopted generally by economics.[2]

   Before we proceed to discuss the operational use made by Steuart of his classification, and in particular the relation of double competition to perfect competition, it is necessary to develop some subsidiary features of his analysis. In the first place, Steuart made self-interest the governing principle of economic behaviour:-

   "The principle of self-interest will serve as a general key to this inquiry; and it may, in one sense, be considered as the ruling principle of my subject."[3]

---

1.   What we would call monopoly is thus an important subcase of simple competition.

2.   The separation of monopoly and free trade was not at all a formal one in the sense that distinct models were defined. Furthermore, emphasis on monopoly wained seriously in the 18th century.

3.   op. cit., p. 218.

In the context of the market, this of course meant that buyers attempted to gain the lowest price, and sellers the highest. Secondly, the price of a good, according to Steuart, is comprised of two elements: "the real value of the commodity, and the profit upon alienation".[1] The real value of the good depended on three factors: the labour productivity of the industry, the cost of materials, and the cost of the workman's subsistence, all taken at their average values. Although he is not completely clear on this, he seems to equate "real value" with (average) unit costs.[2] Given this interpretation, his statement that price cannot be less than real value, and that profit (per unit) is the amount price is above real value, falls into place. The real value of a commodity is given, but the profit upon alienation can vary and depends on the price.

Steuart assumed that there were three main groups of actors in an economy: manufacturers, merchants and consumers. Manufacturers produce goods, and consumers ultimately buy them. In between, merchants carry on the important function of trade. In his theory of double competition, Steuart explicitly assumes that both the buyers and the sellers in a market are merchants. As sellers, they have paid the manufacturers a given price, and must sell above this price to make a profit. Merchant-buyers, on the other hand, must buy at a price below that which they hope to sell to consumers. Under the influence of double competition, according to Steuart, a price is established which provides both buyers and sellers with reasonable profits. Double competition supports an ideal balance of work and demand, and this balance enables the economy to flourish and grow in harmony.

"Double competition is what is understood to take place in almost every operation of trade; it is this which prevents the excessive rise of prices; it is this which prevents their excessive fall.

---

1. ibid., p. 242.

2. Andrew Skinner in his edition of the Inquiry argues that Steuart's real value is the same as Cantillon's concept, intrinsic value (p. 161). This is clearly not the case.

While <u>double competition</u> prevails, the balance is perfect, trade and industry flourish."[1]

This welfare proposition is of course unsupported, but as we know ones like it have been associated with competition by many writers in the history of economic thought.

The features of double competition emphasised by Steuart were that it should involve merchants only, and that emulation should occur on both sides of the market. The reason for the first assumption lies in the specialisation of the merchants. Since merchants engage in trade full-time, they are able to study in depth the conditions of the market. Their knowledge of the true situation means that they do not wildly err in their bids and offers:

"Posts, and correspondence by letters, are a consequence of trade, by the means of which merchants are regularly informed of every augmentation or diminution of industry in every branch, in every part of the country. From this knowledge they regulate the prices they offer; and as they are many, they, from the principles of competition which we shall hereafter examine, serve as a check upon one another."[2]

In like manner, their full knowledge prevents goods of the same quality being sold at more than one price.

The assumption of rivalry on both sides of the market enables a balance to be attained. This balance, however, is not at a single fixed price, but occurs over a range of prices. Steuart assumes a speculative market model in his explanation of this. He assumes that competition vibrates from one side of the market to the other, the amount of vibration differing between markets. Suppose, for example, that competition is strongest amongst buyers. This causes price to rise, and sellers' competition, according to Steuart, will decline as they expect prices to rise even higher in the future. However, as

---

1. op.cit., p. 264

2. ibid., p. 240.

price rises, buyers' margins fall, and so does their competition, till price finds a level. At this point, competition switches to the sellers' side, as they are eager to profit at this peak price. Now price falls, and buyers' competition falls also, as they expect a lower price in the future. Price reaches its lower level, when sellers' margins fall enough to reduce their competition sufficiently. We have here a dynamic market model of price, a notable feature of which is buyers' and sellers' speculation over future prices. In this model, competition vibrates from one side of the market to the other, and in each market a range of equilibrium prices is established, which provide reasonable profits (presumably on average over the cycle):

"Here is the criterion of a perfect balance: A positive moderate profit must balance a positive moderate profit; the balance must vibrate, and no loss must be found on either side."[1]

Thus Steuart presents an original theory of an equilibrium price range under double competition. When such an equilibrium exists in an economy, trade flourishes and industry grows. Given these equilibrium prices, manufacturers know the extent of the demand for their goods, and adjust their output accordingly. Thus resources are allocated in the economy, and there is "a balance of work and demand".

This desirable state of affairs does not come about, however, Steuart argues, if manufacturers or consumers participate in buying and selling. This is because they, unlike merchants, do not coldly calculate their profits, and behave in the manner described in the dynamic market model above. Rather they are too passionate and rush headlong into competition, upsetting the balance

"so soon as consumers or needy manufacturers mingle in the operation all proportion is lost. The competition between them is too strong for the merchants; the balance vibrates by jerks".[2]

---

1. ibid., p. 240.

2. ibid., p. 240.

In this situation competition is simple, being on the side of the impassioned non-merchants, to the advantage of the other side. Such a situation upsets the balance, and is therefore an evil. In such a situation, it is necessary for the statesmen to intervene in order to restore the balance of double competition.

Whilst much of his work is evidently highly original, it is easy to see why Steuart's _Principles_ was largely ignored by subsequent economists. Generally, we may note his laboured style, his old-fashioned use of the benevolent statesman around which to build his analysis, and also his general Mercantilist views which were out of keeping with the trend towards Liberalism, typified in Smith's work. All these factors must have discouraged people from reading his work. But also, as has been noted by Schumpeter, his very penetration of thought, his tendency to dig "below the smooth surface on which A. Smith happily sailed his course", must also have put off his readers.[1] Thus, Smith's relatively simple theory of the natural price was much easier to grasp than Steuart's idea of competition vibrating from one side of the market to the other, and it was not therefore surprising that it was this theory which was to sweep the field. And, in retrospect, we can see that this was probably right, in that Steuart's ideas are not only more difficult but also are conceptually less satisfactory than Smith's. Nevertheless, truly original thinkers are rare indeed in any science, and it is hoped that the brief review of Steuart's ideas on competition in this section has at least indicated that his contribution is not to be belittled.

1. _History of Economic Analysis_, p. 176.

VI. <u>Conclusions</u>

This is not the place for a detailed discussion of the sources of Smith's views on competition and monopoly.[1] Rather, we shall just make one or two points which seem to stand out from the discussion above. Firstly, we have seen in this chapter that many of the elements of Smith's discussion of competition and monopoly can be identified in the pre-Smithian literature. Some of these ideas can be traced back to the Mercantilists and the Scholastic Doctors, whilst others indeed go back to antiquity. The Mercantilist influence seems to have been particularly strong with regard to the distinction of freedom of trade and monopoly, which Smith was to adapt into his famous system of political economy. We may also note the long historical pedigree of the use/scarcity analysis of market price which Smith also took over from the writers of the 17th century.

The essence of Smith's contribution, as we shall see in chapter 3, was, however, his analysis of market and natural price in Book I, chapter vii of the <u>Wealth of Nations</u>. We noted in section II above that the seeds of such a distinction may be found in the work of Pufendorf (1672) and possibly in that of the later Schoolmen. Certainly, these writers discussed the basis of price in contrast to the 'superficial' discussion of market price in the Mercantilist literature. Moreover, as already noted Smith probably derived the actual term <u>natural price</u> from Pufendorf's work. However, their treatment of price determination was not very analytical and, moreover, often confused. In these circumstances it seems inappropriate to argue, as some writers have, that Smith's analysis is a direct attempt to develop Pufendorf's work. Rather it would seem that Smith must at least in part have relied on the work of more contemporary economists.[2]

---

1. This fascinating study is unfortunately a subject in itself, and time limitation prevented me from giving it but cursory attention. For an introduction to the subject see Schumpeter, op. cit., pp. 181-186, and Bowley, op. cit., chapter 3.

2. I am particularly thinking of Bowley's work, cited in the previous footnote, in this context. Despite the impressive case Bowley makes out for the direct link with Pufendorf, in my opinion she fails to take account of the possible French influence on Smith after 1750.

The similarity of Smith's ideas with those published by Cantillon (1755) and those expressed by Turgot in his letter to Hume (1767) suggest (in my opinion strongly) that these ideas must have been 'in the air' in the third quarter of the 18th century, if not actually in print. This, of course, does not detract from Smith's performance of adapting these ideas and synthesising them with the older ideas of the Mercantilists and the Natural Law Philosophers. The measure of the success of this synthesis is the total domination of economic thought it was to have in the century after 1776. However, in my opinion, the textual evidence, particularly with regard to the French economists, supports the view that Smith was working along similar lines to several other writers when he wrote the Wealth of Nations. Whether there was an interchange of ideas on price theory, and the question of who influenced who, are unfortunately questions outside our scope of inquiry.

Chapter 3.

Adam Smith's Conception of Competition and Monopoly

In this chapter, we shall examine Adam Smith's conception of competition and monopoly in his classic work <u>An Inquiry into the Nature and Causes of the Wealth of Nations</u>.[1] This book is of fundamental importance to our study, not so much for the originality of its ideas, which as we shall see owed much to his contemporaries and precursors, but for the way it combined them into an analysis of price, which was to have an enormous influence on 19th century economic thought. At least until the publication of J.S.Mill's <u>Principles</u> in 1848, Smith's book provided the basic text from which economists learnt their craft. And even into the present century, Smith's work provided the framework through which economics was taught, through its strong influence on Mill's text, and later on Marshall's <u>Principles</u>.

1. All references are to Adam Smith, <u>The Wealth of Nations</u>, edited by Edwin Cannan in 2 vols., 6th edition (London: Methuen, 1950). Unless otherwise stated, references are to Vol. I of this work.

Smith's analysis of competition and monopoly must be viewed against the background of his advocacy of laissez-faire policy. As is well known, in contrast to the mercantilist writers who argued that it was necessary for the government to regulate the actions of selfish individuals in order to obtain a beneficial social order; Smith, like the Physiocrats, argued that the pursuance of this same self-interest, if unregulated by government intervention, would, in fact, ensure a harmonious and beneficial outcome. It was as if "an invisible hand" directed the selfish interests of individuals towards the common good.[1]

Smith's advocacy of laissez-faire dictated his general usage of the concepts, competition and monopoly. Although he was not entirely consistent on this, Smith reserved the term monopoly, with its negative emotional value, for situations of government intervention.[2] Hence he was able to advocate laissez-faire policies in contrast to the universally disliked monopoly. This line of approach was not of course conducive to analytical advance with regard to monopoly, and as we will see in section III below, only modest advance was made.

In contrast, Smith's contribution to competitive analysis was of great importance. We have already seen that Turgot took the idea of competition and instituted it as the mechanism by which a general equilibrium of the economy was attained.[3] In Turgot's system, prices were determined by the balance of competition, (in the sense of rivalry), on the side of the sellers and the buyers, in some proportion to the

---

1. The reader is referred to Viner (1960) for a good comprehensive discussion of Smith's place in the intellectual history of laissez-faire. The reference is J. Viner, 'The Intellectual History of Laissez-Faire' Journal of Law and Economics, October 1960.

2. Smith was not, of course, being original in doing this. See, for example, the discussion of Pufendorf's views on monopoly in chapter 2, section 1, above.

3. Chapter 2, section 4.

fundamental or cost price. Smith went further, and in his famous
chapter vii of Book I of the Wealth of Nations, invoked the additional
principle of free competition (i.e. the free mobility of resources
between trades) to ensure the equality of market and natural (cost)
price in equilibrium. In Smith's general equilibrium therefore,
prices were established and resources were allocated by the mechanism
of competition, albeit competition used as we shall see in two
different senses. It was Smith's contention that this competitive
equilibrium was an ideal ordering of the economy, and that therefore
government intervention was undesirable.

Smith's equilibrium model of competition is discussed in detail
in section I below. It is a model of inter-industry equilibrium.
His discussion of the theory of the firm and market structure,
which was much less satisfactory, is discussed separately in
section II. Section III discusses monopoly, whilst section IV
draws some conclusions.

I. The Theory of Market and Natural Price

Adam Smith's theory "of the natural and market price of commodities" is contained in Book I, chapter vii of the Wealth of Nations. As has been noted by Schumpeter this "rudimentary equilibrium theory" was "by far the best piece of economic theory turned out by A. Smith". Furthermore, it became the basis of subsequent economists' analyses of competition:-

"the purely theoretical developments of the nineteenth century consist to a considerable degree in improvements on it".[1]

This being so, we must be careful in this section, not to read into Smith's statement of the theory more than is actually there. It is all too easy to attribute more to Smith's words than is justifiable, because of our familiarity with subsequent developments of his work. We shall find in this section, that despite the suggestions implicit in it, Smith's actual analysis was basically fairly crude.

He begins his analysis by distinguishing the natural price from the market price. The latter is simply "the actual price at which any commodity is actually sold".[2] On the other hand, the natural price is conceived of as a cost price:-

"When the price of any commodity is neither more nor less than what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in raising, preparing and bringing it to market, according to their natural rates, the commodity is then sold for what may be called its natural price."[3]

Specifically, then, the natural price is the cost price, given that

---

1.   History of Economic Analysis, p. 189

2.   Wealth of Nations, p. 58.

3.   ibid., p. 57.

inputs are paid at their natural rates.[1] By implication, since the natural price is conceived of as fixed, Smith assumes that the industry operates under conditions of constant costs.[2] Finally, the natural price is conceived of as a minimum price in the long run:-

"Though the price... is not always the lowest at which a dealer may sometimes sell his goods, it is the lowest at which he is likely to sell them for any considerable time."[3]

At the first stage of his analysis he states that the market price of a commodity "may either be above, or below, or exactly the same with its natural price". It "is regulated by the proportion between the quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity".[4] It is easy to read into Smith's explanation of the determination of market price, a "supply and demand" account of the adjustment mechanism. However, such an interpretation would be misleading. Smith, as we shall see, had only a primitive conception of what we know today as supply and demand analysis. And furthermore, like his predecessors, he did not use the term supply in direct conjunction with the term demand. Rather, as in the quotation above, he uses the term quantity in contrast to demand[5], and in this chapter we shall refer to his analysis as a "theory of quantity and demand" in order to emphasise its nascent state.

---

1. Smith, for the purposes of this analysis, assumed that the natural rates of wages, profit and rent are given.

2. Smith did not, of course, explicitly say this. Rather, as we have seen in the last chapter, he was just following an established tradition of defining a fixed price for the commodity in contrast to the market price.

3. op. cit., p. 58.

4. ibid., p. 58.

5. Smith does use the term supply indirectly with demand, in statements such as "the quantity brought to market is just sufficient to supply the effectual demand" (p. 59). It is easy to see that such a statement could soon be adapted to the shorthand "supply and demand", as indeed it was.

Smith conceived of a fixed quantity of a commodity being brought to market. This quantity confronts <u>the effectual demand</u>, the demand of those buyers willing to pay the commodity's natural price. This demand may be interpreted in two ways. On the one hand, it could be interpreted as meaning the <u>quantity</u> of the commodity demanded, in which case we may accept Smith's statement that the position of the market price relative to the natural price is determined by the <u>proportion</u> between quantity and demand.[1] Equally, however, there are grounds for interpreting it as simply the psychological desires of the effectual demanders, in which case the idea of a proportion between quantity and demand loses its precision of meaning.[2] We shall find that both interpretations were adopted by followers of Smith, and that it was to be a long while before confusion over the concept <u>demand</u> was finally banished from the literature.

Smith argued that if an excess quantity of the commodity was in the market, market price would fall below natural price. This was because sellers would compete to sell their stocks. The extent of the price fall would depend on the eagerness of the competition, which in turn would depend on the amount of the excess quantity and whether the commodity was perishable.[3] On the other hand, an excess effectual demand would cause market price to rise above the natural price. In this case, competition of buyers would be active.

---

1. Hollander supports this interpretation. See S. Hollander, <u>The Economics of Adam Smith</u> (London: Heinemann, 1973), p.118.

2. In support of this interpretation we may note Smith's contrast between effectual demand and absolute demand (p. 58), the difference being that absolute demand is desire <u>not</u> backed by purchasing power.

3. This implies that Smith conceived that sellers may withold some of their stock from the market, so that quantity is not completely fixed as postulated above. As always with Smith, there are instances where he says contradictory things. Overall, however, it seems fair enough to say that he assumed quantity was fixed.

Price would rise more when there was a large excess effectual demand, when the commodity was a necessity, and when "the wealth and wanton luxury of the competitors"[1] was an important factor. Finally,

"when the quantity brought to market is just sufficient to supply the effectual demand and no more, the market price naturally comes to be either exactly, or as nearly as can be judged of, the same with the natural price".[2]

In this case, the competition of buyers or sellers is not required to adjust the market price.

As was noted in chapter 2 above, Smith's analysis of market and natural price bears a close resemblance to Cantillon's discussion of market price and intrinsic value. However, Smith's analysis, as recounted so far, improves on Cantillon's in two respects. Firstly, as noted in chapter 2, Smith does away with the idea that intrinsic value measures the real inputs of land and labour used in producing the commodity, by defining natural price as a cost price. This move, for which precedent exists in, for example, the Physiocrats' fundamental price, immediately makes the theory more applicable by removing the problem of measuring intrinsic value. And secondly, despite its crudity to modern eyes, Smith's discussion of quantity and effectual demand gives more substance to the analysis of the determination of market price than Cantillon's version of the use/scarcity analysis. Although he does not conceive of quantity and demand as functions of price, and despite his ambiguous use of the term demand, his statement, by bringing things more into the open, invited the refinements which were later to be made. Smith's achievement, like Marshall's, was as much in opening the door to new analysis, as in making that analysis himself.

In the second stage of his analysis Smith drops the assumption that the quantity of the commodity brought to market is given. He

---

1. op. cit., p. 58.

2. ibid., p. 59.

now argues that "the quantity of every commodity brought to market naturally suits itself to the effectual demand".[1] If there is an excess quantity, market price will be below natural price, so that wages, profits and/or rents must be paid below their natural rate. This will cause labourers, employers and/or landlords to withdraw part of their labour, stock and/or land from this employment. The quantity of the commodity will be thereby reduced and "will soon be no more than sufficient to supply the effectual demand".[2]

"All the different parts of its price will rise to their natural rate, and the whole price to its natural price."[3]

An excess effectual demand will have exactly the reverse effects. It will give rise to factor rewards in excess of natural rates, increased production, and a reversion to the natural price.

"The natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating. Different accidents may sometimes keep them suspended a good deal above it, and sometimes force them down somewhat below it. But whatever may be the obstacles which hinder them from setting in this centre of repose and continuance, they are constantly tending towards it." [4]

This rudimentary equilibrium theory set the framework for the nineteenth century analysis of price. It had the merit of being simple, and employing concepts that were directly observable in reality. For Smith, and for later writers, it was considered generally applicable to all commodities, although he did admit certain

---

1. ibid., p. 59.

2. Smith suggests that decisions to enter or leave an industry are made by the factor owners alone in these pages (pp. 59-60). At other points in the book he takes a more realistic view that decisions upon resource allocation are primarily taken by the employer of capital (see, for example, pp. 58, 64).
3. op. cit., p. 59.
4. ibid., p. 60.

exceptions to it.[1] Implicitly equilibrium was considered unique and highly stable, although Smith does allow the possibility of oscillatory movements towards equilibrium.[2] It was a great analytical landmark, which despite its crudity was to have a profound impact on economic thought. We shall note here two features of it, which are of importance in tracing the development of perfect competition theory.

In the first place, it is an analysis of industry equilibrium. Smith was not concerned to analyse the behaviour of individual producers in this important chapter. We shall see in the next section that his discussion of business behaviour elsewhere in the book is much less satisfactory. Here we may note that Smith's concentration on industry equilibrium set the pattern for later economists' analyses, particularly in the English tradition. We shall find in Marshall even, that much more weight is given to industry analysis that to the firm.[3] It was not until the 1920s that serious attention was given in England to the competitive firm, which in turn led to disenchantment with perfect competition for many. The slowness of this development can in large part be attributed to the influence of Smith's book, and in this sense it can be said to have hampered the development of a true understanding of perfect competition theory.

In the second place, in Smith's model the adjustment of price to equilibrium is accomplished by the mechanism of competition. Smith brought competition to the centre of the stage. But it is important to note that Smith uses the term in two senses in his analysis. Firstly, he refers to the competition of buyers or sellers, the eagerness of which governs price rises or falls. As has been noted by Stigler, this is competition "in the sense of rivalry in a race - a race to get limited supplies or a race to be rid of excess supplies"[4].

---

1. See section III, below.

2. For example, he says that new entrants to a profitable industry would soon reduce market price to the natural price, "and perhaps for some time even below it". (p. 62).

3. See chapter 9.

4. George J. Stigler, 'Perfect Competition, Historically Contemplated', pp. 1-2.

This is not the type of competition which adjusts market price to natural price, however. This adjustment entails the movement of factors of production to the most profitable employments in an economy, and is dubbed by Smith _free competition_.[1] It is this latter type of competition which ensures Smith's resource allocation result. It is clearly completely different from competition in the sense of rivalry. The distinction between these two uses of competition is important, and has not always been explicitly recognised in the critical literature on Smith.

Smith's equilibrium solution represents a synthesis of a number of strands of thought which we have already encountered. But it is more than this, since it encompassed a vision of the operation of the entire economy. This vision provided both an explanation, and the elements of a justification of the operation of the economy. Inevitably therefore it was to have a powerful impact on economic writing for many years to come.

1. This phrase first appears on p. 63. Smith also uses the term _perfect liberty_ to represent this assumption (see pp. 58, 64 and 101).

II. Market Structure and the Theory of the Firm.

Unlike his analysis of natural and market price, Smith's discussion of market structure and the behaviour of the firm is not concentrated in one place in the book, but rather is distributed throughout it. Like his contemporaries and predecessors, he did not adopt the scientific procedure of making rigid assumptions from which to derive his model. Rather he took the view, which was generally followed by later Classical economists, that his analysis was of general applicability,[1] and proceeded from there to give real-world descriptions of markets. He was not, however, unaware of the types of conditions necessary for his analysis to operate, as we shall see. But, in drawing his scattered observations together in this section, we must be careful not to attribute too much unity to his descriptions.

We shall begin with his discussion of the commodity. Product differentiation was not an important feature of the bulk of the products of agriculture and manufacture in late 18th century Britain, of course. Consequently Smith does not mention the problem very much. However, he was aware that in comparing the prices of a commodity in two countries, it was necessary to take account of the relative quality in each. Thus, English grain is superior to Scottish grain so that

"though often dearer in appearance, or in proportion to the measure of its bulk, it is generally cheaper in reality"[2]

In a number of places he explicitly stipulates that he is comparing commodities of "the same degree of goodness"[3], but in general takes

---

1. Thus, he says, "the quantity of every commodity which human industry can either purchase or produce, naturally regulates itself in every country according to the effectual demand" (p. 402), or, again, "the market price of every particular commodity is... continually gravitating, if one may say so, towards the natural price" (p.62) Italics added.

2. op.cit., p. 77.

3. For example, ibid., p. 8.

this as understood. Closely linked to this assumption of product homogeneity, is the condition that only one price can rule at one time in a market. Smith appears to assume this condition:

"When the quantity brought to market exceeds the effectual demand... some part must be sold to those who are willing to pay less (than the natural price), and the low price which they give for it must reduce the price of the whole."[1]

He realised, of course, that markets separated by great distances, such as Scottish and English grain markets,[2] could have different prices. But further than this he did not explicitly lay down assumptions for the single price theorem to hold.[3]

Turning to Smith's discussion of the traders in a market, we again find his descriptions are 'realistic' rather than analytical. He assumes that employers of capital attempt to make a profit.

"As soon as stock has accumulated in the hands of particular persons, some of them will naturally employ it in setting to work industrious people, whom they will supply with materials and subsistence, in order to make a profit by the sale of their work, or what their labour adds to the value of the materials."[4]

In order to attain his profit, the employer will produce as efficiently as possible:

"The person who employs his stock in maintaining labour, necessarily wishes to employ it in such a manner as to produce as great a quantity of work as possible."[5]

---

1. ibid., p. 59.

2. ibid., p. 77.

3. Jevons appears to have been the first economist to do this, see chapter 8.

4. op.cit., p. 50.   5.   ibid., p. 259.

In addition, he will invest in the most profitable line

"The consideration of his own private profit, is the sole motive which determines the owner of any capital to employ it either in agriculture, in manufactures, or in some particular branch of the wholesale or retail trade."[1]

When Smith comes to consider how the employer of capital selects a level of sales which maximises his profits, however, his analysis is much less satisfactory. His answer is that the employers will best achieve their interest by trying as far as possible to supply the effectual demand. Thus, with regard to the importation of gold and silver

"The merchant importers, like all other merchants, we may believe, endeavour, as well as they can, to suit their occasional importations to what, they judge, is likely to be the immediate demand."[2]

In like manner, the corn dealers serve their interest by meeting the demand:

"It is the interest of the people that their daily, weekly and monthly consumption, should be proportioned as exactly as possible to the supply of the season. The interest of the inland corn dealer is the same. By supplying them, as nearly as he can judge, in this proportion, he is likely to sell all his corn for the highest price, and with the greatest profit; and his knowledge of the state of the crop, and of his daily, weekly, and monthly sales, enable him to judge, with more or less accuracy, how far they really are supplied in this manner."[3]

Smith's solution to the problem of output determination of the firm is not very satisfactory. This is because he fails to distinguish the individual producer from the group of producers. In both of the passages quoted above this distinction is left unclear, so that

---

1. ibid., p. 354.
2. ibid., p. 47.
3. ibid., Vol II, pp. 25-6.

inevitably confusion arises as to what Smith means. Does he envisage producers colluding to regulate supply, or does he envisage each producer endeavouring to meet demand in his own particular part of the market?[1] Whichever is the case, Smith fails to clearly formulate the problem of the equilibrium of the firm, or provide a satisfactory answer to it.[2] He was more concerned, as were the Classical economists after him, with economic groups rather than individual consumers or producers. Concern with individual behaviour was to develop only much later.[3]

Smith's discussion of market structure was also unsatisfactory. In his discussion of Smith's market structure assumptions, Stigler, whilst accepting that the evidence is weak, concludes that he assumed that rivals acted independently, and were sufficient in number to eliminate extraordinary gains.[4] But this overstates the case. With regard to the question of independent action, we have Smith's important real-world observation that

"People of the same trade seldom meet together, even for merriment or diversion, but the conversation ends in a conspiracy against

---

1. Marshall was to sketch a solution along these latter lines. See chapter 9 below.

2. There is a political repercussion of this failure to distinguish individuals from groups, which is a recurrent theme in the Wealth of Nations; namely, the position that individual interests are coincident with group interests, so that individual striving will produce the common good.

3. On a broad level it might be argued that the essential difference between classical and neoclassical economics is the former's emphasis on economic groups, and the latter's emphasis on individuals. With regard to the equilibrium of the firm, Cournot's pioneering work (see chapter 5), despite its early date (1838), should be classified with the latter school of thought.

4. op. cit., p. 2.

the public, or in some contrivance to raise prices."[1]

On the question of the number of producers supplying a market, Smith was equally realistic, and was quite prepared to accept that in some markets there were only a few.[2]

However, as Stigler points out, Smith did argue that the more producers there were, the less would be the likelihood of collusion to raise price. Thus, when speaking of the capital invested in the grocery trade in a particular town, he says

"If this capital is divided between two different grocers, their competition will tend to make both of them sell cheaper, than if it were in the hands of one only; and if it were divided among twenty, their competition would be just so much the greater, and the chance of their combining together, in order to raise the price, just so much the less."[3]

Clearly, the number of producers is important in that the more the producers, the more their competition, and the less chance their collusion, so that the lower will be price. But this observation provides the mechanism by which market price is adjusted to natural price; it does not define a market structure of many independent producers within which firm and industry equilibrium are both determined.

The role of the numbers of producers in Smith's schema was of secondary importance to the adjustment brought about by changes in their number. An excess effectual demand, will induce new producers to a trade, hence reducing price to the natural price; and conversely for an excess quantity supplied. The actual number of producers in the market in equilibrium was determined by the number necessary to supply the effectual demand, and might be few or many. Since Smith did not provide an analysis of producer equilibrium, market structure was not an issue as far as he was concerned.

---

1. op.cit., p. 130. See also p. 127.
2. See the quotation in the next paragraph.
3. op. cit., p. 342

In sum, therefore, whilst of much interest for the insight which they provide into the operation of the 18th century economy of Britain, Smith's observations of business behaviour and market structure fall short of being a satisfactory analysis. His concern was with equilibrium of the group of producers, and not the members of the group, and this emphasis he bequeathed in general to the Classical analysis of competition.

III. Monopoly

As with his treatment of competition, it is possible to separate
Smith's attempt at analysis of monopoly in Book I, Chapter vii of
the Wealth of Nations from his more general discussion of monopoly
in the rest of the book. In this latter discussion, as we shall see
below, Smith followed the common practice of using the term to cover
whatever he wished to condemn. In Book I, Chapter vii, however, he
appears to use monopoly in a more restricted sense. In this Chapter,[1]
monopoly is defined to encompass three ideas:

(1)   Firstly, monopoly implies some privilege which is the
result of government action. If a monopoly exists it must be due to
"particular regulations of police."[2]

(2)   Secondly, by implication, the privilege granted is the
exclusive privilege to carry on a trade. In other words, it is a
guarantee that no new traders will enter that trade. In modern
terminology, barriers to entry are guaranteed absolute in the trade.

(3)   And thirdly, Smith appears to have restricted the term
monopoly to the case of one seller, as implied by the statement

"a monopoly (is) granted either to an individual or to a trading
company".[3]

Ignoring for the moment the issue of how consistently Smith stuck
to this definition of monopoly, we shall treat it as his basic
analytical definition in Book I, Chapter vii of his book. Stated in
the clear form above, it would seem that Smith's conception of
monopoly differed little from the modern conception. This impression

---

1. ibid., pp. 62-64.

2. ibid., p. 62.

3. ibid., p. 63

would be misleading, however. Whilst modern economists would stress the importance of the single seller and entry barrier assumptions, and ignore the government regulation condition, Smith clearly thought that entry barriers enforced by government action was the essence of monopoly, whilst the single seller condition was of purely minor importance. For Smith, as was noted in the last section, the actual number of sellers was unimportant. The important issue, as he saw it, was how easy it was for new sellers to enter a trade, in order that market price might be reduced to the natural price. It is this emphasis which we must remember in assessing Smith's analysis of monopoly.

Smith introduces monopoly as the third of three reasons why the market price might remain above the natural price for a reasonable time, instead of falling towards it. Clearly this will occur if some restriction exists on the adjustment of quantity to effectual demand. Firstly, secrets of trade and manufactures prevent such an adjustment because they mean potential entrants are uncertain as to the outcome of entry. Secondly, scarce factor supplies prevent adjustment, since they restrict the means by which quantity might be increased. Finally, absolute entry barriers due to government action directly and absolutely prevent such adjustment. This last restriction, Smith terms monopoly:

"The monopolists, by keeping the market constantly understocked, by never fully supplying the effectual demand, sell their commodities much above the natural price, and raise their emoluments... greatly above the natural rate."[1]

Monopoly easily fits into Smith's analysis as the complement of competition. Smith assumes generally that prices are determined by quantity and demand. The distinction between competition and monopoly arises, because, in the former case, market price adjusts to natural price, whilst in the latter it remains above natural price. Nevertheless, both cases are treated in terms of price determination by quantity and demand. This finding is surprising, given the fact that the modern theory of monopoly is not consistent with supply and

---

1. ibid., p. 63.

demand analysis. The paradox is easily resolved, however, when we remember that Smith's conception of monopoly differed substantially from the modern one.

This point also must be borne in mind when we consider Smith's famous statement that

"the price of monopoly is upon every occasion the highest which can be got".[1]

Clearly, a profit maximising monopolist in the modern sense would not charge the highest price he could get, i.e. the price where he sold but one unit of a commodity to a single buyer. Rather he would choose price and output such that total profit was a maximum, i.e. such that marginal cost equalled marginal revenue. In the context of Smith's treatment of monopoly, however, the above statement makes good sense. Consider a single seller given the right to practice a trade without threat of new entry. In these circumstances, Smith said, given the quantity produced by the monopolist, market price would be established above natural price by the interaction of quantity and demand. This price would be the highest that could be got in the sense that any other assumption about entry barriers (i.e. they are lower, or ultimately competition is free) would involve a lower market price.

We have already noted in section II above that Smith's theory of the firm was inadequately formulated. We see this again here with his discussion of monopoly. Smith assumes the quantity the monopolist will supply is given, so that price is determined by demand, given that quantity. Such an assumption is of course not justified when we come to consider the theory of the firm explicitly.[2]

---

1. ibid., p. 64.

2. Smith seems to have been aware that there were problems involved with his assumption that the firm's quantity is fixed. He, however, regarded the possibility that a trader might destroy some of his stock in order to raise the price as unlikely (ibid., p. 159).

Generally, the quantity it supplies, and hence the price, is precisely the variable it uses to maximise its profits. Smith swept the problem under the carpet by his assumption that quantity was given, so that his analytical contribution to the theory of the monopolistic firm was negligible.

In Smith's price schema, free competition ensures that new firms enter an extra-profitable trade, and provide the adjustment mechanism to natural price. Under monopoly, on the other hand, regulations of police prevent the entry of new firms, so that price is the highest that can be got. In between these two cases, comes a third possibility: that of limited entry. Laws which provide only partial entry barriers prevent price falling to the natural price more or less, depending on how many firms are able to enter the trade:

"All those laws which restrain, in particular employments, the competition to a smaller number than might otherwise go into them, have the same tendency (to keep up price), though in a less degree (than monopoly)."[1]

Such laws, for example, "exclusive privileges of corporations" and "statutes of apprenticeship", are called by Smith "a sort of enlarged monopolies". These "enlarged monopolies" occupy the middle ground in Smith's price schema, which is clearly based on the entry barriers condition in the market.

This price schema was to exert a powerful influence on future economic analysis. Besides being an important contribution in the positive sense, it provided strong support for the popular dichotomy between the monopoly and free trade (competition) price:

"The one is upon every occasion the highest which can be squeezed out of the buyers, or which, it is supposed, they will consent to give: the other is the lowest which the sellers can commonly afford to take, and at the same time continue their business."[2]

---

1. ibid., pp. 63-4.

2. ibid., p. 63.

Smith's analysis of price provided a rationalisation of the idea
that monopoly was evil because it raised price, whilst free competition
led to a low price. Whilst this view was commonly held, Smith's
analysis provided the most complete rationalisation of it to date.

Further by identifying monopoly with regulations of police,
Smith was able to employ his analysis to support his political
commitment to laissez-faire. Monopoly arose because government
action prevented entry into a trade. Monopoly price was always the
highest that could be got, and so socially undesirable. Therefore,
the proper system of political economy was a freely competitive one
i.e. one in which there was little or no government interference
with trade. It would be easy to criticise this chain of reasoning.
For instance, it relies on classifying only government induced
restrictions on supply as due to monopoly, and ignoring other
"natural" limitations on supply. Or again, it relies on a peculiarly
restrictive notion of the firm, whereby it is not assumed to adjust
its output to maximise profits. Nevertheless, Smith's argument was,
despite its shortcomings, to be the foundation of British economic
policy for much of the 19th century, and was still to have its
supporters well into the present century.

The above argument abstracts from the fact that Smith by no
means stuck rigidly to the definition of monopoly outlined. Rather,
having established monopoly as socially undesirable, he tended
throughout the Wealth of Nations to use it loosely in a variety of
ways, but usually to represent things he disapproved of. We shall
now review some of the principal usages of the term employed by
Smith elsewhere in the book.

In Book I, chapter vii of the Wealth of Nations, Smith uses the
term monopoly to imply absolute entry barriers which secure a trade
for a single seller. When entry barriers are less than absolute
there exists "a sort of enlarged monopoly" in which there are
several sellers. Whilst it is possible that absolute entry barriers
may protect several existing sellers, Smith took the view that monopoly
only exists if there is one seller; several sellers indicating the
enlarged monopoly case. This distinction is adhered to at several
points in the book, but in other places it is not. Thus, for
example, Smith contends that tariffs on the importation of a certain

good, give a monopoly of the home market to domestic producers of
that commodity

"By restraining, either by high duties, or by absolute
prohibitions, the importation of such goods from foreign countries
as can be produced at home, the monopoly of the home market is more
or less secured to the domestic industry employed in producing them."[1]

This example is one of many, which show the wide meaning attached
to monopoly by Smith. Generally Smith used the term to cover the
enlarged monopoly case, where entry barriers might not be absolute
and where more than one producer might exist. It is clear from
the above quotation that for Smith monopoly was given a much wider
meaning than is the rule today. In particular, all tariffs were
examples of monopoly since they restricted free competition in a
trade, and on the basis of Smith's laissez-faire views, they were
condemned. Similarly, other regulations of police which restricted
free competition, such as restrictions on exportation, and the
Act of Navigation were regarded ss monopolies by Smith.[2] In
general, all government laws which restricted free competition were
monopolies.

Smith further extended the term monopoly to cover government
laws, even when they had little or no direct bearing on the freedom
of entry into a trade. Thus, for example, those laws in Spain and
Portugal which protected the rich and the debtor are labelled
monopoly by Smith on the grounds that the uncertainty of payment
they caused upset the natural order of the economy.[3] Government
policies, as opposed to laws, were also condemned as monopolies.

---

1. ibid., p. 418.

2. ibid., p. 427, and Vol. II, p. 153. The Act of Navigation gave
a monopoly of the British carrying trade to British ships.

3. ibid., Vol. II, p. 110.

—

Thus, again, the Portuguese government's policy encouraging trade with the E. Indies in the 16th century was a monopoly policy according to Smith.[1] In general, all government actions, apart from the minimum requirements of justice, police, revenue and arms,[2] were examples of monopoly to Smith, and hence to be condemned.

Smith, of course, did not reserve the term monopoly solely for "regulations of police". We have noted already, that in Book I, chapter vii monopoly was introduced along with secrets of trade and scarce factor supplies, as a reason why market price might remain above natural price. These other reasons are characterised by Smith at certain points as natural, (as opposed to police) restrictions on entry, and hence as only a sort of monopoly. Thus, for example, the owners of the limited supply of land in a town only act "the part of a monopolist".[3] In some places, however, such natural restrictions are simply termed monopolies. Thus, for example, land which is naturally limited in supply, yields a rent which is "the highest which the tenant can afford to pay", and

"the rent of land, therefore, considered as the price paid for the use of the land, is naturally a monopoly price".[4]

Or again, poor communications cause "the monopoly of the country producers" in some country markets, as they restrict the supply from outside producers to these markets.[5] In each of these cases,

---

1. ibid., p. 204. To Smith, the Mercantilists' advocacy of government policies to secure the common good was an anathema as evidenced by his pronouncement

"Monopoly of one kind or another, indeed seems to be the sole engine of the mercantile system", ibid., Vol. II, p. 129.

2. See Smith's 1763 Glasgow University lectures, Lectures on Justice, Police, Revenue and Arms, edited by Edwin Cannan (London: 1896) for his discussion of the proper functions of government.

3. Wealth of Nations, p. 119.   4. ibid., pp. 145-6.

5. ibid., p. 148.

the restriction of quantity which prevents the natural price being established is not dependent on any government action, and yet it is still called a monopoly by Smith.

In conclusion, we may once again stress the two most prominent features of Smith's discussion of monopoly. Firstly, his association of it with limitations on supply, which established it analytically as the complement of free competition; and secondly, his association of it with government actions. This former association was to have an important influence on the analytical development of price theory by the Classical economists. We shall see in the next chapter that the Classical economists' discussion of monopoly is largely of interest because of the different interpretations put on this aspect of Smith's analysis. The latter emphasis of Smith's discussion of monopoly was not, however, pursued by the Classical economists. Its main importance was to lie in the policy of laissez-faire which it gave support to.

IV. <u>Conclusion</u>

Smith's analysis of competition and monopoly in Book I, Chapter vii of the <u>Wealth of Nations</u> is a landmark in the history of economic thought. In this chapter, Smith was to construct an analysis of price determination which was to be a pervasive influence on much of the subsequent work in this field. We have seen that most of the ideas employed by Smith were current in the literature at the time he wrote, and that his work was largely one of selection and synthesis. Further, we have seen that his analysis was fairly primitive, and left much room for improvement. These points, however, do not detract from his achievement of presenting the first fully-fledged analysis of price in the economic literature. It is this achievement, perhaps more than any other, which has earned him the title of the founder of economic science.

Nevertheless, it would be to err just as much on the other side to suggest that Smith's analysis of competition and monopoly was an analysis of essentially perfect competition and pure monopoly. Rather we must conclude that Smith's analysis was of free competition rather than perfect competition. He analysed the movement of resources between trades, bringing inter-industry equilibrium, whilst the question of intra-industry equilibrium was not posed, much less solved. Monopoly, in this framework, meant, essentially, restrictions on the movement of resources, which prevented the attainment of inter-industry equilibrium. Smith further restricted the term to restrictions on supply due to government action in the cause of his anti-mercantilist, laissez-faire ideology. His view of competition and monopoly then differed markedly from the modern conception of these ideas. This modern conception, as we shall see in chapter 5, owes its origin more to the work of Augustin Cournot, and not directly to the work of Adam Smith.

Chapter 4

The Classical Economists and Competition and Monopoly

In this chapter, we shall examine the work of what we shall call
the Classical economists; those economists who wrote within the
framework mapped out by Smith, up to about 1870. These writers
were mainly British although several important members of the
school were not.[1] As with any school of thought these writers had
certain differences as well as certain things in common. Of the
common elements, we may notice that they all worked within a frame-
work derived from Adam Smith. They all turned out general theories
of the economy in terms of a few economic groups. More particularly,
they all gave the theory of value a central place in their works.
McCulloch, for example, went so far as to define economics as "the
science of values"[2], while John Stuart Mill commented at the begin-
ning of his discussion of value:-

"The subject on which we are now about to enter fills so
important and conspicuous a position in political economy, that in
the apprehension of some thinkers its boundaries confound themselves
with those of the science itself."[3]

Moreover, (although here there were important differences) they, like
Smith, made competition an integral part of their theory of value.

---

1. For our purposes, J.B. Say's name stands out in this context.

2. J.R. McCulloch, Principles of Political Economy (First edition
1825, Third edition (one used) 1843) (Edinburgh: W. Tait, 1843), p.3.

3. J.S. Mill, Principles of Political Economy (First edition 1848,
Seventh edition (one used) 1871) reprinted as vols. II and III of
F.E.L. Priestley et al, ed., Collected Works (Toronto: University Press,
1965), p. 455. F. List criticised "Smith's School" for teaching
"nothing else than the theory of values"; see F. List, The National
System of Political Economy (First edition (one used) 1841) trans.
by S.S. Lloyd (Longmans, 1916).

Within any group it is possible to make sub-divisions. One such division, which immediately suggests itself, is between those economists who supported a labour theory of value (the Ricardians, for short), and those who did not. Another division, perhaps not so obvious, is between those economists who tended to smooth over problems in competitive theory (the orthodox economists) and those who took a more critical and individualistic line (the individualistic group).[1] Both sub-divisions will prove useful in this chapter. The first, because of the tendency of the Ricardians to adopt a more fundamental and abstract viewpoint, which, amongst other things, led them to say very little about competition and monopoly. And the second, because it was the individualistic group who most attacked the empirical relevance of the theory of competition, and hence, amongst other things, had the most to say about monopoly, which was regarded as the opposite of competition. I shall, of course, not hesitate to cut across these sub-divisions, in what follows, if need be.

Certain economists of the period, of whom the most important is Cournot,[2] are not dealt with here, on the grounds that they were not in the Classical tradition in our terms. Of the remaining writers we shall see that, although they may have refined and developed Adam Smith's analysis, they failed to advance knowledge in any fundamental way. This distinction must be reserved for Cournot. They, rather, adopted Adam Smith's perspective on economic reality, and though they were able to gain minor insights, they were not able to make major advances in their analyses of competition and monopoly.

---

1. The Ricardians would probably be classified as a sub-group of the former, while Bailey and Senior figure prominently in the latter.

2. Mention should also be made of the contributions of Ellet and Lardner to monopoly theory. These writers were concerned with practical problems (specifically with canal and railway pricing respectively) and their works had no influence on subsequent economists. A planned discussion of their contribution to be given in an Appendix has been omitted because of time limitations. For a discussion of Ellet's contribution, see, however, C.D. Calsoyas, 'The Mathematical Theory of Monopoly in 1839: Charles Ellet Jr.' Journal of Political Economy, vol. 58, 1950, pp. 162-70.

We shall examine the Classical conception of competition first in Section I. Section II deals with monopoly, while in Section III we will briefly examine the reasons why the Classical economists did not achieve more in these spheres.

I. The Classical Analysis of Competition

The Classical economists developed their analysis of competition within the framework laid down by Adam Smith in the Wealth of Nations. It is not surprising,therefore,that in assessing their work we shall be primarily concerned with their interpretation and development of the ideas in that book. Before we move on to discuss some of their specific contributions, however, it is important to develop some general considerations to put their work in context.

The first point to note is that the Classical economists took over from Smith the idea that free competition is the general rule in the economy, and that exceptions to the rule are rare and put under the heading of monopoly. A typical statement of this view is the following:-

"Exchangeable commodities may be divided into two sorts: those upon the value of which competition produces its full effect, and those upon which it does not produce its full effect. We shall confine our observations to the former, because they constitute the general rule."[1]

For the orthodox majority of Classical economists only a few commodities were not considered subject to free competition, and these were generally afforded little comment. Only a few individualistic economists questioned the empirical relevance of free competition, and their work will be reviewed in detail in section II below.

Secondly, whereas Smith only uses the term free competition sparsely in his book, Classical economists raised competition to a central position in their work. It was central to Classical value theory, which in turn was central to Classical economic thought.

---

1. Quoted from a review of Samuel Bailey's Critical Dissertation (possibly written by James Mill), Westminster Review, January 1826, p. 167.

It was perhaps inevitable, therefore, that it tended to acquire for Classical economists a wider significance than solely as a mechanism of price adjustment. This point is well illustrated in J.S. Mill's famous statement that

"Only through the principle of competition has political economy any pretension to the character of a science. So far as rents, profits, wages, prices are determined by competition, laws may be assigned for them. Assume competition to be their exclusive regulator, and principles of broad generality and scientific precision may be laid down according to which they will be regulated."[1]

These sentences must strike a sympathetic chord for any economist brought up on the predominantly competitive assumptions of modern economic theory. Nevertheless, they are incorrect in the sense that economic theories need be based on competitive assumptions no more than on any other assumptions. Mill, and implicitly other Classical writers, impressed by the power of Smith's analysis, tended to elevate competition to a position above that of ordinary economic theories. Whilst clearly it is not logically tenable to place competitive theory above other theories, nevertheless, this view has had a pervasive influence on the history of economic thought ever since.[2]

Thirdly, Classical economists, like Smith, tended to concentrate their attention on free competition and inter-industry equilibrium, rather than market structure and the theory of the firm. They were concerned, basically, with the long run determination of the equilibrium values of aggregate economic variables, such as wages, profits and rent. In this framework, the central theorem of Classical

---

1. _Principles_, Book II, chapter iv, p. 239.

2. Discussion of the reasons for the pervasiveness of this view is postponed to Chapter 10, below.

value theory was the equalisation of returns in all directions,
which was brought about by the mechanism of free competition.
They were thus primarily concerned with inter-industry equilibrium,
and paid less attention to intra-industry equilibrium. In addition,
since they did not clearly distinguish theory and practice, regarding
the 19th century capitalist economy as essentially competitive, they
tended to describe real-world market structures rather than define
the market structure relevant to their theory. This failing we
have also noted in Smith's work. It follows then that there is
little of interest with regard to market structure and the theory
of the firm in the work of the Classical economists. In this section.
we shall only briefly look at the Classical contributions in these
areas, before passing to two subjects where the Classical contribution
was important: namely, in the development of Smith's analysis of
long run equilibrium, and his analysis of supply and demand.

Starting with the consideration of market structure, the Classical
economists saw the principle of competition as being broadly applicable
to "all civilized and commercial countries".[1] J.S.Mill argued that
in "a rude state of society" custom was the primary force determining
the distribution of income, etc. However, in time, competition becomes
the dominant force and the market economy evolves, although

"competition, in fact, has only become in any considerable degree
the governing principle of contracts, at a comparatively modern
period".[2]

In this context, then, the Classical economists regarded their
theory of competition as being applicable to modern capitalist
economies, and they were not concerned in general to abstract a market

---

1. J.R. McCulloch, Principles, p. 316. For similar expressions see
the works of Marcet, Malthus, Senior and J.S.Mill.

2. J.S. Mill, Principles, pp. 239-244. Mill argued that custom still
had an effect even in the modern market economy, so that theorems
derived from an assumption of competition in economic theory are
subject to "a general correction" (p. 244).

structure from their description of real-world markets. To take
the example of the number of sellers, for example, whilst on the
one hand, McCulloch refers to "thousands of sellers" entering a
market,[1] on the other, there are references to one or a few sellers
in a market. Clearly, such references are essentially isolated and
descriptive and we would not be justified to read any significance
into them one way or the other. Generally, the Classical economists
were not concerned with market structure.

Nor were the Classical economists interested in presenting a
theory of the competitive firm. They did say, as did Smith, that
the firm would close down if less than ordinary profits were earned.
For example, Senior writes

"It is true that unless that result (profit) were expected,
production would not be continued."[2]

And again, they believed that a firm would try to maximise its
profit, although they rarely stated it as baldly as this. But they
did not conceive of the firm choosing an equilibrium output to
achieve this end. Rather, when they made a comment about the firm,
it was vague and loose. Bailey, for example, writes

"No man, who bestows his time and attention on the production of
a commodity, will continue to produce it for the purpose of
exchanging it against another commodity, which he knows cost less
to the producer than his own and, on the other hand, every producer
will be willing to sell as large a quantity of his commodity as he
can dispose of at the same price as his fellow producers."[3]

---

1. Principles, p. 316.

2. N.W. Senior, An Outline of the Science of Political Economy,
(1836), (London: Allen and Unwin, 1951), p. 100. Senior quotes
Torrens to the same effect (pp. 98-100).

3. Samuel Bailey, A critical dissertation on the nature, measures
and causes of value: chiefly in reference to the writings of Mr.
Ricardo and his followers... (1825), Reprints of Economic Classics,
(New York: Augustus M. Kelley, 1967), pp. 199-200.

Bailey and the other classical writers were not aware that the profit maximisation assumption defines an equilibrium output for the competitive firm. Rather, like Smith, they felt that the firm would sell as much as possible at the market price.

The Classical writers had more to say about determination of the market price than the theory of the firm, but again their analyses offer little advance on Adam Smith. Consider, for example, the model of the market presented by Senior.[1] He assumes that each party in an exchange tries "to give as little, and obtain as much as possible". In doing this he envisages each attempting to estimate the utility and the limit to the supply of each commodity exchanged. Hence each dealer is not viewed as simply reacting to the price signals of the market, but as trying to delve into the causes of the value of each commodity, in order to ascertain their relative value. Senior notes, correctly, that "this is, however, a troublesome operation." Hence, in its stead, he argues that each dealer estimates the current relative value of commodities by taking an average of past prices. They therefore adopt a usual or traditional price. Senior goes on to argue that the institutional development of a money commodity greatly facilitates the dealers' estimate of the competitive price. If there is a money commodity (explicitly assumed homogeneous) all dealers can easily estimate its value from its utility and its scarcity. Then all that has to be done is for each trader to determine "the quantity of each (commodity) that is usually exchanged for a given quantity" of money, and their relative value is inferred". Senior sees price determination in the market as a matter of dealers estimating relative values by estimating usual prices; behaviour which is quite different from their responding to price signals as in modern market theory.

Another description of market price determination can be found

---

1. N.W. Senior, Outline, p. 96.

in Malthus' Principles.[1] The relation of the growth of the competitive
relative price system and the growth of the market economy is again
stressed in Malthus' work. He starts by arguing that relative value
is determined by reciprocol demand in the market

"When this reciprocol desire exists, the rate at which the
exchange is made, or the portion of one object which is given for an
assigned portion of the other, will depend upon the estimation in
which each is held by the parties concerned, founded on the desire
to possess, and the difficulty of procuring possession of it."

In the first instances of exchange, he argues that each small group
of traders would fix its own relative values. But when individuals
hear of better terms of trade elsewhere, they will not continue to
exchange at the poorer ones.

"After a certain time it might be expected that a sort of average
would be formed... a current relative value of all commodities in
frequent use would be established ."

This process is facilitated by the development of money. The result
is a market economy with a set of competitive relative prices.
Malthus does not suggest traders take past average prices to estimate
relative values as did Senior. But again his description closely
links the development of these prices to that of the market economy.
And this implies a strong historical influence on them.

J.S. Mill discusses another aspect of price determination in
the market in his chapter on 'Competition and Custom'.[2] This is the

---

1. T.R. Malthus, Principles of Political Economy, (First edition
1820; second edition (one used) 1836), Series of Reprints of Scarce
Works on Political Economy, 3 (Tokyo: Kyo Bun Kwan, 1936), pp. 51-2.
This passage bears a close resemblance to Turgot's treatment of market
price (see chapter 2, section 4 above), and indeed Turgot is mentioned
by name (p. 51).

2. J.S. Mill, Principles, Book II, chapter iv, pp. 242-3.

single price theroem. He says

"There is no proposition which meets us in the field of political
economy oftener than this - that there cannot be two prices in the
same market. Such undoubtedly is the natural effect of unimpeded
competition."

Setting aside for the present his observation that in the retail
trade in the real-world this proposition does not hold, he goes on
to argue in terms of the wholesale trade:-

"In the wholesale markets therefore it is true as a general propo-
sition, that there are not two prices at one time for the same thing:
there is at each time and place a market price, which can be quoted
in a price-current."

He gives as the reasons for this that both buyers and sellers are
businessmen, who apply only business considerations to their
purchases and sales.[1] There are two points of interest in Mill's
discussion. Firstly, he confuses the concept of a perfect market
with that of competition. Although it is usual to assume a perfect
market when considering the competitive model, it is not true that a
perfect market is consistent only with this model. The perfect
market and the single price theorem are consistent with other market
models also. At a time when other models were not dealt with it is
not surpising, however, that Mill did not perceive this distinction.
Nevertheless, confusion over the two concepts has persisted in the
literature and we shall have cause to return to this subject in a
later chapter. Secondly, we can see that although he was aware of
the types of assumption necessary for the theorem to hold, Mill did
not state explicitly the conditions which give rise to a perfect
market. This, of course, is explained again by the Classical
economists' failure to explicitly state the market assumptions they
were making. All in all then, Mill's statement that competition
produces a single price must be interpreted as no more than an
empirical observation, the analysis of which was essentially crude.

---

1. Mill also notes that better transportation facilities would make
prices more uniform in retailing (pp. 242-3).

Turning now to the Classical economists' discussion of long run
equilibrium, we find a much more satisfactory analysis. We shall look
at the treatments given by Senior and Ricardo, in that order. Senior
presented a highly individual account of Smith's theory in which he
distinguished two cost ideas: "the cost of production on the part of
the producer or seller" and "the cost of production on the part of the
consumer or purchaser".[1] The former is that cost which just enables
the producer "to continue to produce". The latter is the cost to
the potential buyers, or some people on their behalf, of producing the
commodity themselves. No seller will produce if price is less than
the former, and no buyer will buy if price exceeds the latter (it
being then worthwhile for him to produce the commodity himself). In
the case of perfectly equal competition, by definition, the commodity
may be produced with equal advantages by everybody. Hence these minimum
and maximum costs would be the same, and so price will equal them.
If price is below cost, production will be "discontinued or diminished"
so that supply falls and price rises to cost. If price exceeds cost,
extra profits attract new producers, increasing supply and lowering
price to cost.

Hence "under free competition, cost of production is the regulator
of price". Senior recognised, however, that "its influence is subject
to much occasional interruption". He then goes on to list the condi-
tions under which "its operation can be supposed to be perfect".
Firstly, there must be "no distrubing causes", by which he presumably
means no exogenous changes in supply or demand. Secondly, "capital
and labour can be at once transferred, and without loss, from one
employment to another". And, thirdly, "that every producer has full
information of the profit to be derived from every mode of operation".
If we add to these assumptions, Senior's first axiom of political
economy, "that every man desires to obtain additional Wealth with as
little sacrifice as possible",[2] then we have a comprehensive list of
conditions for the theorem that in long run equilibrium the rate of
profit of each firm in each industry is just sufficient to keep it
producing. A better statement of these conditions could not be

---

1. N.W. Senior, Outline, pp. 101-3.

2. ibid., p. 26.

desired, and all credit must be given to Senior for stating them so clearly.[1]

A number of points arise out of Senior's discussion. In the first place, his assumptions are so comprehensive that they are very unrealistic. Senior himself saw this

"But it is obvious that these suppositions have no resemblance to the truth."

In particular, he noted that capital in the form of "buildings, machinery and other implements" as well as specially adapted labour cannot be transferred to other employments.[2] Also, the information assumption is unrealistic as "few capitalists can estimate, except upon an average of some years, the amount of their own profits, and still fewer can estimate those of their neighbours". These two drawbacks, as well, presumably, as exogenous shocks, do not, in Senior's opinion, subvert the competitive result. Rather, they convert it into a long run tendency, which nevertheless is always in operation in cases of equal competition. It is the assumption of equal competition which Senior indicts as the real cause of the unrealistic nature of the theory. Since this implies, as he has defined it, that no producers, actual or potential, have any peculiar advantage in production, it excludes from its auspices all commodities for which rent figures at any point in their production. As Senior notes this excludes practically all commodities from the case of perfectly equal

---

1. Senior's work stands out amongst the Classical economists for his attempt to state his assumptions explicitly, and so build economic science on a firm foundation.

2. op. cit., p. 102. Say is another writer who emphasised this point strongly; see J.B. Say. A Treatise on Political Economy, or the production, distribution, and consumption of wealth, (First U.S. edition (1821), from the fourth French edition), Reprints of Economic Classics (New York: Augustus M. Kelley, 1964), p. 321.

competition.[1] Senior was the first writer to see the stringent nature
of the theory, and set it up as an "ideal" case

"we do not mean to state that any such commodities exist, but
that , if they did exist, such would be the laws by which their price
would be regulated".[2]

The second point which arises from Senior's discussion is the
logical independence of the theorem that each firm only earns ordinary
profits, from the theory of the equilibrium of the firm. It is not
necessary that conditions of pure competition exist (to use Chamberlin's
terminology), for firms in long run equilibrium to earn no excess
profits. The assumptions which bring this result about are in a
sense arbitrary, and placed on top of the market structure posited.
We are not, of course, saying that Senior saw this point, for he was
not very precise as far as market structure was concerned. However,
in an example he gives, he does bring this point out into the open.
He refers to the case of the supply of water to London being provided
by a single company.[3] In time as price rose above cost the company
earned excess profits, so that three new companies were established,
and price fell with the increased supply. There are obvious difficul-
ties with this example, which we will not dwell on here. Suffice
it to say that the market structure involved here is certainly not
one of pure competition; but is is not necessarily inconsistent with
Senior's long run theorem. For Senior and generally for the Classical
economists, the theory of competition referred to the equalisation
of profit rates in all directions, and this result is logically
independent of the model of price determination within a market
which is postulated.

Ricardo, in spite of his almost exclusive concentration on long
run theorems, does in a brief chapter present an important analysis
of the adjustment to the long run.[4] If market price diverges from the

---

1. Practically all commodities in Senior's view are produced under
monopoly; see section 2 of this chapter.

2. op. cit., p. 114.   3. op. cit., pp. 101-2.

4. David Ricardo, On the Principles of Political Economy and Tax-
ation, vol. I of P. Sraffa, ed., The Works and Correspondence of David
Ricardo (Cambridge University Press, 1970), chapter iv, 'On Natural
and Market Price'.

"primary and natural price" then "profits are elevated above or depressed below their general level and capital is either encouraged to enter into, or is warned to depart from the particular employment in which the variation has taken place". Ricardo gives two separate explanations of this mechanism. The first is along the lines we have already met with Senior, and is on a more general level than the other. Ricardo postulates two assumptions as sufficient for it to operate: that "every man is free to employ his capital where he pleases" and that each "will naturally seek for it that employment which is most advantageous". These assumptions are not as comprehensive as those given by Senior, and in particular omit the important availability of information assumption. Nevertheless from them Ricardo argues

"This restless desire on the part of all the employers of stock, to quit a less profitable for a more advantageous business, has a strong tendency to equalize the rate of profits of all, or to fix them in such proportions, as may in the estimation of the parties, compensate for any advantage which one may have, or may appear to have over the other."[1]

Despite the less heroic nature of his assumptions, it seems likely that Ricardo realised their unreality. At any rate he modifies his explanation of the adjustment mechanism when he goes on to deal with it more specifically.[2] In his second explanation, he assumes that there exists "in all rich countries" a large pool of "circulating capital", owned by "the monied class" and the bankers, who use it to discount bills or make industrial loans, and live on the interest. Further every manufacturer is assumed in some degree to borrow from this pool to finance, in part, his production. Now suppose "the demand for silks increases, and that for cloth diminishes", raising profits in the former trade and lowering them in the latter. His first explanation implies that the clothier will "remove with his capital to the silk trade". In this second explanation, however, adjustment

"is probably effected, by a manufacturer not absolutely changing his employment, but only lessening the quantity of capital he has in that employment".

---

1. op. cit., pp. 88-9.   2. op. cit., p. 89.

In our example, each clothier will contract production, dismiss some workmen, and borrow less capital in each period: while each silk manufacturer will expand production, hire more workers, and borrow more capital. Thus, labour moves between employments, and so does capital (in the form of money): but it is not required that producers actually switch employments, or that physical capital be moved.

Ricardo's second explanation of the adjustment process to long run equilibrium is more down-to-earth and realistic than the first one, and hence is more acceptable on this level. But it also has implications for the theory of the firm which the first general explanation does not. Ricardo argues that the silk producer, faced with a raised demand, has a higher price and profit, and so will increase his output. Conversely, the clothier with a lower price will decrease his output. This, in fact, would happen under pure competition with increasing marginal costs. But, Ricardo did not think of it in these terms. He only observed that in real life firms in expanding industries expand output; and vice versa. He did not conceive of the profit maximising assumption defining an equilibrium output for the firm. In his conception each firm would expand or contract output until only ordinary profits are earned. We have met a similar conception of the firm's activities in Smith's work, and it seems clear that this was the general Classical line on the theory of the firm.

Finally, we shall discuss the role given by Classical writers to supply and demand analysis.[1] The non-Ricardian majority of Classical economists held the view, like Smith, that supply and demand analysis was applicable to the determination of the price of every commodity, whether produced under competitive or monopoly conditions. Malthus,

---

1. The phrase "supply and demand", as was stressed in chapter III above, was not used by Smith. Its use, however, was widespread in the nineteenth century, and apparently owes its origin to a number of writers, notably James Mill and David Ricardo, who used it in the first two decades of the century. See P.D. Groenewegen, 'A note on the origin of the phrase "supply and demand"', Economic Journal, vol. 83, June 1973.

for example, asserted this strongly

"probably not a single instance of a change of price can be
found, which may not be satisfactorily traced to some previous change
in the state of the demand and supply".[1]

Support for this position was not universal, however. Ricardo, in
particular, dissented from it in the case of long run competitive
equilibrium.[2] He argued that cost of production and not demand and
supply determined long run competitive price:-

"The opinion that the price of commodities depends solely on the
proportion of supply to demand, or demand to supply, has become almost
an axiom in political economy, and has been the source of much error
in that science... It is the cost of production which must ultimately
regulate the price of commodities, and not, as has often been said,
the proportion between the supply and demand: the proportion between
supply and demand may, indeed, for a time, affect the market value
of a commodity, until it is supplied in greater or less abundance,
according as the demand may have increased or diminished; but this
effect will be only of temporary duration... the prices of commodities...
will ultimately depend, not on the state of demand and supply, but on
the increased or diminished cost of their production".

Supply and demand analysis was, in Ricardo's view, only applicable to
monopolized commodities and "the market price of all other commodities
for a limited period". Lip-service to this position was paid by
followers of Ricardo, notably the Mills, father and son.[3]

What is Ricardo's purpose in this distinction? He undoubtedly
thought it important, since he devoted a whole chapter to it. On my
reading of this chapter, he excluded supply and demand analysis from
the long run determination of competitive price for two distinct
reasons. These reasons were not distinguished in his mind, but we

---

1. *Principles*, p. 62. See also pp. 69-83.
2. D. Ricardo, *Principles*, chapter 30, pp. 382-385.
3. James Mill, *Elements of Political Economy*, (First edition 1821,
Second edition (one used)1824)(London: Cradock and Joy, 1824),
pp. 88-9, and J.S.Mill, *Principles*, pp. 468, 582.

shall distinguish them and bring out the greater importance (for us) of the second one. In the first place, Ricardo used the dichotomy to distinguish the <u>fundamental</u> nature of long run equilibrium price, from oscillatory disequilibrium prices. In his mind, supply and demand were associated with short run price movements, and he excluded them from the determination of long run price to emphasise the latter's less transitory nature. On this view, Ricardo did not deny that it was adjustments of supply which brought about long run equilibrium, but he said that in equilibrium these forces do not determine price, but cost does. Hence, his position is reduced to a semantic difference with the majority of Classical economists. But also, Ricardo did support a position which was much more than one which can be reduced to semantics. He also argued that price may move to long run equilibrium after an exogenous shock, though supply and demand do not change.

We have already seen that Ricardo understood the adjustment mechanism to long run equilibrium, in terms of factor movements, as well as anybody. What he did not fully understand, however, was supply and demand analysis, and it was this which caused him to make this mistake. It is worthwhile to quote the relevant passage in full:-

"If the natural price of bread should fall 50 per cent, from some great discovery in the science of agriculture, the demand would not greatly increase, for no man would desire more than would satisfy his wants, and as the demand would not increase, neither would the supply; for a commodity is not supplied merely because it can be produced, but because there is a demand for it. Here, then, we have a case where the supply and demand have scarcely varied, or if they have increased, they have increased in the same proportion: and yet the price of bread will have fallen 50 per cent, at a time, too, when the value of money had continued invariable."[1]

---

1. Ricardo, <u>Principles</u>, p. 385. Ricardo fails to see that price will fall because supply increases because of increased profits in the bread industry.

Ricardo's poor conception of the workings of supply and demand leads him to argue that it does not bring about long run price, but cost of production does. In other words, he treats supply and demand analysis as a rival theory of value to the cost theory here, rather than as but a part of the competitive mechanism. This misunderstanding, although we have seen that it was but an inconsistent aberration, implies that Ricardo had only a vague conception of the place of supply and demand in competitive analysis.[1]

We have seen that Ricardo had a poor understanding of the workings of supply and demand, and this could be said of practically all the Classical economists. Although they did not often make such blatant mistakes as the one quoted above, there was a great deal of vagueness in the conceptual tools with which they approached the subject.

---

1. Maurice Dobb (Theories of Value and Distribution since Adam Smith. (Cambridge University Press, 1973), pp. 118-20) defends Ricardo against the charge that he had a poor conception of supply and demand analysis. He argues that Ricardo used "supply and demand" as "a label for the rival theory of value and distribution (i.e. Smith's theory) that he was combating", but that he clearly saw that in both theories shifts in demand and supply cause price movements, whilst in equilibrium price equals cost of production. The quotation in the text, however, appears to belie this argument. See also J.A. Schumpeter, History of Economic Analysis, pp. 600-1, who takes the line "that Ricardo was completely blind to the nature, and the logical place in economic theory, of the supply and demand apparatus". We have taken a less strong line than Schumpeter's, arguing that Ricardo was more confused rather than blind concerning supply and demand analysis.

We shall employ Malthus' treatment of the subject, to indicate the general Classical confusion.[1] In the first place, Malthus adopts a typical Classical definition of demand and supply

"the demand for any sort of commodities may be defined to be, the will of persons to purchase them, combined with their general means of purchasing; and supply, the quantity of the commodities for sale, combined with the desire to sell them".

Since the object of the exercise is to relate demand and supply, we can immediately see problems in these definitions. As J.S. Mill put it

"What ratio can there be between a quantity and a desire, or even a desire combined with a power?"[2]

It is clearly the unsymmetrical definition of demand as desire which causes the problem. Malthus was aware of the somewhat intangible nature of this definition of demand. And his alternative definition, that, if the value of money is constant, "demand will be represented and measured by the sacrifice in money which the demanders are willing and able to make in order to satisfy their wants", is more helpful. Given these definitions, he then gives the usual Classical statement that "the value of commodities in money or their prices are determined by the demand for them, compared with the supply of them".

The relationship between demand and supply in equilibrium was generally left vague by Classical economists, who often spoke of a ratio or proportion between them. Malthus, however, goes on to investigate the idea that the relation between demand and supply is one of equality. It is with this problem that he is most penetrating.

---

1. T.R. Malthus, _Principles_, pp. 61-9. Malthus' treatment is atypical in that he devotes more space to demand and supply analysis than was usual amongst Classical economists. However, what he had to say is fairly representative of the Classical position.
2. J.S. Mill, _Principles_, p. 465.

He realises that a relationship of equality requires that demand and
supply are measured in the same way. He therefore introduces the
concepts "the extent of actual demand" and "the extent of the actual
supply", meaning by these the quantities demanded and supplied.[1]
This is progress, but, unfortunately, he does not go further. In
particular, he does not clearly define these quantities as functions
of price. He does say that

"The actual extent of the demand, compared with the actual extent
of the supply are always nearly equal to each other."

But he is not clear here as to whether he is speaking of an equality
in equilibrium, or simply of an ex post identity. He was not sufficient-
ly in control of his concepts to clarify this.

His analysis now moves on to a wrong track. Arguing, misguidedly,
that since demand and supply are always nearly equal in the above
sense, these concepts are of no use in explaining how a change in the
proportion of demand to supply determines price, he moves on to consider
another concept of demand and supply. This is the idea of "the
intensity of demand". He argues that demand depends on the number
of buyers, their desires and their wealth. An increase in any of
these factors will increase the intensity of demand. The use he
makes of this concept is rather confused and provides no further
insight into the analysis of demand and supply, so we will pursue it
no further. Suffice it to say that his unsymmetrical treatment of
demand and supply, and his failure to recognise the supply and demand
functions, severely hamper his treatment of the subject.

Although, in general, Classical economists had a poor understanding
of demand and supply, two economists, J.B. Say and J.S. Mill, stand
out as forging the modern conception of these ideas. J.B. Say, despite
the early date of his work, was able to give a near complete account
of the concepts.[2] In the first place, he defines both demand and

1. These concepts were also used by J.B. Say (see below).
2. J.B. Say, Treatise, Book II, chapter i, pp. 287-90. Say's
achievement in this respect, as in others, is notable given the early
date of the first appearance of his work (1803).

supply as quantities of the commodity, desired or offered respectively.

> "the demand for a specific object, or product, or act of product-
> ive exertion, has a certain degree of extent. The aggregate demand
> for sugar in France is said to exceed 500, 000 <u>quintals</u> per annum...
> ..the quantity attainable at a given time, and ready for the satis-
> faction of those who are in want of the specific article, may be
> called the supply or amount in circulation".[1]

He thus starts by placing demand and supply on an equal footing.
Secondly, he explicitly makes both demand and supply functions of
price. The market demand for a commodity does not only depend on the
individuals! desire to possess it, (since then demand would be
unlimited), but also on the purchasing power (or wealth) they possess.
Hence, as price rises, fewer are able to buy, and demand is less.
Conversely demand rises, as price falls and more buyers are able to
buy:-

> "the same product or products may be in greater demand at a
> lower scale of price... merely because accessible to a greater number
> of consumers; and, on the contrary, less in demand at a higher scale
> of price, because accessible to a smaller number".

On top of this, Say argues that an individual buyer "will buy less
according as the price rises, and more according as it falls". Together
these effects add up to postulating market demand as a negative
function of price. On the supply side, since a commodity will not be
produced if its cost exceeds the market price, as market price rises,
supply will increase; and vice versa:-

---

1. ibid., pp. 287-8. Say, writing in French, spoke of "offer and
demand"("la quantité offerte" and "la quantité demandée") rather than
"supply and demand", and this was in the French tradition: see chapter 2
above.

"Inasmuch as supply consists of those commodities only, which
are to be had at the current price or ordinary rate of the market, a
commodity raised by the cost of production above that level, will
cease to be produced, or to form part of the supply. Wherefore, the
supply will be more abundant, when the current price is high, and more
scanty when the price has declined."

Say's recognition of the demand and supply functions was a major
original achievement. He did not, however, take the final step and
use them to show how price is determined. Rather he obscures his
analysis by introducing other subsidiary factors which affect demand
and supply. And, in the event, his conception of the determination
of price by demand and supply does not utilise the idea of demand and
supply as functions of price. Instead he conceives of equilibrium in
terms of the analogy of a beam and fulcrum. Demand and supply are
conceived as weights i.e. given quantities, on either end of a beam.
The price scale is measured along the beam and the equilibrium price
is the price which just balances demand and supply.

$$\underbrace{D}\quad \text{higher prices} \quad\underset{\underset{P}{\triangle}}{}\quad \text{lower prices} \quad\underbrace{S}$$
$$\xleftarrow{\quad\quad a \quad\quad}\; P\; \xleftarrow{\quad\quad b \quad\quad}$$
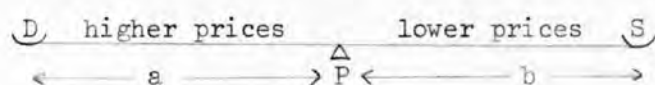
Say conceived the equilibrium price to be such that $D.a = S.b$.
Given this conception of demand and supply he was able to "prove" the
popular assertion that "the price of a commodity rises in proportion
to the increase of the demand and the decrease of the supply, and
vice versa". He, thus, used demand and supply as given quantities in
his conception of price determination. And he failed to see that in
equilibrium demand and supply were not just balanced, but made
equal to each other.[1]

---

1. It is interesting to note that Say's analogy of the beam and
fulcrum does give the correct comparative static results that an
increase in demand will raise price, and an increase in supply will
lower it (see figure). These results, however, depend on the
(arbitrary) measurement of price from high to low, as we move from
demand to supply along the beam.

It was left to J.S. Mill to complete Say's work, and present the
first correct statement of supply and demand analysis in words.[1] Mill,
as we have noted, recognised the meaninglessness of comparing "a
quantity and a desire, or even a desire combined with a power".[2] He,
therefore, defined demand and supply as quantities of the commodity

"A ratio between demand and supply is only intelligible if by
demand we mean the quantity demanded, and if the ratio intended is that
between the quantity demanded and the quantity supplied."

Secondly, he makes demand, and with less emphasis, supply, functions
of price. With demand he is explicit:-

"the quantity demanded is not a fixed quantity, even at the same
time and place; it varies according to the value; if the thing is
cheap, there is usually a demand for more of it than when it is dear".

Supply he treats less carefully, but he does say that a high price
may bring forward "additional sellers sufficient to supply it",
and a low price may cause the withdrawal of "a part of the supply".

---

1. J.S. Mill, Principles, Book III, chapter 2, pp. 465-8. Mill
undoubtedly built on the foundations laid by Say as the following
quotation indicates

"Undoubtedly the true solution must have been frequently given,
though I cannot call to mind any one who had given it before myself,
except the eminently clear thinker and skilful expositor, J.B. Say"
(p. 466).

2. ibid., p. 465. As Mill notes, "some confusion must always attach
to a phrase so innappropriate as that of a ratio between two things
not of the same denomination".

Mill, unlike Say, used the conceptual tools he forged to show the determination of price by demand and supply. Since both demand and supply depend on price, he saw that price would change until it reached an equilibrium position where demand is "just sufficient to carry off the existing or expected supply". If demand exceeds supply initially, price will rise, lowering demand and raising supply, until both quantities are the same. Conversely if supply exceeds demand, price will fall. Mill notes that, in general, it is untrue that if, say, "the demand exceeds the supply by one third, the value rises one-third". Rather price will rise to that level, whatever it be, where demand and supply are equal. And it is this recognition that the equilibrium price was determined by the equality of demand and supply, which was Mill's true achievement:-

"the idea of a ratio, as between demand and supply, is out of place, and has no concern in the matter: the proper mathematical analogy is that of an equation. Demand and supply, the quantity demanded and the quantity supplied, will be made equal".

The realisation that an equation of demand and supply was involved in the determination of price, swept away all the vague ideas of a proportion or ratio. And, likewise, the other concepts used by Say and Mill, made ideas like the extent and intensity of demand obsolete. Demand and supply analysis in the hands of Say and Mill was brought to a level where it was readily amenable to geometric and algebraic treatment.[1]

In conclusion then, the Classical economists contribution to the analysis of competition was shaped by the Smithian framework within which they worked. Their most notable achievement was the sophistication of the notions of supply and demand presented by Smith, whilst

---

1. The algebraic treatment of supply and demand was, in fact, first given by Cournot in 1838, and so was not dependent on Mill's work (see chapter 5 below). Jenkin, who provided the first geometric treatment in 1870, probably did benefit from Mill's analysis, however, (see chapter 8 below).

they also made headway with the conditions under which long run competitive equilibrium would result. In both these cases, the groundwork of analysis had been presented by Smith in Book I, Chapter 7 of the Wealth of Nations, so that the Classical contribution was one of development rather than stark originality.[1] In the areas of market structure and the theory of the firm, the Classical contribution, like Smith's was negligible. This was again because the Smithian framework of analysis was not focussed on these particular issues. The important developments in these areas were to come from an altogether different source.

_____

1. The Classical contribution in these areas only came from a few writers: from Senior and Ricardo in the first case, and from Say and J.S. Mill in the second. In general, Classical discussions of supply and demand, and equilibrium under free competition, added little or nothing to Smith's work.

II. Four Classical Views of Monopoly

Classical economists as a whole dealt much more sparsely with the
theory of monopoly, than with the theory of competition. In some
treatises it was ignored altogether, while in others it received
isolated mention in out-of-the-way chapters.[1] Only individualistic
writers, such as Samuel Bailey and Nassau Senior, afforded it anything
like the status given to the theory of competition. Nevertheless, we
should not conclude from this apparent neglect of monopoly, that the
Classical economists offered no theory of it. Rather, within the
Classical literature, there are a number of quite separate monopoly
theories. In this section, we shall examine four of these theories,
in the context of four Classical writers. And we shall see that
despite the apparent agreement of Classical economists on the problem
of monopoly, each of these theories is logically distinct. But before
we do this, we shall consider some general similarities in the views
of Classical economists on monopoly.

Throughout the Classical literature there is a certain looseness
in the use of the term monopoly. Not only did different authors
present different theories of monopoly, but often within the work
of a single author, five or six different usages of the term may be
found. In his Treatise on Political Economy, J.B.Say for example,
at different places, defines monopoly as "a producer without
competitors"; a commodity with inelastic supply; and a situation
of government protection for one, or a class of producers, from the
competition of outsiders.[2] J.S. Mill, writing much later, used mono-
poly in all these senses, and in addition referred to the case of
the isolated exchange of a single commodity as a monopoly.[3] Like

---

1. James Mill, for example, makes no mention of monopoly in his
Elements of Political Economy (1821), whilst Ricardo's discussion of
it (see below) is consigned to one of the chapters on taxes (chapter
xvii) in the Principles.

2. J.B. Say, Treatise, pp. 292, 290, 147 respectively.

3. J.S. Mill, Principles, pp. 405, 464-9, 136-9, 232-3.

Smith, the Classical economists were not in general careful over their
usage of the term monopoly, again indicating a lack of analytical
interest in the case. In addition, we must also note that few writers
actually considered the case of the single seller of a commodity. The
treatments of Bailey and Senior we will consider below, but even
in these cases it is fair to say that there was no real advance towards
the development of pure monopoly theory.[1] Analysis of the sole seller
of a product went no further in the work of the Classical economists.

In the second place, Classical economists, like Adam Smith, were
bound by the popular notion that competition and monopoly were oppo-
sites. And linked to this was the usual normative indictment of
monopoly. In John Stuart Mill's words:-

"wherever competition is not, monopoly is; and... monopoly,
in all its forms, is the taxation of the industrious for the
support of indolence, if not of plunder".[2]

These popular conceptions were fitted quite smoothly into the frame-
work of Classical economics by giving the name monopoly to all
situations which were considered exceptions to the rule of competition.
It is this point which accounts for the different theories of monopoly
advanced by different Classical economists. As different economists
had different ideas as to what were exceptions to the competitive
rule, so they defined 'monopoly' differently to cover these exceptions.
Thus, Classical economists, such as Ricardo, who admitted few
exceptions, meant something completely different by 'monopoly' from
more individualistic writers, like Bailey, who admitted many
exceptions. The four different Classical definitions and theories
of monopoly, which we will meet below, are all directly derived
from this Classical framework of competition and monopoly.

---

1. We shall see below that Senior can lay claim to some advance,
although his contribution was ignored by the other Classical economists.

2. Principles, Book IV, chapter 7, p. 794.

Finally, in the Classical literature, despite the fact that different theories were being employed, there is a superficial feeling of harmony of conception of monopoly. We will demonstrate below that this was not justified, but it would be as well to account for it now. We have already mentioned the Classical looseness of thought, and the common Classical conceptual framework: both factors which contribute to a feeling of unity on monopoly, as does the common heritage in Smith's Wealth of Nations. Further, many, though not all, Classical conceptions of monopoly involved some kind of limitation of the supply of a commodity, although no more precise idea generally holds. However, if not all Classical economists agreed on the criteria for a monopoly, they all agreed on the tool of analysis that was applicable to the case. It is one of the ironies of the history of economic thought that while heated debate went on over the applicability of supply and demand analysis to the theory of competition, Classical economists accepted without hesitation its application to monopoly. In Malthus' words:-

"It has never been a matter of doubt, that the principle of demand and supply determines exclusively, and very regularly and accurately, the prices of monopolised commodities, without reference to the ordinary cost of production."[1]

This common tool of analysis along with the other factors mentioned, makes for a superficial unity in Classical economists' monopoly theories. That there are differences between their theories, however, there can be no doubt, as we shall now see.

We shall begin our discussion with the work of Ricardo, who had the narrowest view of monopoly of the four authors we shall look at. The other authors we shall consider (McCulloch, Bailey and Senior) had successively wider views of monopoly. In his Principles, Ricardo divides commodities into two groups: those which derive exchangeable value "from their scarcity", and those which derive

---

1.   T.B. Malthus, Principles, p. 70. We shall argue in chapter 9 below that the Classical belief that supply and demand analysis is applicable to monopoly was to shape the treatment of monopoly presented by Alfred Marshall, writing at the end of the 19th century.

it "from the quantity of labour required to obtain them".[1] The former
group are characterised by the criterion that "no labour can increase
the quantity of such goods", while in the latter case additional
labour inputs will increase supply. The result of this classification
is that whilst in the latter group exchangeable value "depends on
the relative quantity of labour which is necessary for... production"[2],
in the former group there is no such relation, value varying as demand
varies. The latter case was regarded by Ricardo as the general
case, so it was to the former group that he gave the name monopoly,[3]
Since

   "These commodities... form a very small part of the mass of
commodities daily exchanged in the market".

he felt able to omit them from the bulk of his analysis. It is only
in a couple of paragraphs in chapter xvii that the monopoly case
receives attention.

   Before we proceed to Ricardo's monopoly theory, however, we must
say something about the evident logical problems of his classification
of commodities. It seems clear that Ricardo was involved in logical
misdemeanours in his attempt to establish the quantity of labour
as the basis of exchangeable value. In the context of monopoly,
regarded as the non-competitive case, this meant that he defined it
as the case where scarcity not labour determines value; where
supply is fixed not variable; and where value in the long run is not
related to labour input. In fact, as we shall see below, nothing
of import is lost in the classification of commodities if all
reference to labour quantity is dropped. If this is done, we are

---

1. _Principles_, chapter i, p. 12.

2. ibid., p. 11.

3. The term monopoly does not appear in chapter i of the _Principles_,
but it seems clear that this is Ricardo's intention.

left with the contention that monopolised commodities are those which
are fixed in supply, and this is undoubtedly what Ricardo meant by
monopoly. All the rest must be regarded as metaphysical super-
structure, irrelevant to a positive appraisal of Ricardo's monopoly
theory.

In his chapter on 'Taxes on other commodities than raw produce',
Ricardo gives us his monopoly theory in four propositions. Firstly,
monopoly is the case where the supply of a commodity is wholly
inelastic:-

"Commodities are only at a monopoly price, when by no possible
device their quantity can be augmented; and when therefore, the
competition is wholly on one side - amongst the buyers."[1]

That Ricardo adheres to the fixed supply criterion of monopoly is
borne out by the examples he gives of it:-

"Some rare statues and pictures, scarce books and coins, wines
of a peculiar quality, which can be made only from grapes grown on
a particular soil, of which there is a very limited quantity, are
all of this description."[2]

Secondly, Ricardo supports Smith's dictum that monopoly price "is
upon every occasion the highest which can be got", in the sense
that

"When a commodity is at a monopoly price, it is at the very highest
price at which the consumers are willing to purchase it."[3]

When supply is fixed "price is limited only by the extent of the
power and will of the purchasers". Thirdly, the price of monopoly

---

1. op. cit., chapter xvii, pp. 249-50.

2. ibid., p. 12. Similar examples are given on pp. 249-50.

3. ibid., p. 249-50. Ricardo is thinking of a single monopoly price
here, so that it measures the willingness to pay of the marginal
consumer only.

may be high in one period and low in another, according to the
level of supply and demand. And fourthly, monopoly price is therefore
not at the natural price

"The exchangeable value therefore of a commodity which is at a
monopoly price, is no where regulated by the cost of production."[1]

As an example of this, he gives the case of a wine produced in
special vineyards for which the rent "may be raised beyond any
moderately assignable limits". He makes no more precise statement
on the level of monopoly price.

Although Ricardo is not altogether consistent in the Principles,[2]
we shall take the above as being his theory of monopoly. It is
typically Classical in its use of demand and supply analysis.
Yet at the same time it is a distinct view of monopoly. Ricardo emp-
loys a very narrow definition of monopoly in the fixed supply
criterion, restricting its application to only a few commodities,
such as rare pictures. In fact it is the narrowest usage we shall
meet. It was not generally adopted by Classical economists, who,
as a whole, were not so sparse in their treatment of exceptional
cases, as was Ricardo.

---

1. ibid., p. 250.

2. In particular, our interpretation of Ricardo's view of monopoly
as involving commodities in fixed supply is not consistent with his
statement (Principles, chapter 30, p. 385) that

"Commodities which are monopolised, either by an individual, or
by a company... fall in proportion as the sellers augment their
quantity, and rise in proportion to the eagerness of the buyers to
purchase them; their price has no necessary connexion with their
natural value."

We have taken the view that this statement is an aberration from
Ricardo's central position that monopoly, being the opposite of free
competition, involves commodities in fixed supply.

The second author we shall consider is J.R. McCulloch. Although the foremost disciple of Ricardo his discussion of monopoly is not so narrow as that of his teacher. Rather it is fair to say that the position he adopted, involved a synthesis of the doctrine of both Smith and Ricardo on monopoly. Whereas Ricardo only considered commodities fixed in supply as subject to monopoly, McCulloch added the class of commodities where supply is not fixed but restricted so that market price would not fall to natural price in the long run. These two groups of commodities together, accounted for all the exceptions to the competitive rule. This grouping of commodities is more logically satisfactory than Ricardo's, and was more popularly adopted by Classical economists.

McCulloch begins his discussion of value, like Ricardo, by dividing commodities according to whether the source of their value is labour or scarcity.[1] However, he amends Ricardo's analysis slightly by allowing in the monopoly group all commodities "the supply of which does not admit of an indefinite extension".[2] This leaves him with two groups of monopolised commodities: those which are fixed in supply, which he refers to as natural monopolies; and those of which the supply is restrained, which he refers to as artificial monopolies:-

"some commodities exist only in limited quantities, and are, consequently, subject to a natural monopoly; while the production of others, the supply of which might be indefinitely increased, is sometimes subject to artificial restraints."[3]

---

1. J.R. McCulloch, Principles, Part II, chapter i, p. 297.

2. ibid., p. 297.

3. ibid., p. 300. See also pp. 297; 317-8. In McCulloch's view, commodities which are not fixed in supply, but are neither subject to free competition, are restricted by some act of government. This explains his use of the phrase "artificial monopoly", as opposed to "natural monopoly", to describe them. The influence of Smith is evident in this view.

In both cases "the marketable or exchangeable value of these
commodities bears no definite proportion to their cost or real
value". Such commodities, where supply is restrained so that price
exceeds the supply price, are in the Classical tradition

"readily discriminated from those that may be freely produced
in unlimited quantities; and are but few and unimportant when
compared with the latter".[1]

McCulloch's discussion of what he calls "natural monopolies",
e.g. rare statues, and special wines, adds nothing to Ricardo's
analysis. Their exchange value is determined by supply and demand,
not cost; and

"As their supply cannot be increased, their price varies as the
demand, and is totally unaffected by any other circumstance."[2]

"Artificial monopolies" on the other hand, are not regarded by
McCulloch as being as oppressive as this, but are still regulated
by the same principle:

"When an individual, or class of individuals, obtains the exclu-
sive privilege of furnishing any species of goods, the principle of
competition is suspended with respect to them, and their price must,
in consequence, depend wholly on the proportion in which they are
brought to market, compared with the demand."[3]

McCulloch is clearly using here the Smithian view of monopoly, in
which an individual or group possesses a government privilege to a
trade which excludes the competition of outsiders. Again, supply
and demand determine price, but in this case, the producers may
vary supply.

_____

1. ibid., p. 300. Like Ricardo, McCulloch felt that the monopoly
case was not important enough to devote more than a few paragraphs
to it.

2. ibid., p. 318.
3. ibid., p. 317.

Smith did not analyse the problem of how the protected sellers decide what quantities they offered for sale. Rather, he just assumed they would offer certain quantities, and in aggregate supply would fall short of effectual demand. McCulloch noted, however, that it would be possible for the sellers to keep the market fully stocked, so the natural price would rule "and the monopoly would have no disadvantage farther than the exclusion of the public from an employment which every one should have leave to carry on." However, he felt that

"All classes endeavour to get the highest price for their products; and, in this view, those who are protected by a monopoly against the risk of being undersold by others, uniformly keep the market understocked or supply it with inferior articles, or both."[1]

The result is a high price limited only by "the will and power of the purchasers". Whilst McCulloch clearly saw that the producers under monopoly could vary the quantity (and quality) of their output, he went no further than to suggest that they would gain by restricting supply (and producing shoddy goods). In general, we may regard his discussion of monopoly as an essentially Smithian one, which whilst of some interest, did not basically go further than had Smith.

Our third author, Samuel Bailey, presented, in 1825, his Critical Dissertation, which was an important attack on the Ricardo-Mill - McCulloch analysis of value in the Classical period. His last chapter 'on the causes of value' is of interest to us here.[2] Bailey held the view that it was not possible to explain value by one general (competitive) theory

"On a review of the subject it appears, that economists attempt too much. They wish to resolve all the causes of value into one, and thus reduce the science to a simplicity of which it will not admit."[3]

---

1. ibid., p. 317.

2. Samuel Bailey, Critical Dissertation, chapter 11.

3. ibid., p. 231.

Rather he felt that "some classification of exchangeable articles" was called for, and he put forward a three-fold division:-

"1. Commodities which are monopolized, or protected from competition by natural or adventitious circumstances.

2. Commodities, in the production of which some persons possess greater facilities than the rest of the community, and which therefore the competition of the latter cannot increase, except at a greater cost.

3. Commodities, in the production of which competition operates without restraint."[1]

In the first two classes competition "does not produce its full effect", and it becomes clear that Bailey uses the term monopoly to cover both of these. Let us see what Bailey has to say on monopoly.

The first class of commodities are those in which the existing seller or sellers are protected from the competition of outsiders. Bailey significantly divides this class into two:

"those in which there is only one interest concerned, and those in which there are separate interests".[2]

The single seller case is of particular interest to us. Bailey's discussion of it is, however, mainly limited to a quotation from Ricardo, which says only that price varies under monopoly with demand; and also that competition is wholly on the side of the buyers.[3] To this he adds the observation, that it may be to the advantage of the single seller "to withold his article from the market in times of dull demand, or even to destroy a part of it to enhance the value of

---

1. ibid., p. 185.   2. ibid., pp. 185-6.

3. Note that Ricardo's definition of monopoly was not the same thing at all as Bailey's. Bailey may have interpreted Ricardo's view that competition is solely on the buyers' side as meaning that he was referring to the case of a single seller.

the remainder."[1] He goes no further, however, towards analysis of
the single seller's optimum price.

More interesting is his treatment of the case where there are
separate interests selling a commodity, so that there may be competi-
tion amongst the sellers as well as amongst the buyers".[2] In this
case, it is not possible to artificially restrict supply, without
collusion, which is specifically ruled out by the assumption of
separate interests. In Bailey's view, each producer in this case,
"finds it beneficial to dispose of all that he possesses" and "is
obliged... to produce the greatest supply in his power, so long as
the average price pays him a higher profit than the ordinary employment
of capital". Since the producers are protected from general competi-
tion, Bailey implies that they will earn above ordinary profits. The
case is thus in between that of a single seller, who can restrict
supply, and of free competition, where supply increases to meet
effectual demand.[3]

Bailey goes on to argue that all commodities fall temporarily
into this monopoly class when market price diverges from the supply
price:-

"It deserves to be remarked, that all commodities, which require
any considerable period of time for their production, are liable
to be occasionally forced into the class of articles owing their
value to this second kind of monopoly, by a sudden alteration in
the relative state of the demand and supply."[4]

---

1. ibid., p. 187   2.   ibid., p. 187.

3.Bailey's three-fold classification of commodities, basically on
the grounds of the number of sellers, bears a striking resemblance
to the classification adopted by Cournot (see chapter 5 below). As
with Cournot's price schema, Bailey implies that price is lowered as
one moves from one seller, to a few, to many. Unlike Cournot, however,
he offers no analysis to explain why this is so.

4. ibid., p. 188.

The producers of a commodity for which demand exceeds supply, or supply exceeds demand at the natural price,[1] and for which supply may not be immediately adjusted, would possess "a temporary monopoly". If supply is less than effectual demand, the separate monopolists gain; if it is more, they lose. To our eyes, couched in the belief that in the real world disequilibrium is the rule, it would seem that to class commodities out of long run equilibrium as monopolised, is to class most commodities as being so. It is clear, however, that Bailey did not hold this view. He felt that "occurrences of this kind must not be considered as rare and unimportant," but at the same time he did not think that the bulk of commodities resided in this class.[2] Nevertheless, he classes corn as frequently subject to temporary monopoly. And even more important labour falls into this class. On the general level, labour supply is slow to adjust so that monopoly is the rule for extensive periods. On the particular level, skilled labour of a particular type enjoys a temporary monopoly.

Bailey's discussion of the second class of commodities gives us a good idea as to the relation of the concepts of monopoly and rent in Classical thought. He divides producers of a commodity into two groups: existing producers, and potential producers. The former possess a factor with superior ability, while the latter do not possess any superior factor and so can only produce at a greater (average) cost. The existing producers, therefore, have "a monopoly to a certain extent". Under these circumstances price rises only to the level where it would pay the less efficient producers to produce. Unlike the previous case, price is determinate at such "a height as will afford the ordinary profit to those who produce it at a greater expense".[3] Bailey illustrates this with the usual example of corn, where land is the special factor. In this case

---

1. In order to maintain symmetry in his argument Bailey also classed the case where supply temporarily exceeds effectual demand as monopoly.

2. ibid., pp. 189-93.

3. ibid., p. 193. Bailey held that price was not determinate for the first class of commodities in the sense of being related to the natural price, but was rather determined by supply and demand.

"The owners of land of superior fertility enjoy a monopoly, which
however, does not enable them to raise their commodity indefinitely,
according to the varying wants and caprices of mankind, but which
is bounded by the existence of inferior soils."[1]

From this the relation of rent to monopoly is clear; "it is simply
out of this monopoly-value that rent arises".

The extra profit of monopoly is paid to the owner of the superior
factor (in the case of land, the landlord) as rent. Bailey regards
this class of commodities as of more empirical importance than
the first class. He gives as examples of commodities in this
class, those for which land is an important factor, e.g. "corn,
raw produce in general, metals, coals, and several others". He also
recognises that other factors also, such as labour, may be of superior
quality

"In so far as competition cannot reach them, the owner of the
rich soil and the possessor of the extraordinary skill obtain a
monopoly price."[2]

Rent would exist in his model whether or not the inferior lands were
brought into cultivation, reverting to the corn example. Thus it is
"the effect of monopoly, an extraordinary profit, and not the
consequence of the cultivation of inferior soils". It is clear that
Bailey treats this second class of commodities as monopoly. It is
possible to argue that by monopoly he was referring to the exclusive
ownership of superior factors by existing producers.[3] However,

---

1. ibid., p. 195.

2. ibid., p. 197. Bailey was amongst the first economists to stress
the idea that rent accrues to other factors besides land.

3. Senior, as we shall see, based his monopoly analysis on this
principle.

in my opinion, Bailey was referring to the fact that commodity producers, who possess superior factors, are protected from the full effects of competition, when he spoke of monopoly in this context. For Bailey it was not the ownership of the factors, but the privilege this ownership afforded in terms of protection from competition, which justified the use of the term "monopoly" here.

Such is the analysis of monopoly as expounded by Bailey. He obviously chose a wide criterion for monopoly. For the first class of commodities alone, it is possible to hypothesise that he used the criterion that a divergence of market price from the natural price is evidence of monopoly. But this hypothesis falls down when the second class of commodities is considered. The only criterion which encompasses both classes of commodities is that non-normal profits are earned under monopoly.[1] All cases of monopoly discussed by Bailey fit this criterion. By using it, Bailey elevated monopoly both theoretically and empirically to a greater prominence than most Classical authors:-

"Instead of scarcity, or, in other words, monopoly, or protection from competition, being an unimportant source of value, and the commodities which owe their value to it forming a very small part of the mass of commodities daily exchanged in the market, we have seen that it is a most extensive source of value, and that the value of many of the most important articles of interchange must be referred to this as its origin."[2]

Bailey must be ranked amongst that band of sceptical economists whose role is to offer radical criticisms of accepted orthodoxy: a spiritual forerunner of the economists of the late 1920s and early 1930s. Like them his work is distinguished for the wide role he gives to monopoly. Whilst his analysis of monopoly showed little advance on established doctrine, his work is important for the individuality of his classifications of commodities.

---

1. As was noted above, Bailey included commodities where less than ordinary profits are earned under his definition of monopoly.

2. Critical Dissertation, p. 229.

Our final author, Nassau Senior, like Bailey, was an individualis-
tic economist who gave much greater prominence to monopoly than most
Classical economists. In his view "perfectly equal competition" only
exists in the production of commodities where "no appropriated natural
agent" is used.[1] A natural agent is defined as any factor with a
peculiar advantage, such as "peculiar advantages of soil, or
situation", or "extraordinary talent of body or mind", or "processes
generally unknown, or protected by law from imitation". Since very
few products do not use an appropriated natural agent of some kind,
the great mass of commodities do not fall under the competitive
head.[2] They are therefore subject to monopoly.

"When the assistance of these agents... has been obtained, the
result is more valuable than the result of equal labour and abstinence
unassisted by similar aids. A commodity thus produced is called the
subject of a monopoly; and the person who has appropriated such a
natural agent, a monopolist."[3]

Thus Senior's criterion for the monopoly of a commodity is that it
be produced with the use of an appropriated factor which possesses
peculiar advantages over other factors. Since rent is "the invariable
sign of the agency of some instrument not universally accessible", it
is closely associated with Senior's criterion of monopoly.[4] This
criterion is obviously a highly individualistic one, but it will
become clear that Senior believed it to be a consistent organising
principle within which various types of monopoly discussed in the
literature could be fitted.

---

1. N.W. Senior, Outline, p. 103.

2. ibid., pp. 111-2.

3. ibid., p. 103.

4. ibid., p. 111. We shall see, however, that the relationship
between rent and some of the kinds of monopoly discussed by Senior
is somewhat tenuous.

Senior distinguishes four kinds of monopoly, all of which have in
common the fact that a natural agent figures in production.[1] These
four cases, as we shall see, do not comprise together a comprehensive
treatment of non-competitive commodities. In the first kind, the
monopolist(ie. the producer with a natural advantage) is one of a
number of producers of a commodity; and he is able to increase output
at the same or lower cost. This case is the least pernicious

"The value of a commodity produced under such circumstances
approaches more nearly to the cost of production on the part of
the seller, than that of any other monopolised commodity."[2]

There are two limits to price: the supply price of the monopolist,
below which the price cannot fall; and the cost of production to
consumers, above which price cannot rise.[3] Senior uses the example
of Arkwright's patent machinery for the production of yarn to illus-
trate this case.

This gave Arkwright a supply price a fifth of that of others. The
question is where should Arkwright set his price between the price
limits. Senior assumes that as Arkwright expanded output price fell,
and costs fell more steeply. Under these circumstances it was in
his interest to produce a great quantity at a lower price

"As is usually the case, his own interest and that of the
public coincided, and led him to accept a price far exceeding indeed
the cost of production to himself, but falling short by a still
wider interval of what would have been the cost of production to
them."[4]

---

1. Outline, pp. 103-115.

2. ibid., p. 103.

3. For a discussion of Senior's concept of the cost of production
to consumers see section 1 of this chapter.

4. ibid., p. 104.

Senior concludes:-

"Sir R. Arkwright's monopoly, therefore, was of the most limited kind. His remuneration was bounded, and it was not in his interest even to approach that boundary."[1]

This model of monopoly is one of partial or incomplete monopoly. Senior is quite correct in arguing that under sharply falling costs, the monopolist's optimum output is large, so that price falls towards the monopolist's cost of production. Like all Classical economists, however, he did not take the further step of determining the monopolists optimum price, and in fact held that it was not determinate.[2]

The "second kind of monopoly is in the opposite extreme". Senior defines this as the case of a single monopolist, who is protected from the competition of others, and whose supply cannot be increased. From the example he gives it is clear that he does not allow supply to be decreased either, so that we have a fixed supply. This is the Ricardian case, except that Senior only admits one producer. Senior gives the example of a special wine produced by one farm. He arrives at the Ricardian conclusion that

"The price cannot of course fall below the cost of production, but may indefinitely exceed it. It is limited solely by the will and the ability of the consumers."[3]

He does not consider the possibility that the monopolist might earn maximum profits at a lower output.

---

1. ibid., p. 104. Senior does not explain why other producers remain in production in this case of monopoly, although he clearly felt they would. In the yarn example, Arkwright's competitors were Hindu producers of muslin, who were presumably able to supply the upper end of the market with a finer quality product.
2. Senior's assertion that Arkwright's price was nearer the lower bound of the price range was not based on an analysis of the monopolist's optimum price. Clearly, in general, the monopolist's price will depend on the shape and position of the cost and demand curves.
3. op. cit., p. 105.

"A third and more frequent kind of monopoly lies between these two extremes."[1] This is the case of a single producer, who can increase his output under conditions of constant or decreasing cost. This is but the first kind of monopoly above, except that the monopoly is absolute rather than incomplete i.e. the monopolist has no rivals since the natural agent which he alone possesses is such that production without it is impossible. Senior gives the example of a book-seller who owns the copyright of a book. He operates under decreasing costs,

"It is in his interest, therefore, to encourage a large sale by affixing a price but slightly exceeding the cost of production"[2].

The only difference of this case from the first, that rival producers set no upper limit to price, is made irrelevant by the cost assumption which dictates the establishment of a low price.

Senior argues that prices under the first three kinds of monopoly "are but little governed by any general rules".[3] In the first case there are two limits to price, and a tendency to the lower one. In the second and third cases there are no (upper) limits to price, but Senior argues price tends to be lower in the third case, since supply is variable. Turning to the fourth kind of monopoly, which "may be called unequal competition or qualified monopoly",[4] Senior implies a determinacy not existing in the other cases. In this case,

---

1. ibid., p. 105.

2. ibid., p. 105.

3. By this Senior means that prices bear no fixed relation to the natural price.

4. op. cit., p. 115.

a monopolist is one of a number of producers, who can increase output at progressively increasing cost. It is this case which is most important according to Senior, and it is here that the association of rent and monopoly comes into its own. Although Senior admitted that rent is paid to all natural agents, it is land to which he directs his attention. It is this case which encompasses "the great monopoly of land" mentioned so frequently in Classical treatises from Smith on. Most raw produce, and a large number of other commodities come under this head, so that "all general theories as to value must be subject to error until the general laws regulating the value of the assistance to be derived from land have been ascertained."[1]

Despite his insistence on referring to a single producer as the monopolist in this case,[2] Senior does not go on to give a theory of this one producer. Rather he gives a general theory of rent. Under conditions of increasing costs, price tends to coincide with the supply price of the portion of the commodity produced at the greatest cost

"The price... has a constant tendency to coincide with the cost of production of that portion which is continued to be produced at the greatest expense."[3]

For the lower cost output "the difference between the price and the cost of production is Rent," and this is paid to the owner of the scarce natural agent. Senior implies price is determinate in this case of monopoly, where in the others it was not.

Senior provided the peak Classical treatment of monopoly price. If we set aside his unusual criterion for monopoly, we see that he went further in analysing monopoly than any other Classical writer. His first and third kinds of monopoly are important here, although it is noteworthy that in all cases he restricted the term monopolist

---

1. ibid., p. 105.

2. ibid., p. 111.   See also 'Contents', p. vii.

3. ibid., p. 115.

to one seller. In these cases he was aware like no other Classical economist of the importance of revenue and cost to monopoly price. And he correctly deduced that under falling costs, optimum output would be higher. But even he did not define the optimum condition; nor did he recognise its determinate existence.

It is clear from the above discussion that there was no one single Classical theory of monopoly. Whilst the Classical economists worked broadly within the framework of price theory established by Adam Smith, they did not stick rigidly to his view of monopoly. Thus, whilst they all thought of monopoly as the opposite of competition, and in most cases treated it as the case of restricted supply, they tended to drop the emphasis placed by Smith that monopoly was the result of government action. Further, for a number of writers, notably Bailey and Senior, monopoly was associated with the idea of rent, and so took on a wider significance, than being just the exception to the rule of Smith's analysis.[1] Nevertheless, even in these cases, despite some important insights, there was little in the way of analysis of monopoly. Classical economists got little farther than Smith towards a proper theory of monopoly.

---

1. In Bailey's case part of this wider significance arose from his treatment of disequilibrium situations as monopoly.

III. Conclusions

Writing in 1848, J.S. Mill summed up a widespread view amongst Classical economists when he said

"Happily, there is nothing in the laws of Value which remains for the present or any future writer to clear up; the theory of the subject is complete."[1]

This is not the conclusion we have reached with regard to the theories of competition and monopoly in Classical economics. In the former field, despite notable achievements in the areas of supply and demand analysis and long run competitive equilibrium, other areas, such as market structure and the theory of the firm, were left almost untouched. As for monopoly, the superficial unity of thought on this subject, has been shown on closer examination to give way to a number of separate treatments of the problem.

The Classical economists' main contribution to economic analysis was to modify and extend the economic **theories** of the Wealth of Nations. Whilst there may have been important differences between their theories and Smith's, it is nevertheless true that the questions they asked were broadly the questions that Smith had asked. The principle reason therefore for their failure to fundamentally advance the economic analysis of monopoly and competition, must lie in the fact that they worked within Smith's framework of analysis. The Wealth of Nations contained a set of novel principles concerning the long run equilibrium of certain variables under free competition, and the Classical economists set about developing these principles. They were not primarily concerned with monopoly and competition, and any advances that were made in these spheres were largely incidental to their main task. For them, market structure, the theory of the firm and intra-industry equilibrium were largely problems outside their scope of inquiry.

Even when they did address themselves to these problems they failed to make much headway. On the one hand, this explained, partly by their method of approach. Thus, for example, they felt no need to

---

1. Principles, p. 456.

define a market structure since they felt generally that their
(competitive) theory was broadly applicable to all markets.
Thus, there approach was to describe real-world markets rather than
to outline the assumptions on which their theories were based.
On the other hand, however, even if they had approached the problem
correctly they tended generally to lack the technical (particularly
mathematical) competance to solve the problems of the analysis of
competition and monopoly. We have already seen that it was not until
the middle of the 19th century that J.S. Mill clarified the idea
that price was set by the proportion of supply to demand by resort
to "the mathematical analogy" of an equation.[1] Likewise the idea of
the demand function was not explicitly formulated by the Classical
economists. If they could not formulate such simple ideas then
clearly it is little wonder that the determination of intra-industry
equilibrium was beyond their grasp. Such problems are less difficult
for someone armed with the power of mathematics, and in particular
the calculus. And we shall see that in the competent hands of
Cournot these tools enabled him to make the most important single
contribution to the analysis of competition and monopoly, in our
historical period.

1. The first geometric treatment of supply and demand in the
English literature was made by Fleeming Jenkin in 1870 (see
chapter 8 below). Supply and demand curves were drawn by Cournot in
1838, however, as we shall see in the next chapter.

Chapter 5

The Contribution of Augustin Cournot

Antoine Augustin Cournot (1801-77) published his classic work
Recherches sur les principes mathematiques de la theorie des richesses
in 1838.[1] This slim book was the most important single contribution
to the analysis of competition and monopoly in the period under
investigation.[2] This will become clear as we proceed. Here we will
indicate the important role played by methodology, and, in particular,
mathematics, in shaping Cournot's achievement.

Unlike the Classical economists, Cournot was particularly concerned
to adopt a scientific approach in his study of economic problems.
In a number of places in the book he calls attention to the vague
and confused use of terms and concepts in the work of his contempor-
aries.[3] In addition, he criticises the confusion of economic theory
with systems i.e. methods of economic control (such as laissez-
faire) which are regarded as ideal:

"I will only observe that theory ought not to be confounded with
systems, although in the infancy of all sciences the instinct of
system necessarily attempts to outline theories."[4]

---

1. All references will be to the first English translation made in
1897 by Nathaniel T. Bacon, Researches into the Mathematical
Principles of the Theory of Wealth, (London: Hafner Publishing Co.,
1960). The important chapters for competition and monopoly analysis
are chapters iv-viii.

2. For an assessment of Cournot's achievement see, for example,
Schumpeter, History of Economic Analysis, pp. 958-60, 973-85.

3. See, for example, Recherches, p. 79.

4. ibid., p. 1.

Hence, in the _Recherches_, Cournot is concerned to rigorously define and consistently use economic concepts. And, as has been noted by Schumpeter, much of the importance of Cournot's work springs from this simple work of clarification of concepts.[1]

Allied to this, Cournot's other methodological prong of attack was his use of mathematics in the analysis of his models. As he was the first to admit, he nowhere uses more than the first principles of differential and integral calculus.[2] Nevertheless these relatively simple tools proved sufficient to make a large number of analytical advances in the _Recherches_. As we shall see in sections II and III below, they enabled Cournot to provide the first analysis of pure monopoly and pure competition in the literature. Clearly, it would be very difficult to define equilibrium in these models without the use of algebra. Cournot was able to gather the first fruits of applying the mathematical method, and in so doing demonstrate beyond doubt the tremendous power of the mathematical approach.

Cournot's analysis stands out from the work of its contemporaries both in terms of his analytical approach and his analytical contribution to competition and monopoly theory. In section I, we examine Cournot's general approach to monopoly and competition, in contrast to the Classical economists, and assess its significance to the

---

1. Schumpeter, op. cit., p. 959. In the same passage, Schumpeter argues that Cournot did not aim for any "novelty of principle". It is true that he dealt with commonplace doctrines, such as that competition reduced prices, but as we shall see, he so redefined these problems that to argue he aimed at no novelty of principle, is to understate his achievement.

2. _Recherches_, p. 4.

modern approach to these problems. In section II the essentials of
Cournot's analysis of monopoly are examined, while in section
III the same is done with his analysis of unlimited competition.
In both cases Cournot's analysis was extensive (if in the case of
unlimited competition, a trifle terse), and amounts to a surprisingly
complete analysis of the models of pure monopoly and pure competition.[1]
In section IV we preview subsequent developments in the light of
Cournot's achievement.

1. Because of its extensiveness, we have not examined all of his
analysis in sections II and III. Readers interested in the complete
list of Cournot's theorems on pure monopoly and pure competition are
referred to the mathematical appendix to this chapter.

I. Cournot's Approach to Price Theory

In this section we shall examine Cournot's general approach to
the problem of price determination. Inevitably, in doing this, we
shall have to employ a number of concepts which will not be defined
fully until sections II and III of this chapter. The reader is
asked to bear with us in this, since there is much to be learnt by
first discussing Cournot's general line of attack.

The first thing to notice is that Cournot's approach to the deter-
mination of price was wholly different from that of the Classical
economists. For them, the economy was broadly viewed as being comp-
etitive, in the sense that capital was free to move between trades
in response to differences in profit rates, the condition of
equilibrium being that rates of return were equalised in all
directions. This analysis was supposed to be applicable to the
vast majority of trades, and, moreover, to provide a beneficial
result. In contrast, monopoly was held to be the opposite of com-
petition, to be pernicious, and was (not very consistently) applied
to (the few) situations where limitations of supply prevented the
competitive outcome.[1]

Cournot's line of approach was completely different. Whereas
the Classical economists were concerned with inter-industry
equilibrium, Cournot focussed his attention on intra-industry
equilibrium. For him the unit of study was the market and the firm,
and the method of approach was partial, not general, equilibrium

---

1. This summary of the Classical economists' approach to competition
and monopoly is, of course, very sweeping. The reader is referred
to chapter 4, where he will find each one of the assertions in this
paragraph qualified, at least with respect to some writers.

analysis.[1] He set himself the problem of explaining how

"for each commodity <u>by itself</u>, the law of demand in connection
with the conditions of production of that commodity, determines the
price of it and regulates the incomes of its producers".[2]

Thus, his book is concerned directly with the theory of the firm
within the market, an area of study which, as we have seen, had
previously received scant attention in the economic literature.

This is not to say, however, that Cournot was not aware that
the partial approach involved some loss of realism. He is quite
clear on this point

"in reality the economic system is a whole of which all the parts
are connected and react on each other. An increase in the income of
the producers of commodity A will affect the demand for commodities
B, C, etc., and the incomes of their producers, and, by its reaction,
will involve a change in the demand for commodity A. It seems,
therefore, as if, for a complete and rigorous solution of the problems
relative to some parts of the economic system, it were indispensible
to take the entire system into consideration".[3]

However, he felt that such a line of approach "would surpass the
powers of mathematical analysis".[4] And clearly, as Marshall was
later to argue, there is often much to be gained by adopting a
partial approach at the cost of a little approximation.

---

1. Cournot was quite aware that a partial approach requires the use
of <u>ceteris paribus</u> assumptions
    "We consider as given and invariable the prices of other commodi-
ties and the incomes of other producers." ibid., p. 127.

2. ibid., p. 127 (italics added)

3. ibid., p. 127.

4. We shall see in chapter 6 below that Walras, working on Cournot's
foundations was to prove that this was not so.

Inevitably, since he was attacking a different problem to the Classical economists, Cournot uses the terms <u>monopoly</u> and <u>competition</u> to mean different things from them. In contrast to the association of monopoly with limitation of supply in the works of the Classical economists, Cournot takes the "word in its most absoluting meaning, which supposes that the production of an article is in one man's hands".[1] On the other hand, he uses competition to mean rivalry, and contrasts competition of producers with monopoly (one producer). There is no mention of free competition at all in the <u>Recherches</u>. He is justifiably scathing with regard to the failure of his contemporaries to adequately define competition:-

"Every one has a vague idea of the effects of competition. Theory should have attempted to render this idea more precise; and yet, for lack of regarding the question from the proper point of view, and for want of recourse to symbols (of which the use in this connection becomes indispensable), economic writers have not in the least improved on popular notions in this respect. These notions have remained as ill-defined and ill-applied in their works, as in popular language."[2]

Cournot saw his task as to introduce scientific rigour in place of analytical confusion, and his analyses of monopoly and competition, as we shall see, go a long way towards the attainment of that end.

Having outlined his line of attack, our second task in this section will be to examine the solution Cournot offered to the problem of price determination. Whilst the Classical economists distinguished two models of price, competition and monopoly; Cournot distinguished three: <u>monopoly</u>, <u>competition of producers</u>, and <u>unlimited competition</u>.

---

1. ibid., p. 55.

2. ibid., p. 79.

These three models make up his schema of price determination. It will be demonstrated in sections II and III of this chapter that the former and latter of these cases are none other than what we have called the theories of pure monopoly and pure competition. On the other hand, the other case, competition of producers, is Cournot's famous solution to the oligopoly problem.[1] Each of these models of price is distinguished by having a different equilibrium solution. Together, however, they form a price schema into which Cournot hoped to fit all markets in the real world. The basis of this schema was that the equilibrium price in the market would depend solely on the market structure of that market; or, more specifically, on the number of sellers in that market. It is in the Recherches that we first find the emphasis on market structure, (and in particular, on whether the number of sellers is one, few or many), which forms such an important part of modern price theory, and, also, its empirical counterpart, the study of industrial organisation. Although neglected at the time of its publication, the price schema suggested by Cournot has in the 20th century taken a central role in micro-economic study.

Cournot begins his analysis of price with the case of one seller. He then introduces several sellers, and, finally, arrives at the case of very many sellers. Whilst the number of sellers is altered in his analysis, Cournot keeps all the other assumptions of his models the same. Thus in each model, each producer is assumed to select that output which maximises his own net revenue, where appropriate

1. It is not possible here to analyse Cournot's oligopoly theory in detail. (For an introduction to the large literature on this subject see Schumpeter, op. cit., pp. 979-83). However, it will be pointed out below that the non-generality of Cournot's solution inevitably flaws his schema of price determination.

taking the output of all other producers as given.[1] The monopolist, therefore, maximises net revenue

$$f(D).D - \phi(D)$$

where D is sales, $f(D)$ the inverse demand function, and $\phi(D)$ the cost function. He will thus fix output so that

$$f(D) + D.f'(D) - \phi'(D) = 0 \qquad (5.1)$$

In the case of competition of producers, similarly, the kth producer will maximise his net revenue

$$f(D).D_k - \phi_k(D_k)$$

Assuming the outputs of all other producers are given, the equilibrium condition for the kth producer is

$$f(D) + D_k.f'(D) - \phi_k'(D_k) = 0 \qquad (5.2)$$

Finally, in the case of unlimited competition, Cournot assumes that the output of the kth producer is innappreciable, so that it can be neglected from equation (2), which then simplifies to

$$f(D) - \phi_k'(D_k) = 0 \qquad (5.3)$$

In unlimited competition price equals marginal cost. Thus, each of the models are distinguished by different equilibrium conditions (equations 5.1, 5.2 and 5.3) which are derived by applying the same behaviour assumption to different assumptions concerning producer numbers.[2]

---

1. We shall see in section II below that, in fact, Cournot treated the monopolist as a price-setter, and then switched to producers being output setters in the competitive cases. Clearly, however, the equilibrium solution is the same in the case of monopoly, whether the monopolist sets price or his sales, since $D = F(p)$ by the demand relation.

2. More detailed discussion of the variables, assumptions and equilibrium conditions in this paragraph are given in section II and III below.

Cournot's price schema fits neatly together, arguing that differ-
ences in the number of sellers determines price. In this schema,
pure competition and pure monopoly are regarded as the poles of the
analysis with oligopoly in between, again an idea which was to have
a large number of adherents after Cournot's death. But as has been
often noted there is an important flaw in the unity of this schema,
with regard to the oligopoly case. Whilst it is quite sensible for
producers to maximise their own net revenue in the pure monopoly and
pure competition cases, it may not be so in the oligopoly case.
In this latter case, as distinct from the others, such a policy
ignores the fact that, out of equilibrium, each output decision taken
by a producer, will cause other producers to react, and alter their
output decisions.[1] In such a situation, one or more producers might
well adopt alternative strategies in order to make short run gains,
thus upsetting the model. Or, again, the producers may collude in
order to alter the equilibrium solution.[2] Hence, less so than in the
polar cases, where no such reactions occur, Cournot's solution may
well be but one of many possible solutions.[3] This being so,
Cournot's price schema, and in particular, his progression from
competition of producers to unlimited competition, i.e. from
equation (2) to equation (3), loses its generality. Certainly,

---

1. This problem does not arise in the monopoly case because there
are no other producers, while in the case of unlimited competition,
the output of each producer is so small that his actions will not
provoke a reaction.

2. Cournot recognised this possibility would offer the producers
larger joint profits than his solution, (ibid. p. 83). He, however,
only offered the weak argument that in reality "error" and "lack of
forethought" on the part of the producers, would make his solution
applicable.

3. This argument is valid if we accept the postulate that all pro-
ducers aim to maximise net revenue. If we introduce the possibility
of other behaviour postulates, then other solutions present them-
selves in the polar cases also.

156.

few economists after Cournot were to follow his procedure in this respect, presumably because of the non-generality of the oligopoly model.

This loss of generality also weakens the welfare aspect of Cournot's price schema. This aspect of his analysis was his proof that "the result of competition is to reduce prices".[1] Cournot shows, using a rather complex argument, that price will be lower under competition than monopoly, declining monotonically as the number of producers is increased. Consider a monopolist in equilibrium setting

$$P = - \frac{F(p)}{F'(p)} + \phi'(D)$$

where $D = F(p)$ is the demand function, and $\phi(D)$ is total cost. In contrast, n producers supplying the market, such that

$$D = \sum_{i=1}^{n} D_i,$$ would set price

$$p = \frac{1}{n} \left[- \frac{F(p)}{F'(p)} + \sum_{i=1}^{n} \phi_i'(D_i) \right]$$

Cournot argues that the average competitor will have higher marginal costs than the monopolist because the latter can always operate the most efficient plants first.[2] Nevertheless, it is possible to show that monopoly price will be higher than competitive price, although the proof is tricky.[3] If we were, however, to simply assume the marginal costs of the monopolist and all competitors were identical then in the competitive case

$$np = \frac{F(p)}{F'(p)} + n \phi'(D)$$

From this it follows directly that competitive price is lower falling monotonically as n increases. However, if competitors do not follow

---

1. ibid., p. 84. The proof in the zero cost case is given on pp. 83-4, using figure 4, and in the positive cost case on pp. 87-9, using figure 5.

2. ibid., p. 87.   3. ibid., pp. 87-9.

Cournot's oligopoly assumptions, such a proof is no longer valid, so that it is not possible to say generally that competition lowers price.

Cournot believed that he had demonstrated that competition, in his sense of the word, meant lower prices. In addition, he felt that competition and, in particular, unlimited competition, was the general rule of the social economy. He went on to conclude with the Classical economists that

"common sense teaches that society can only gain by the weakening or extinction of monopoly".[1]

We shall see in section III that his belief that competition was predominant in the economy, in part contradicts other conclusions which he reaches. And we have seen here, that there are grounds for not accepting his welfare proposition that competition lowers prices. Cournot despite his more scientific approach, was still not wholly free of the emotive content of the words, monopoly and competition. His attempt to prove what "every one believes without any analysis",[2] was thus not fully successful. Nevertheless, it must be admitted that Cournot at least attempted such a proof when his contemporaries and predecessors had done no more than assert this result.

On a more general level, however, Cournot's price schema was a tremendous success. Every undergraduate student knows of the division of price theory into monopoly, oligopoly and pure competition: the one, the few and the many sellers. Likewise, every student of industrial economics knows the conventional wisdom that market structure determines market behaviour determines market performance. We are not concerned at the present time with the value of these ideas, merely noting that in origin they emanate from Cournot's work. We shall examine their permeation in subsequent chapters. In the next two sections of this chapter, however, we shall examine Cournot's analysis of pure monopoly and pure competition, the polar cases of his price schema.

---

1. ibid., p. 135.

2. ibid., p. 84.

II.   Cournot's Monopoly Analysis

Cournot begins his analysis of price with the case of monopoly.
He adopts this unusual procedure not because he regarded monopoly
as the dominant form of market organisation in the real world, but
in accordance with the usual scientific practice of proceeding
from "the simple to the complex".[1] By analysing monopoly first,
he hoped to be able to go on to "analyse more accurately the
effects of competition of producers".[2] The case of monopoly was the
simplest since it involved the assumption of one seller

"The simplest hypothesis for the purpose of investigating by
what laws prices are fixed, is that of monopoly, taking this word in
its most absolute meaning, which supposes that the production of
an article is in one man's hands".[3]

---

1.   Recherches, p. 55. This is not to say that monopoly was for
Cournot a mere abstraction or 'ideal' case, convenient as an
analytical starting point, but of no practical importance. Rather,
he clearly thought that "it is realised in certain cases" (p. 55).
In a number of places he gives specific examples of monopoly; for
example, a theatrical enterprise or a toll-bridge (p. 61); or a
rare bood owned by a publisher (pp. 11-12).

2.   ibid., p. 55.

3.   ibid., p. 55.

Unlike the Classical economists who were vague and inconsistent over the definition of monopoly, Cournot used it throughout the Recherches to mean one seller.

He was equally clear over his other assumptions. Consider first his assumptions over demand. We have seen in chapter 4 above that there was a great deal of confusion over the meaning of demand amongst Classical economists, which had not been entirely cleared up by the middle of the century. Cournot's mathematical training, however, allowed him to cut through this confusion, and present clearly, in 1838, what his non-mathematical contemporaries could only vaguely formulate. The monopolist was assumed to confront a demand function, $D = F(p)$, where D is the quantity demanded and p is price.[1] This demand function is treated by Cournot as given, and in general possesses a negative first derivative, $F'(p) < 0$. In addition, it is assumed to be continuous (and, presumably, differentiable). With the minimum of algebraic notation, we have here a clearly defined demand curve.

Notwithstanding the technical advance, however, it is important to notice that the assumption that the monopolist faces a given demand function immediately imposes a severe limitation on the applicability of the model. In the words of Schumpeter, the monopolist

"on the one hand, can exploit a given demand schedule at his pleasure and, on the other hand, is not supposed to be able to alter it to his advantage, for example, by advertising or by teaching his customers new uses of his product. For the first time, we are thus presented , by implication, with a definition of monopoly, but with one that excludes the large majority of all the "single sellers" we can observe in real life."[2]

---

1. Cournot started from the demand curve (see chapter iv of the Recherches), and made no attempt to derive it from a theory of consumer behaviour. Likewise, he accepted its negative slope as self-evident, although he did admit that for "objects of whim and luxury" (p. 46) such as diamonds, a fall in price might lead to a fall in demand.

2. Schumpeter, History of Economic Analysis, p. 976.

By abstracting from the monopolist's ability to change demand, we are omitting from consideration an important part of monopoly power.

Two lines of defence are open to Cournot. The first is that the assumption of a given F(p) simplifies the subsequent analysis, and makes it more tractable. The second is that at the time Cournot wrote, the ability of single sellers to influence the demand for their products was probably much more circumscribed than it is today. In support of this we may suggest that product differentiation and sales promotion were probably relatively minor aspects of business behaviour in the first half of the 19th century. If these arguments are accepted then Schumpeter's indictment cannot be used directly, against Cournot. Rather, it is an indictment of modern economic theory, which still uses Cournot's model even when the basic condition that F(p) is given, seems to contradict direct observation of modern market behaviour.

Cournot's assumptions with regard to cost conditions are less contentious, while, like their counterparts with regard to demand, they represent path-breaking pieces of clarification. In addition, they are imbued with the common sense, characteristic of all Cournot's work. The monopolist is assumed to have a cost function, $\phi(D)$, where D is amount produced. Its first derivative, which was only much later to be called marginal cost, is assumed to be positive or zero, on the grounds that

"it would be absurd that the absolute expense of production should decrease as production increases."[1]

Cournot believed that this "differential coefficient ... exerts very great influence on the principal problems of economic science".[2]

The second derivative of the cost function could be negative, positive or zero. The former possibility was exemplified in Cournot's opinion by manufactured articles

"This comes from better organisation of the work, from discounts on the price of raw materials for large purchases, and finally from the reduction of what is known to producers as general expense".[3]

---

1. Recherches, p. 59.   2. ibid., p. 59.   3. ibid., p. 59.

Even in these cases, however, he admitted that at high output rates, marginal costs might begin to increase if high prices of raw materials and labour are induced. On the other hand, increasing marginal costs are likely to be a feature of agriculture, and mining and quarrying, presumably through the operation of diminishing returns as more inputs are applied to the fixed input, land. Though simple, this division of industry and agriculture on the basis of decreasing or increasing marginal costs has merit, and indeed is still used today as a first approximation in the analysis of industrial structure.

Having discussed Cournot's definition of monopoly, and of demand and cost, it only remains to discuss his behaviour posutlate. This he defines generally:-

"we shall invoke but a single axiom or, if you prefer, make but a single hypothesis, i.e. that each one seeks to derive the greatest possible value from his goods or his labour".[1]

In the context of monopoly, this implies that the monopolist tries to maximise his net revenue. The word maximise is important, since to a mathematician such as Cournot it immediately suggests the use of calculus to determine maxima and minima. It was by the use of calculus that Cournot went on to give the first solution of the pure monopoly model.

We shall concentrate upon three aspects of Cournot's monopoly analysis: his discussion of equilibrium in the zero, and non-zero cost cases, and his analysis of the effects of a change in marginal costs on equilibrium. Consider, first, the case where a monopolist

1.   ibid., p. 44.

"has no cost of production to bear, or the cost can be considered insignificant."[1] For concreteness, Cournot postulates a "proprietor of a mineral spring which has just been found to possess salutary properties possessed by no other".[2] Such a proprietor could fix a high price of 100 francs a litre but if he did this, he would sell so little that he would not "make the most of his property". Instead

"he will therefore successively reduce the price of the litre to the point which will give him the greatest possible profit".

The monopolist will therefore, in fact, find his equilibrium position by a process of trial and error.

Formally, in the zero cost case, this amounts fo finding the maximum of his gross revenue function, $p.F(p)$. Since, by assumption, $F(p)$ is continuous, $p.F(p)$ is also continuous. In addition, at zero price, $p.F(p)$ must be zero, while at a very high price $F(p)$ is zero, so that again $p.F(p)$ is zero. Between these price limits, $p.F(p)$ will be positive and finite, so that at least one maximum total revenue must exist. The maximum is found by differentiating $p.F(p)$ with respect to p, and setting the result equal to zero. Thus

$$F(p) + p. \ F'(p) = 0 \qquad\qquad (5.4)$$

The left hand side of this equation was (only much later to be) given the name marginal revenue[3], so that equation 5.4 expresses the equilibrium condition that the monopolist should set price such that marginal revenue equals zero. In the zero cost case, price and gross revenue in equilibrium depend only on the nature of the function $F(p)$ That is we have:-

---

1. ibid., p. 57.   2.   ibid., p. 56.

3. ibid., p. 56. For a discussion of the "discovery" of marginal revenue in the 1920s, see G.L.S. Shackle, The Years of High Theory: Invention and Tradition in Economic Thought, 1926-39, (Cambridge University Press, 1967) Chapter 4.
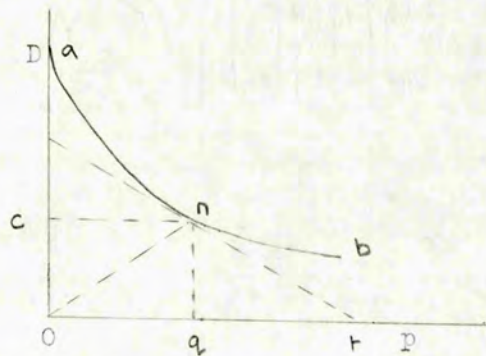
$$p = - \frac{F(p)}{F'(p)}$$

and

$$p.F(p) = - \frac{[F(p)]^2}{F'(p)}$$

The solution represented by equation (5.4) is depicted geometrically by Cournot (Figure 5.1)[1].

Figure 5.1

The demand curve is anb, and the problem is to maximise the area Oqnc. By a proposition of geometry, the solution is to select the point n such that the triangle Ont is isosceles and Oq = qt. This is equivalent to equation (5.4), as can be seen by substituting Oq for p, nq for $F(p)$ and $-\frac{nq}{qt}$ for $F'(p)$ in that equation.

Equation (5.4) is only a necessary condition for total revenue to be a maximum, as Cournot was aware. The sufficient condition for it to be a maximum is that

$$2 F'(p) + p.F''(p) < 0$$

Since $F'(p)$ is assumed to be negative, a sufficient condition for a maximum is that $F''(p) < 0$ i.e. the demand curve be concave from the origin.[2] If the demand curve is thus shaped

---

1. This is Cournot's figure (1). To my knowledge this is the first "demand curve" ever drawn in the literature.
2. It is still possible for $F''(p) > 0$, and yet gross revenue be a maximum, if absolutely

$$|2F'(p)| > |p.F''(p)|$$

In the linear case $F''(p) = 0$, and there is only one maximum solution.

"it is impossible that there should be a minimum, nor more than one maximum. In the contrary case, the existence of several maxima or minima is not proved to be impossible".[1]

This last possibility has important implications for our monopolist moving to equilibrium by trial and error, since if two or more local maxima exist, it is possible that he will select a local rather than the global maximum, unless he (unrealistically) tries every conceivable price. Cournot, however, was not unduly worried about this possibility, taking the practical view that it was highly improbable that the revenue function would have more than one maximum within the specified price range. In this case, equation (5.4) would always give the maximum revenue solution.

The second aspect of Cournot's analysis we shall discuss is the non-zero cost equilibrium position under monopoly. He postulates a monopolist who possesses "the secret of a medical preparation or an artificial mineral water, for which the materials and labour must be paid for".[2] This monopolist will try to maximise net revenue defined as total revenue minus total cost

$$p \cdot F(p) - \phi(D)$$

The cost function, $\phi(D)$, although expressed as a function of D, is implicitly a function of p, so that we are able to derive the equilibrium condition

$$D + \frac{dD}{dp} \left[p - \frac{d\{\phi(D)\}}{dD} \right] = 0 \qquad (5.5)$$

Equation (5.5) is equivalent to the basic proposition of the modern theory of the firm that equilibrium occurs where marginal revenue equals marginal cost. The monopolist will produce at the price

---

1. ibid., p. 55. Maxima and minima will alternate with, on Cournot's assumptions a maxima at each extreme.

2. ibid., p. 57.

such that equation (5.5) holds, as long as net revenue is positive
at this point.

Equation (5.5) represents the general solution to the monopoly
problem. It is immediately clear that in equilibrium price must
exceed marginal costs

$$p > \frac{d\{\phi(D)\}}{dD}$$

and further that the zero cost case is just a special case of this
general solution. In addition, equation (5.5) reveals the important
theorem that fixed costs can have no effect on equilibrium monopoly
price, since in this case

$$\frac{d\{\phi(D)\}}{dD} = 0$$

and again, equation (5.5) simplifies to equation (5.4). Cournot
regarded this case as being quite realistic

"This case occurs more frequently than would be suspected at
first glance... For instance, in a theatrical enterprise D denotes
the number of tickets sold, and the cost of the enterprise remains
practically the same, without reference to the number of spectators.
For the tolls of a bridge, which is another monopolistic investment,
D denotes the number of passengers; and the cost for repairs, watching,
and bookkeeping will be the same, whether the crossing is much or
little used."[1]

In such instances, price will depend on the nature of the demand
function alone, and fixed costs will be a deduction from gross
revenue.

Finally, we shall examine Cournot's proof that "when the cost of
production increases, the price fixed by the monopolist, according
to equation (5.5), will increase likewise".[2] Cournot rewrites the
function $d\{\phi(D)\}/dD$ in equation (5.5) as an explicit function of
price, $\psi(p)$, and subjects it to an infinitesimal change, u. This

1. ibid., pp. 60-1.

2. ibid., p. 61. Cournot's discussion of this theorem is given on
    pp. 61-66 of the Recherches.

will cause the equilibrium price, p_0 to become $p_0 + \delta$, and the problem is to prove that u and δ always have the same sign. The proof, which is given in more detail in the mathematical appendix to this section, relies on the fact that δ and u are so small, that their product, and squares and higher powers of them, may safely be neglected. This being so the new equilibrium position may be written

$$\frac{\delta}{u} = \frac{F'(p_0)}{F'(p_0)\{2 - \psi'(p_0)\} + F''(p_0)\{p_0 - \psi(p_0)\}} \qquad (5.6)$$

The right hand side of equation (5.6) tells us both the direction of change in price, δ, for a change in cost, u, and the size of such a change. The numerator, $F'(p_0)$, is negative by assumption, whilst the denominator is also negative, by the second order conditions for a maximum. Hence δ and u must have the same sign. In addition, depending on which is the bigger absolutely, the numerator or the denominator, so will the change in price be bigger or smaller than the cost change. This theorem forms the basis of Cournot's analysis of the effects of taxation on monopoly in chapter vi of the Recherches.

Whilst being an important theorem it is strictly only applicable in the case of infinitesimal changes in cost. Cournot attempts to generalise it to large changes in cost, u, by arguing that such large changes may be conceived of as a series of small changes, u_1, u_2, u_3, etc. all of the same sign. The total change in price, δ, can also be so conceived, so that u_1 and δ_1 will have the same sign, as

will u_2 and δ_2, etc., so that

$$\delta = \delta_1 + \delta_2 + \delta_3 + \ldots$$

will be of the same sign as

$$u = u_1 + u_2 + u_3 + \ldots$$

This argument is invalid for the obvious reason that in a chain argument of this sort it is no longer admissable to neglect squares and higher powers of the terms, so that it is not possible to say, in general, that δ and u will have the same sign.[1] Nevertheless, on the usual criterion of examining the comparative static effects of small changes, Cournot's analysis was pathbreaking as in so many other areas of analysis.

The remainder of Cournot's monopoly analysis concerns the effect on equilibrium price of various forms of taxation, and is summarised in the Mathematical Appendix to this chapter. The essence of Cournot's monopoly analysis has, however, been discussed in this section. It is clear that Cournot's achievement was two-fold . Firstly, he rigorously defined the pure monopoly model for the first time in the economic literature, and, secondly, he deduced many of the important theorems of the model. This was an outstanding achievement when one considers that, in Schumpeter's words, "practically no theory of monopoly had existed before him".[2] Such a contribution alone would place him in the front rank of economic theorists. We shall see in the next section, however, that his contribution to the analysis of pure competition was equally important.

---

1. See Schumpeter, History of Economic Analysis, p. 977, n. 14.

2. Schumpeter, ibid., p. 976.

III. Cournot's Analysis of Pure Competition

We turn in this section to the other pole of Cournot's price schema, the theory of <u>unlimited competition</u>.[1] As with the theory of monopoly it would be tedious to recount in detail all the various theorems derived by Cournot with regard to unlimited competition. We shall restrict ourselves in this section, therefore, to his discussion of equilibrium, and the effects of a change in marginal cost on this equilibrium.[2] The results discussed in this section represent the first statement of the model of pure competition in the literature.

As we have seen in section I above, Cournot regarded unlimited competition as the extreme form of his model of competition of producers. In the case of a single producer, as we have seen, the monopolist will set price so that

$$D + \frac{dD}{dp} \left[p - \phi'(D) \right] = 0 \qquad (5.7)$$

When there are a number of competitors in the market, n, Cournot assumes that each producer will set sales to maximise his net revenue, taking the sales of all other producers as given.

---

1. This model is analysed rather tersely in chapter viii of the <u>Recherches</u>. This terseness, undoubtedly, arises because Cournot approaches this case last, having already gone over the same problems with respect to monopoly, and competition of producers. We shall argue at the end of this section, that, nevertheless, Cournot provides all the basic elements of an analysis of pure competition in these few pages.

2. For a complete list of theorems see the Mathematical Appendix to this chapter.

Let $p = f(D)$ be the inverse demand function, where

$$D = \sum_{k=1}^{n} D_k$$

The kth producer will then maximise his net revenue

$$D_k \cdot f(D) - \phi_k(D_k)$$

Thus we will have n equilibrium conditions

$$D_k + \frac{dD}{dp}\left[p - \phi_k{}'(D_k)\right] = 0 \qquad\qquad (5.8)$$

which will determine the n partial productions, D_k. Price will then be determined by summing these n equations

$$D + \frac{dD}{dp}\left[n \cdot p - \sum_k \phi_k{}'(D_k)\right] = 0 \qquad\qquad (5.9)$$

The hypothesis of unlimited competition is defined by Cournot as follows:-

"The effects of competition have reached their limit when each of the partial productions D_k is _inappreciable_, not only with reference to the total production $D = F(p)$, but also with reference to the derivative $F'(p)$, so that the partial production D_k could be subtracted from D without any appreciable variation resulting in the price of the commodity."[1]

This represents an admirable definiton of the model of pure competition. The advantage of making this assumption from a technical point of view is that "it introduces a great simplification into the calculations". In the n equations (5.8), since the partial productions D_k are so small they may "be neglected without sensible error" and the equilibrium conditions simplify to

$$p - \phi_k{}'(D_k) = 0 \qquad\qquad (5.10)$$

In other words, each producer will determine his output such that price equals marginal cost.[2]

---

1. _Recherches_, p. 90.
2. Monopoly and competition of producers are, of course, characterised by price in excess of marginal cost (see equations 5.7 and 5.8.)

The market price is determined by the condition

$$\sum_k D_k = F(p)$$

If we solve the n equations (5.10) for the partial productions D_k, then we have the total production in equilibrium. This is the supply function (although Cournot does not call it this), which is a function of price

$$S = \Omega(p)$$

Hence price is determined by the condition that demand equals supply.

$$\Omega(p) - F(p) = 0 \qquad\qquad (5.11)$$

In equilibrium, under unlimited competition, marginal cost must be increasing. This can be seen clearly from the second order condition for net revenue to be a maximum i.e. by differentiating equations (5.10) with respect to D_k, and making the result less than zero.

$$-\phi_k''(D_k) < 0 \quad [1]$$

Cournot, however, chooses to argue this proposition by saying that otherwise gross revenue

$$p \cdot D_k = D_k \cdot \phi_k'(D_k)$$

would be less than cost of production

$$\phi_k(D_k) = \int_0^{D_k} \phi_k'(D_k) \cdot dD_k$$

This proof implicitly assumes that marginal cost decreases throughout its length, and is not valid in general. Figure (5.2) demonstrates this: Figure (5.2a) confirming Cournot's proof, and Figure(5.2b) disproving it.

---

1. This result introduces some assymetry into Cournot's price schema, since no such restriction is placed on the slope of marginal cost in the models of monopoly and competition of producers.

Figure 5.2
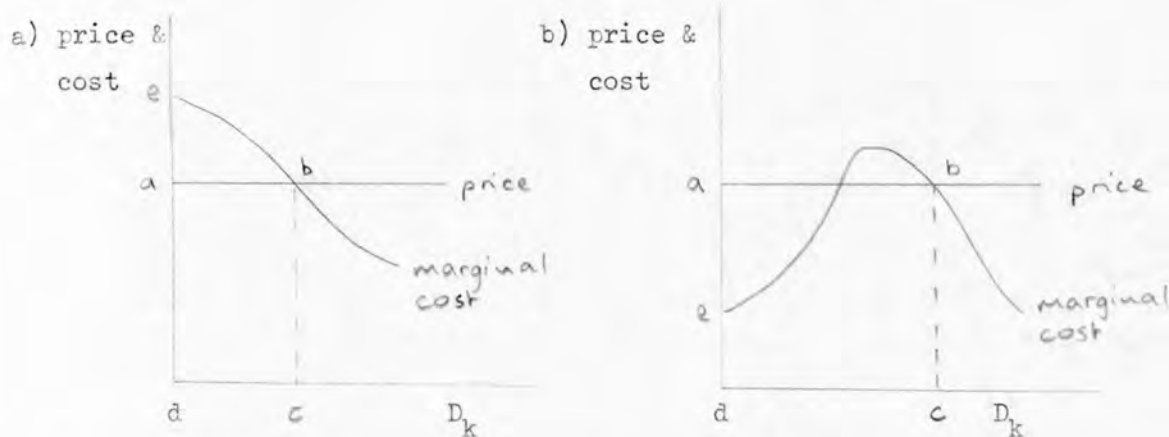
In both cases, output dc satisfies the equilibrium condition, and
marginal cost falls at this output. But while a loss is made in
figure (5.2a), i.e. the area ebcd exceeds the area abcd, a profit is
made in figure (5.2b), i.e. the area abcd exceeds the area ebcd. In
the general case, therefore, the question of profit or loss is not
relevant; the condition that marginal cost is increasing being nec-
essitated by the second order condition for a maximum.

In the case, where marginal cost is a monotonic decreasing function
of production, D_k, Cournot's loss criterion holds. Cournot clearly
saw the practical implication of such a situation. By producing an
extra unit of the commodity past output ab in figure (5.2) the producer
will make a profit on that unit. On a successive unit he will make
a larger profit, and so on, so that "nothing would limit the production
of the article".[1] Hence, in such a situation of monotonically falling
marginal cost, the partial productions, D_k, will become so large
that the assumption that D_k is negligible is violated. In Cournot's
words, the existence of falling marginal cost

"proves that the effect of monopoly is not wholly extinct, or
that competition is not so great but that the variation of the
amount produced by each individual producer affects the total production
of the article, and its price, to a perceptible extent".[2]

This finding, that decreasing marginal cost is not compatible
with pure competition was, of course, to be a major argument raised

---

1. ibid., p. 91.   2.   ibid., pp. 91-2.

by Sraffa as to the empirical usefulness of the model, and it is
interesting to note that Cournot had already anticipated this
objection. However, Cournot did not offer any escape route from
the problem. Rather, he argued that

"This hypothesis (unlimited competition) is the one which is
realized in social economy, for a multitude of products, and,
among them, for the most important products."[1]

This statement is curiously at odds with his division, mentioned in
section II above, of industry and agriculture, the former typically
experiencing decreasing marginal costs, and the latter increasing
marginal costs. Surely, Cournot was not suggesting that no important
products were manufactured? And, of course, he was not. Rather, it
would be fairer to say that Cournot, like a number of writers we
shall meet in the remaining chapters of this thesis, of whom the most
important was Marshall, stopped short of pursuing the logic of the pure
competition model to its end, since such a course promised the
destruction of much of its apparent relevance. It was only in the
1920s that discussion of this fundamental restriction to the model
came into the open.

The main interest in examining Cournot's proof that an increase
in marginal cost for all producers will necessarily raise price,
arises from his use of what we would call demand and supply curves
in his demonstration. We have already seen in section II that Cournot
postulated that market demand was a negative function of price, and
that he drew such a curve for the purposes of determining equilibrium
in the zero cost monopoly case (see Figure (5.1). In addition,
supply is also a function of price, $\Omega (p)$. Moreover, since each
producer's marginal cost is increasing, his partial production, D_k,
in equilibrium, must also be a function of price, increasing with
price. On summation, therefore, the supply function, $\Omega(p)$, must also
increase with price. Thus, demand is a negative function of price,
and Cournot represents equilibrium simply by the intersection of
these two curves.

---

1. ibid., p. 90.

Figure 5.3[1]
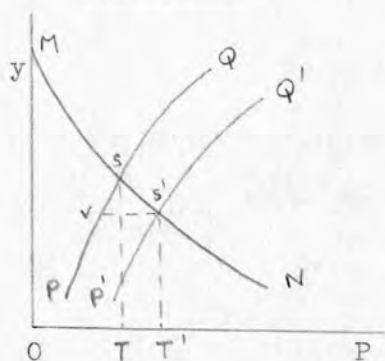
In figure 5.3, y is production and p is price. The demand curve, MN, has a negative slope, and the supply curve, PQ, a positive slope. The equilibrium price is OT at which demand equals supply. Figure 5.3 thus depicts clearly what has since become known as 'the Marshallian cross'.

If we now imagine

"all of the functions $\phi_k'(D_k)$ as being increased by the quantity u, as would take place in consequence of the establishment of a specific tax on the article, equation (5.11) would be replaced by

$$\Omega(p-u) = F(p) \text{ "}[2]$$

Graphically, the new supply curve is P'Q', and is related to PQ such that

"the portions intercepted between these two curves, of all lines parallel to the axis of the abscissas, such as VS', are equal to u"[3]

Evidently, the increase in cost will increase price from OT to OT'. Just as clearly, the rise in price must be less than the increase in cost, i.e. the distance TT' will be less than VS', as long as the demand curve slopes downward. Cournot also proves this result using the calculus, this proof being given in part 2, § 4 of the mathematical appendix to this chapter.

_____

1. This corresponds to Cournot's Figure (6). This is the first depiction of supply and demand curves in the literature.

2. ibid., p. 92.   3. ibid., p. 92.

Cournot does not go on to examine explicitly the effect of an increase in demand on price under pure competition. This was in line with his discussion of monopoly, where again only changes in cost were considered. Nevertheless he clearly saw that it would raise price and so each partial production D_k, as is self-evident from figure 5.3. Hence although his analysis of supply and demand was not given prominence in the Recherches, Cournot clearly analysed it comprehensively and satisfactorily. When supply and demand analysis took the centre of the stage in later works of the 19th century, no mention was made of Cournot's pioneering analysis. Yet it is clear that here, as in so many other fields, claim of priority lies in the slim volume of the Recherches.

Again, the reader is referred to the Mathematical Appendix for Cournot's analysis of the effects of taxation, in the unlimited competition case. It is clear, as it was in the case of monopoly, that Cournot must be credited with the pioneering analysis of this model, which is such an important part of modern theory. That this has not been entirely recognised in the secondary literature is, in part, due to Cournot's rather terse treatment of the model.[1] And, in addition, Cournot restricts himself to only pure competition, so that, as Stigler has argued, with reference to perfect competition his analysis is "one-sided".[2] This criticism undervalues the contribution of Cournot. As far as pure competition is concerned, at least, Cournot's analysis was outstanding.

---

1. As noted above, this was due to the fact that he analysed the case last, and so did not want to be too repetitive by going into the kind of detail he went into with the monopoly case.

2. Stigler, Perfect Competition, Historically Contemplated, p. 6. See chapter 1 where it is argued that this criticism is not justified.

IV

In this chapter, we have seen the important contribution made by Cournot to the analysis of competition and monopoly. Such concepts as marginal revenue, marginal cost, supply and demand, pure monopoly, and pure competition, all figure in his analysis, if not in name. The analysis of pure competition and pure monopoly comprises the equilibrium solution, and, in addition, much of the comparative static work with regard to these models. The position of these models in Cournot's price schema, and the idea of market structure determining price, form today the basic schema for analysing markets. Cournot's contribution was the single most important contribution to the analysis of competition and monopoly we shall meet.

It is against this background that we shall briefly look forward to future work on monopoly and competition. First, with regard to monopoly, Cournot's analysis replaced confusion with coherence. According to Edgeworth,

"the classical economists rather anathematised than analysed monopoly, ... it was reserved for Cournot to cultivate this neglected branch of economics".[1]

Subsequent work in this field can be roughly split into two. On the one hand, non-mathematical writers, not having access to Cournot's work, continued to use monopoly loosely, and to provide little in the way of analysis of the problem.[2] On the other hand, mathematical writers, of whom Walras, Edgeworth and Marshall may be mentioned, accepted Cournot's model as a starting point, and devoted themselves to developing it.[3] In Schumpeter's words

---

1. F.Y. Edgeworth, "Railway Rates", Economic Journal, (1912), reprinted in Papers Relating to Political Economy, vol. I (London: Macmillan, 1925), p. 172.

2. See, however, Menger's interesting discussion of the problem, analysed in chapter 7 below.

3. Edgeworth and Marshall share honours for developing Cournot's theory, Walras doing little more than reproduce Cournot's analysis.

"the period's (1870-1914) work may be described as a series of successful attempts to develop his statics of straight monopoly".[1]

It was only with the appearance of Marshall's Principles in 1890, that the non-mathematical majority of economists was to become acquainted with Cournot's pure monopoly theory.

As far as the analysis of competition is concerned, the next important development was to be the work of Walras. His contribution was to provide a general analysis in place of Cournot's partial analysis and in the process, to integrate some of Cournot's ideas with the idea of inter-industry equilibrium. This, as we will see, was another major achievement in the development of the idea of perfect competition theory. However, in less mathematical writings, the integration of these ideas was less satisfactorily carried out. Not until the work of Marshall towards the end of the 19th century do we find an attempt at integrating the ideas of pure competition and free competition into a consistent framework of analysis at a level of abstraction less rarefied and more practical than that adopted by Walras.

Cournot's analysis of pure competition, as we have seen, was fairly terse. Hence, there was room for expansion of some of its ideas in subsequent work. Thus, for example, although he drew supply and demand curves, Cournot did not dwell on them, and it was left to Fleeming Jenkin to use them in a comprehensive analysis. Or again, although Cournot assumed there would be but one price in the market he did not enunciate conditions which would ensure such a result. These conditions were first given by Jevons. Cournot's work nevertheless broke the back of the pure monopoly and pure competition models. And as we shall see, the failure of the Recherches to reach a wide audience in the half century after 1838, must be largely held responsible for the poor quality work on competition and monopoly which was to predominate in that period.

1. Schumpeter, op. cit., p. 976.

Mathematical Appendix.

Cournot's analysis of Monopoly and Unlimited Competition

In this appendix, I have gathered together the theorems on pure monopoly and pure competition derived by Cournot in chapters iv-vi, and viii, respectively, of the Recherches. I have used Cournot's notation, but where appropriate I have expanded his proofs in order to clarify the exposition.[1] It is a measure of Cournot's great contribution to the analysis of competition and monopoly, that all the proofs here included were first given in his work.

---

1. For further clarification the reader should refer to I. Fisher's, 'Notes on Cournot's Mathematics', prefaced to the Recherches.

1.   The Theory of Monopoly

§1.   In the zero cost case, a monopolist faces a demand curve
$D = F(p)$, and maximises his gross revenue, $p.F(p)$, by setting price
such that

$$F(p) + p.F'(p) = 0 \tag{1}$$

By doing this he receives a revenue dependent only on the nature of
the function $F(p)$

$$p.F(p) = \frac{\{F(p)\}^2}{-F'(p)}$$

§2.   The gross revenue of the monopolist will be a maximum if

$$2.F'(p) + p.F''(p) < 0$$

Since $F'(p)$ is negative, and p is positive, a sufficient condition
for a maximum is that the demand curve be concave from the origin

$$F''(p) < 0$$

§3.   If the monopolist suffers capacity constraints such that his
maximum output, Δ , is less than required by equation (1), price will
be determined such that

$$F(p) = \Delta$$

§4.   In the non-zero cost case, a monopolist maximises net
revenue

$$p.F(p) - \phi(D)$$

where cost, $\phi(D)$, is an implicit function of price. The equilibrium
condition in this case is

$$D + \frac{dD}{dp} \left[p - \frac{d\{\phi(D)\}}{dD} \right] = 0 \tag{2}$$

Since marginal cost is positive, in equilibrium

$$p > \frac{d\{\phi(D)\}}{dD}$$

§5. If marginal cost is constant, g, equation (2) becomes

$$D + F'(p) \{p - g\} = 0$$

If total costs are fixed, equation (2) reverts to equation (1)
and price depends on demand alone.

§6. A capacity constraint which limits output to Δ, less than
equilibrium output, leads to a price determined by

$$F(p) = \Delta$$

In this case, cost does not affect equilibrium, but only serves to
diminish the monopolist's income.

§7. When costs are positive, a monopolist will continue production,
as long as net revenue is positive

$$p. F(p) - \phi(D) > 0$$

§8. A small rise in marginal cost, u, will cause a small rise
in price, δ. Let p_0 be the original equilibrium price, so that

$$F(p_0) + F'(p_0)\{p_0 - \psi(p_0)\} = 0 \tag{3}$$

where $\psi(p_0) = \phi'\{F(p_0)\}$. In the new equilibrium we have

$$F(p_0 + \delta) + F'(p_0 + \delta)\{p_0 + \delta - \psi(p_0 + \delta) - u\} = 0 \tag{4}$$

By Taylor's theorem, neglecting terms involving squares and higher
powers of δ, we have

$$F(p_o + \delta) = F(p_o) + \delta F'(p_o)$$

$$F'(p_o + \delta) = F'(p_o) + \delta F''(p_o)$$

$$\psi(p_o + \delta) = \psi(p_o) + \delta \psi'(p_o)$$

Using these approximations in equation (4), subtracting equation (3), and discarding terms such as δ^2 and δu, we have

$$\left[F'(p_o)\{2 - \psi'(p_o)\} + F''(p_o)\{p_o - \psi(p_o)\} \right] \delta - u.F'(p_o) = 0 \qquad (5)$$

The coefficient of δ in equation (5) will be found to be the derivative of equation (3) with respect to p_o, which must be negative by the second order condition for a maximum. Hence from equation (5), δ must have the same sign as u.

§9. The rise in price, δ , will be more or less than the rise in u according to the relation

$$\frac{d}{u} = \frac{F'(p_o)}{F'(p_o)\{2 - \psi'(p_o)\} + F''(p_o)\{p_o - \psi(p_o)\}}$$

From equation (3)

$$p_o - \psi(p_o) = - \frac{F(p_o)}{F'(p_o)}$$

so that $\delta > u$ if

$$\{F'(p_o)\}^2\{1 - \psi'(p_o)\} + F''(p_o).F(p_o) < 0$$

Clearly a sufficient condition for this to hold is that $\psi'(p_o) > 1$ and $F''(p_o) < 0$.

§10. A tax of a fixed amount, α , will not affect the monopolist's equilibrium price. His net revenue is now

$$p.F(p) - \phi(D) - \alpha$$

181.

so that equilibrium is again expressed as equation (2). Consequently,
such a tax falls wholly on the monopolist, and does not affect the
consumer.

§11. A tax proportional to net revenue likewise does not affect
equilibrium, and hence falls solely on the monopolist. His net revenue
in this case will be

$$\{1-i\} . \{ p.F(p) - \phi (D)\}$$

where i is the tax rate.

§12. A tax proportional to $F(p)$ does affect monopoly equilibrium.
Such a tax, i, is equivalent to an increase in the function $\phi'(D)$
by a constant i. Thus net revenue is

$$p.F(p) - \phi(D) - i.F(p)$$

so that equilibrium becomes

$$F(p) + F'(p)\{p - \phi'(D) - i\} = 0$$

which is equivalent to equation (4) above.

Let p_o be the pre-tax equilibrium price, and p' be the post-tax
price. Then by the argument in §§ 8-9.

$$p' - p_o = \frac{i.\{F'(p_o)\}^2}{\{F'(p_o)\}^2\{2 - \psi'(p_o)\} - F(p_o).F''(p_o)} \tag{6}$$

We already know that if i is positive, $p' > p_o$, and hence $F(p') < F(p_o)$.
Equation (6) determines the extent of the price rise to p'.

The loss to consumers who continue to buy the commodity is

$$(p' - p_o). F(p')$$

The gross profit of the treasury is

$$i. F(p')$$

Thus the loss to the consumers will exceed the treasury gain if

$$p' - p_0 > i$$

The loss of net income by the monopolist is

$$p_0 . F(p_0) - \phi\{F(p_0)\} - \left[p'.F(p') - \phi\{F(p')\}\right] + i.F(p')$$

Since p_0 was the original equilibrium price

$$p_0 . F(p_0) - \phi\{F(p_0)\} > p'.F(p') - \phi\{F(p')\}$$

Thus the loss to the monopolist must exceed the treasury gain.

Since absolute cost must be lower after the tax, as sales are lower i.e.

$$\phi\{F(p_0)\} > \phi\{F(p')\}$$

it follows that expenditure on consumption is reduced by the tax

$$p_0 . F(p_0) > p'.F(p')$$

The treasury will maximise gross revenue by selecting i such that

$$F(p') + i.F'(p').\frac{dp'}{di} = 0$$

p' being a function of i, given by

$$F(p') + \{p' - \psi(p') - i\}F'(p') = 0$$

If the monopolist is unable to produce the equilibrium output both before and after the tax, then price will be such that

$$F(p) = \Delta$$

Where Δ is maximum output, and the tax will not affect price. Hence it will fall solely on the monopolist.

If the treasury grants a bounty i to the monopolist, the price he will charge in equilibrium falls from p_0 to p'. The gain to the original consumers is

183.

$$(p_o - p').F(p_o)$$

and the loss to the treasury is $i.F(p')$. The gain to the monopolist
is

$$i.F(p') - \left[p_o.F(p_o) - \phi\{F(p_o)\} - \{\, p'F(p') - \phi[F(p')]\,\} \right]$$

As before the expression in brackets $\{\}$ is positive, so that the gain
to the monopolist is less than the loss to the treasury.

§13. A tax, n, proportional to gross revenue has the following
effects. In the zero cost case, it does not affect equilibrium. The
monopolist's gross revenue is in this case

$$(1 - n)\, p.F(p)$$

In the positive cost case, the monopolist's net revenue becomes

$$(1 - n).p.F(p) - \phi(D)$$

and the equilibrium condition becomes

$$F(p) + F'(p)\left[p - \frac{1}{1-n}.\phi'\{F(p)\} \right] = 0$$

The effect of this tax is to raise the cost term by $\frac{1}{1-n}$. Hence the
larger is $\phi'(D)$, the greater will be the effect of the tax.

Let p_o be the pre-tax price and p' the post-tax price. The loss
to the consumers who continue to buy the commodity is

$$(p' - p_o).F(p')$$

The gross profit of the treasury is

$$n.p'.F(p')$$

Thus the loss to the consumers exceeds the gain to the treasury as

$$p'(1 - n) > p_o$$

The loss borne by the producer is

$$p_0 . F(p_0) - \phi\{F(p_0)\} - \left[p'.F(p') - \phi\{F(p')\} \right] + n.p'.F(p')$$

As before this loss exceeds the gross profit to the treasury.

The treasury will maximise gross revenue by setting n such that

$$p'F(p') + \frac{dp'}{dn}.n.\{F(p') + p'.F'(p')\} = 0$$

§14. A tax in kind which affects cost but not revenue has the following effects. If it is a fixed quantity tax, k, the equilibrium condition is

$$F(p) + F'(p) \left[p - \phi'\{F(p) + k\} \right] = 0$$

In this case, price is raised or lowered by the tax as $\phi'(D)$ increases or decreases with D.

On the other hand, if the tax is proportional to gross production such that net revenue is

$$p.F(p) - \phi\{\frac{F(p)}{1-n}\}$$

then equilibrium requires

$$F(p) + F'(p)\left[p - \frac{1}{1-n}.\phi'\{\frac{F(p)}{1-n}\}\right] = 0$$

§15. If the tax in kind is a constant, k, taken from the monopolist's revenue, then we have

$$p.\{F(p) - k\} - \phi\{F(p)\}$$

The equilibrium condition is then

$$F(p) - k + F'(p)\{p - \phi'(D)\} = 0$$

On the other hand, a tax proportional to gross product would give for the function for the maximum

$$(1 - n).p.F(p) - \phi(D)$$

This is equivalent to the proportional tax in money analysed in §13.

2. The Theory of Unlimited Competition

§1. If there are n producers, each attempts to maximise net
revenue

$$D_1 f(D) - \phi_1(D_1)$$

$$D_2 f(D) - \phi_2(D_2)$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$D_n f(D) - \phi_n(D_n)$$

This leads to a system of equilibrium conditions

$$D_1 + \frac{dD}{dp} \cdot p - \phi_1'(D_1) = 0$$

$$D_2 + \frac{dD}{dp} \cdot p - \phi_2'(D_2) = 0$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$D_n + \frac{dD}{dp} \cdot p - \phi_n'(D_n) = 0$$

A situation of unlimited competition is defined as one in which the
partial productions, D_k, are inappreciable with reference to D and
$F'(p)$, so that D_k may be subtracted from D without any appreciable
variation in price. In such a situation, the terms D_k may be neglected,
and the equilibrium conditions simplify to

$$p - \phi_1'(D_1) = 0$$

$$p - \phi_2'(D_2) = 0 \qquad\qquad (1)$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot$$

$$p - \phi_n'(D_n) = 0$$

These n equations together with

$$D_1 \, D_2 \ldots + D_n = F(p) \qquad\qquad (2)$$

determine the n+1 unknowns, p and D_1, $D_2 \ldots D_n$.

§2. If we solve all the equations (1) for the partial productions D_1, $D_2 \ldots D_n$, then we have total production in equilibrium, S, which is a function of p.

$$S = \Omega(p)$$

Price is then determined by the condition

$$\Omega(p) - F(p) = 0 \qquad\qquad (3)$$

§3. All the functions $\phi_k'(D_k)$ must increase with D_k in equilibrium. Otherwise gross revenue

$$p \cdot D_k = D_k \cdot \phi_k'(D_k)$$

will be less than costs

$$\phi_k(D_k) = \int_0^{D_k} \phi_k'(D_k) \cdot dD_k$$

As all the functions

$$\phi_k''(D_k) > 0$$

D_k is a function of p_1 increasing with p. Thus the function $\Omega(p)$ must increase with p

$$\Omega'(p) > 0$$

§4. A small increase in marginal cost of magnitude u for all producers will cause price to rise by a quantity δ. Let the original equilibrium position be

$$\Omega(p_0) = F(p_0) \qquad\qquad (4)$$

and the subsequent equilibrium be

$$\Omega(p_o + \delta - u) = F(p_o + \delta) \qquad (5)$$

By Taylor's theorem, neglecting squares and higher powers, we have

$$\Omega(p_o + \delta - u) = \Omega(p_o) + \delta\Omega'(p_o) - u\Omega'(p_o)$$

and

$$F(p_o + \delta) = F(p_o) + \delta F'(p_o)$$

Subtracting (4) from (5), using these expressions, gives

$$(\delta - u)\Omega'(p_o) = \delta F'(p_o) \qquad (6)$$

This condition can only be satisfied, bearing in mind that u is positive, if

$$\delta > 0 \text{ and } \delta < u$$

Thus the cost increase will raise price, but by an amount less than the increase in cost. It also follows from equation (6) that the flatter the demand curve i.e. the smaller the value of $F'(p)$, the more nearly will the price rise δ approach the magnitude of the cost rise u.

§5. Let us assume that u is a specific tax, proportional to D_k, levied on each producer. The initial equilibrium of the kth producer is

$$\{ \phi_k'(D_k) \}_o = p_o$$

The post-tax equilibrium is

$$\{ \phi_k'(D_k) \}' = p' - u$$

We know from §4 that

$$p' - u < p_o$$

so that

$$\{ \phi_k'(D_k) \}' < \{ \phi_k'(D_k) \}_o$$

In addition

$$\{D_k\}' < \{D_k\}_o$$

so that, _a fortiori_,

$$(p' - u)\{D_k\}' < p_o\{D_k\}_o$$

The producer suffers two types of loss. Firstly, the difference between the price p_o and $p' - u$, on the quantity produced $\{D_k\}'$

$$(p_o - p' + u)\{D_k\}'$$

Secondly, the net revenue he was receiving on the lost production $\{D_k\}_o - \{D_k\}'$

$$p_o(\{D_k\}_o - \{D_k\}') - (\{\phi_k(D_k)\}_o - \{\phi_k(D_k)\}')$$

The total loss is therefore

$$p_o\{D_k\}_o - (p' - u)\{D_k\}' - (\{\phi_k(D_k)\}_o - \{\phi_k(D_k)\}')$$

This loss diminishes as $\phi_k'(D_k)$ has a steeper slope.

The producers as a whole will therefore lose

$$uD' + p_o D_o - p'D' - \sum_k (\{\phi_k(D_k)\}_o - \{\phi_k(D_k)\}')$$

Since

$$\{\phi_k(D_k)\}_o > \{\phi_k(D_k)\}'$$

the total producer loss is necessarily less than the treasury gain u.D' if

$$p'D' > p_o D_o$$

In other words, if $F(p)$ is elastic.

The loss to the consumers who continue to buy the article is

$$(p' - p_0)D'$$

This loss is less than the receipts from the tax since

$$p' - p_0 < u$$

§6. A tax proportional to gross revenue implies the net revenue of the kth producer is

$$p.D_k - \phi_k (D_k) - n.p.D_k$$

The equilibrium condition therefore becomes

$$p(1 - n) - \phi_k'(D_k) = 0$$

Solving this condition for each producer gives us total supply, so that price is determined by

$$\Omega\{ (1 - n)p\} - F(p) = 0$$

The effect of the tax is to raise price, just as if $\phi_k'(D_k)$ had been increased by the ratio $1:\dfrac{1}{1-n}$. The effect on price will therefore be greater, the larger is $\phi_k'(D_k)$.

The analysis is the same if a tithe or tax in kind, proportional to production, is levied, assuming $F(p)$ is not affected.

§7. The net revenue in money of the kth producer is

$$\phi_k'(D_k).D_k - \int_0^{D_k} \phi_k'(D_k).dD_k \qquad (7)$$

If price rises, so that D_k rises, the net revenue of the producer must increase.

In order to derive the return in kind, we must divide equation (7) by $p = \phi_k'(D_k)$

$$D_k - \frac{1}{\phi_k{}'(D_k)} \cdot \int_0^{D_k} \phi_k{}'(D_k) \cdot dD_k$$

This return will be a maximum where

$$\frac{d\phi_k{}'(D_k)}{dD_k} = 0 \qquad\qquad (8)$$

But condition (7) cannot be obtained since $\phi_k{}'(D_k)$ must increase with D_k always. Hence a rise in price which raises D_k will always raise the net return in kind of the kth producer.

Chapter 6

Leon Walras' 'Pure Economics'

Leon Walras published his <u>Elements d'economie politique pure</u> in two parts in 1874 and 1877.[1] In this work, he presented what must be regarded as the classic statement of the theory of free competition,[2] in the economic literature. Whereas the Classical economists only made vague statements with regard to competitive equilibrium, Walras presented an explicit and rigorous treatment of it. He presented the Classical competitive theorems in a general equilibrium framework, thus demonstrating their logical position in economic theory. And further, as we shall see, his explicit approach uncovered some of the problems of competitive theory which had been obscured by the vaguer Classical treatments. He did not solve all the problems of competitive theory, but his work provides the basis for subsequent research into general competitive analysis by mathematical economists.[3]

---

1. Subsequent editions were published in 1889, 1896, 1900, and 1926. I have used Jaffé's translation of the 1926 "edition definitive": Leon Walras, <u>Elements of Pure Economics: or the Theory of Social Wealth</u>, trans. by W. Jaffé, (London: Allen and Unwin, 1954).

2. We are distinguishing free and pure competition here. The Classic statement of the latter is, as we have seen, Cournot's.

3. As explained in chapter 1 we shall not be concerned with the development of Walras' general competitive analysis by mathematical economists in the remainder of our period, but rather with the less abstract work of mainstream economists. For a good summary of the mathematical refinement of Walras' work, see Kenneth J. Arrow and F.H. Hahn, <u>General Competitive Analysis</u> (Edinburgh: Oliver and Boyd, 1971) chapter 1.

The Elements is an exercise in pure theory. Further, the basic assumption of the book is "a hypothetical regime of perfectly free competition". Walras saw the book as part of an attempt to make economics into an exact science, like the physico-mathematical sciences of mechanics or hydrodynamics. The pure theory of economics was, like the pure theory of mechanics, the rational part of the science, and as such should use the methods and language of mathematics. It is this use of mathematics which, more than any other factor, enabled Walras to present the classic statement of free competition theory, just as it had enabled Cournot to present the classic statement of pure competition and pure monopoly theory.[1] In a sense Adam Smith's competition theory can be viewed as the attempt of a non-mathematical economist to express essentially mathematical relationships in words. But what Smith found extremely difficult to do, was for Walras much easier, because he was able to use the powerful tools of mathematics. Did mathematics dictate the theory which Walras presented? Partly, yes; but it also, in the same way, dictated Smith's theory; with the primary difference that Smith did not possess the mathematical tools essential to properly present the theory.

Walras' book attempts to provide a general theory of price determination. It builds up this general theory in successive stages. At each stage the central idea is the concept of general equilibrium. Walras shows that at each stage his theory is determinate in the sense that the number of equations and unknowns are equal. Consequently the book is concerned with system. And to ensure that nothing interferes with this system, the argument is carried on at a high level of abstraction. But system isn't everything, and inevitably in this logical tour de force, problems which threaten to upset the argument are ignored or assumed away. And such problems are the bread and butter of practical applications of the theory. Walras was not concerned to be practical in the Elements, and so there is little in the book critical of the theory. But then perhaps it would be too much to expect the classic exposition of free competition theory, to also provide its own critique. The critique must come later.

---

1. In the Preface to the Fourth Edition (p.37 of the Jaffé edition) Walras acknowledges two sources: his father, Auguste Walras, and Cournot. To the latter he owed "the idea of using the calculus of functions" to elaborate his theory.

The _Elements_ is a difficult book to deal with because of its
architectonic structure. Its core consists of 4 parts: the theory
of exchange (Parts II and III); of production (Part IV); of
capitalization (Part V); and of circulation (Part VI). Each of these
parts builds on the preceding ones, so that the theory is gradually
made more complex. For reasons of space I shall not present a
consideration of each of the parts, and I have elected to largely
ignore the last two parts in what follows. Further, space considera-
tions have also forced me to restrict the use of mathematics to the
absolutely necessary. The net result of these restrictions is to
play down the breadth of Walras' achievement, and this limitation
should be noted in what follows.

I have divided this chapter into 5 sections. Section I deals with
Walras' conception of free competition. Section II looks at the
theory of exchange and section III the theory of production. Section
IV briefly examines Walras' theory of monopoly; whilst section V draws
some conclusions.

I. Walras' conception of free competition

The whole of Walras' edifice of pure economics is built on the
assumption of free competition. Walras, unlike Cournot, devoted
little space to alternative assumptions.[1] His aim was to build a
systematic, general theory of price determination, which would make
economics into an exact science. And for this purpose he chose one
assumption only, that of free competition, and used it throughout.

Why did Walras choose the assumption of free competition? One
could argue that he chose it, because it was the most suitable to
a general theoretical approach. Its symmetry and its simplicity are
both conducive to a general model, in a way that monopoly, say, is
not. Certainly, there is something in this argument, but in my view
it is not basic. More important, was Walras' commitment to the free
competition concept both as a description of what is, and as a
description of what ought to be.[2] This belief in free competition is,
of course, the same belief that most economists at least from the
time of Adam Smith had had, and it had resulted in a traditional
competitive approach to price determination. Walras, despite his
superior analytical ability, accepted this tradition, and built
his system upon it.

Walras' belief in free competition, as with other economists,
led him to treat it with less rigour than he treated other concepts
in the Elements. There, therefore, emerges from the book a rather

---

1. Monopoly is dealt with only in the last part of the Elements
(Part VII) and is mentioned in only one or two places before that.
See section IV of this chapter.

2. That is Walras, like the Classical economists, was ideologically
biased in favour of free competition. See Schumpeter, History of
Economic Analysis, p. 34.

loose conception of free competition. A primary example of this is
Walras' failure to make a clear distinction between the theoretical
method and the particular theory of free competition.[1] This can
be clearly seen from the first Lesson of Part II of the _Elements_,
where he proceeds imperceptibly from a statement of the theoretical
problem to the assumption of competition.[2] It is brought out even
more explicitly in the Preface to the Fourth Edition, where Walras says

"_Pure economics_ is, in essence, the theory of the determination
of prices under a hypothetical regime of perfectly free competition".[3]

Thus Walras identifies free competition with the science itself.
Clearly such an identification is not logically valid. Its acceptance
by Walras gives an ideological bias to his frequent defence of the
scientific method, by also making it a defence of free competition.
Even today one on occasion hears the argument that an assumption of
perfect competition should be made, at the theoretical stage of a
problem, before the empirical stage is dealt with. Such an argument
makes the same mistake as Walras did of confusing two logically
separate ideas: that of the theoretical method and of perfect
competition.

One would expect that an economist as concerned with making
economics a science, as Walras was, would put great emphasis on the
assumptions of his theory. However, this is not the case. Rather in
the _Elements_, a peculiar dualism exists between the theory and the
assumption of free competition. On the one hand, Walras derives his
theorems of competition mathematically from certain conditions, such
as demand should equal supply or price should equal unit costs. Then
he switches to explaining in crabbed prose, how, in 'the real world',
the mathematical general solution "is empirically solved in the market
by the mechanism of competition". This mechanism of competition worked
in the real world, because of the existence of a real-world situation
called _free competition_. Thus, free competition described a real-world
situation, rather than a theoretical model. As a direct consequence

---

1. This criticism, of course, applies equally to the Classical economist.
See chapter 4 above.

2. _Elements_, Lesson 5, pp. 83-91.   3.   ibid., p. 40.

of this, nowhere in the Elements will you find an explicit discussion
of the assumptions of the model of free competition. As with earlier
writers free competition was a situation, and as such we are only able
to infer the type of situation which Walras had in mind from his
descriptions of the competitive economy.

Perhaps the best description of free competition in the Elements
is given at the beginning of the discussion of the theory of
exchange.[1]

"Value in exchange, when left to itself, arises spontaneously in
the market as the result of competition. As buyers, traders make
their demands by outbidding each other. As sellers, traders make
their offers by underbidding each other. The coming together of
buyers and sellers then results in giving commodities certain values
in exchange."[2]

From this we see Walras' commitment to competition, in that he does
not consider value in exchange arising from alternative circumstances.
Further we see the familiar elements of buyers and sellers competing
in the market for commodities. There is however no attempt to be
more specific as to the number of traders, or their share in the
market.

However, Walras does recognise different markets are more or less
perfectly competitive, and that

"The more perfectly competition functions, the more rigorous is
the manner of arriving at value in exchange."[2]

The "perfectness" of competition depends on the extent to which the
market is organised:-

"The markets which are best organised from the competitive
standpoint are those in which purchases and sales are made by auction,
through the instrumentality of stockbrokers, commercial brokers or
criers acting as agents who centralise transactions in such a way

---

1. ibid., Lesson 5, pp. 83-6.   2.   ibid., p. 83.

that the terms of every exchange are openly announced and an
opportunity is given to sellers to lower their prices and to buyers
to raise their bids."

Stock markets, commercial markets, grain markets and fish markets
conform to this picture. Fruit, vegetable and poultry markets
are not so well organised, while retail markets are poorly organised,
although "competition... nevertheless operates quite adequately"
even in these. Further, competition is "unquestionably... the
primary force" even in the least organised markets; for example, for
the services of lawyers or musicians. Walras felt justified,therefore,
in taking the idealised perfectly competitive market as his assump-
tion:-

"we shall suppose that the market is perfectly competitive, just
as in pure mechanics we suppose, to start with, that machines are
perfectly frictionless."[1]

Hence, he envisages in his assumption of free competition, a market,
such as the stock market, which is highly organised, such that experts
deal in it, and all relevant information is available in it. This
picture closely resembles Jevons' notion of a perfect <u>market</u>, and
again Marshall's emphasis on organisation in the market.[2]

Walras gives as an example of "how competition works in a well-
organised market", the trading in 3% French Rentes on the Paris
Stock Exchange.[3] In this market brokers act for the buyers and the
sellers. Suppose the price to be 60 francs. Brokers with orders to
sell at this price or less will offer these three per cents, and
together these Rentes are termed the <u>effective offer</u>. Conversely,

---

1. ibid., p. 84.

2. Jevons' views on the perfect market are discussed in chapter 8
below, whilst Marshall's views on competition are dealt with in
chapter 9.

3. ibid., pp. 84-6.

brokers with orders to buy at 60 francs or above, demand a certain quantity of the Rentes, called the <u>effective demand</u>. If effective offer and demand are equal, exchange takes place, and "the market is in a <u>stationary state</u> or in <u>equilibrium</u>". If demand exceeds offer, price will have to rise to obtain equilibrium; and fall, if offer exceeds demand. The mechanics of the market do not concern us at present[1]. What we may note from this example is that traders are conceived as quantity adjustors to a change in price, i.e. that offer and demand are functions of price. This, of cours, is a basic feature of supply and demand analysis, and Walras correctly perceives it. However, he in no way further elucidates the competitive assumptions which enable the construction of demand and offer curves in this example.

The discussion of free competition so far only relates to the exchange economy. Turning to Walras' discussion of production, we find the usual assumption that firms will move towards trades where a profit is being made, and away from trades where a loss is being made:-

"Under free competition, if the selling price of a product exceeds the cost of the productive services for certain firms and a <u>profit</u> results, entrepreneurs will flow towards this branch of production or expand their output, so that the quantity of the product will increase, its price will fall, and the difference between price and cost will be reduced; and, if, the cost of productive services exceeds the selling price for certain firms, so that a <u>loss</u> results, entrepreneurs will leave this branch of production or curtail their output, so that the quantity of the product will decrease, its price will rise and the difference between price and cost will again be reduced".[2]

This statement directly explains the tendency for price to equal unit costs under free competition. Further it implies, as Walras noted

---

1. See section 2 below.

2. <u>Elements</u>, Lesson 18, pp. 224-5.

"that the desire to avoid losses and to make profits is the mainspring of the entrepreneur's actions in demanding productive services and offering products for sale, just as we saw earlier that the desire to obtain maximum satisfaction was the mainspring of the actions of landowners, labourers and capitalists in offering productive services and in demanding products".[1]

He goes no further, however, in his discussion of the assumptions sufficient to ensure a tendency to zero profits. His analysis of this problem closely parallels that of the English Classical economists, to whom this principle was, of course, fundamental.[2]

Two other aspects of Walras' competitive analysis may usefully be considered here, before we pass to his analytical contributions in sections II and III: namely, his discussion of "statics and dynamics", and his discussion of the welfare properties of free competition. The theory of competition is a static one in the sense that all variables have the same time subscript, and equilibrium is determined given the parameters of the model.[3] Walras' mathematical approach of explicitly writing the equations of his system, enabled him to grasp this clearly, in a way the non-mathematical Classical economists had not. Again he invoked the parallel with mechanics to explain the point:-

"We shall suppose the basic data of the economic problem... to remain fixed, so as to give us something in economics analogous to what is called a <u>stable system</u> in mechanics".[4]

---

1. ibid., p. 225.

2. The zero profit condition is further discussed in section III below.

3. See Schumpeter, <u>History of Economic Analysis</u>. p. 963.

4. <u>Elements</u>, Lesson 35, pp. 378-9. Walras' general competitive analysis used the same tools and is formally analogous to mechanics.

Setting aside his substitution of _stable_ for _static_, Walras clearly
saw that the theory of competitive equilibrium was a static one.
This point was one which was to cause confusion amongst literary econ-
omists even into the present century, however.[1]

Walras also believed that he transcended static analysis, and
presented a dynamic analysis in the _Elements_. Having dealt with
static equilibrium

"we shall be in a position, if we so desire, to pass from the
static to the _dynamic_ point of view. In order to make this trans-
ition we need only suppose that the data of the problem, viz. the
quantities possessed, the utility or want curves, etc. to vary as
a function of _time_. The _fixed_ equilibrium will then be transformed
into a _variable_ or _moving_ equilibrium, which re-establishes itself
automatically as soon as it is disturbed."[2]

This step is taken in Part VII, Lesson 35 with the introduction of
"the continuous market".[3] In this Lesson, Walras drops the hypothesis
of "an annual market period" in favour of a continuous market, "in
order to come still more closely to reality". In the continuous
market there is continuous change in "the basic data of the problem",
so that there is a perpetual tendency to equilibrium, which is never
realised fully. "Thus we pass from the static to the dynamic state".

We see here that Walras was not talking of what we would today
call dynamics. The idea that continual change in real world markets
makes the movement to equilibrium only a tendency is, of course,
prominent in the _Wealth of Nations_. The formalisation of it, that
we are examining the effect on the equilibrium position of changes in
the parameters of the model, is, of course, the problem of com-
parative statics. Walras went no further than to explore the

---

1. See Frank H. Knight's _Risk, Uncertainty and Profit_, first
published in 1921, as an example of this.

2. _Elements_, Lesson 29, p. 318.

3. ibid., pp. 377-81.

comparative static possibilities of his model in the <u>Elements</u>.
This can be clearly seen from his division of his subject into
"three phases":-

"(1) the phase of <u>preliminary gropings</u> towards the establishment
of equilibrium in principle;

(2) the <u>static</u> phase in which equilibrium is effectively
established <u>ab ovo</u> as regards the quantity of productive services
and products made available during the period considered, under the
stipulated conditions, and without any changes in the data of the
problem;

(3) a <u>dynamic</u> phase in which equilibrium is constantly being
disturbed by changes in the data and is constantly being re-estab-
lished."[1]

It is not sufficient to change the parameters of static equations,
in order to make a theory dynamic. Walras can be given the credit
for formally dividing competitive theory into the three divisions:
disequilibrium, equilibrium and comparative equilibrium. But it is
not in the <u>Elements</u> that we will find a dynamic treatment of
competition theory.

We have already noted that Walras regarded free competition as a
welfare ideal. This was not unusual, indeed it was a supposition
held by practically all 19th century economists. What was unusual,
was that Walras attempted to prove it. Previously, economists
had not possessed an explicit enough model to be able to do this.
Walras possessed the technique to present an explicit, systematic
theory of competition; and he used this to try to demonstrate that
competition was "a good thing".

There has been a great deal of debate in the economic literature
over Walras' welfare theorem.[2] He first states it for the simple
two commodity exchange model thus:-

---

1. ibid., Lesson 29, p. 319.

2. See, for example, Knut Wicksell, <u>Lectures on Political Economy</u>
(1901, 1911) trans. by E. Classen, ed. by L. Robbins, (London:
George Routledge and sons, 1946) vol. I, pp. 73-83.

"The exchange of two commodities for each other in a perfectly
competitive market is an operation by which all holders of either
one or both, of the two commodities can obtain the greatest possible
satisfaction of their wants consistent with the condition that the
two commodities are bought and sold at one and the same rate of
exchange throughout the market."[1]

What does this statement mean? In my opinion there are two broad
interpretations that can be given to it. Firstly, it may mean that
out of every possible method of setting uniform prices, perfect
competition obtains "the greatest possible satisfaction", in some
sense. This was Wicksell's interpretation. If valid, it is a
very strong welfare result, with widespread practical importance.
In my opinion Walras did not mean this in his statement given above.
He makes no mention of alternative methods of determining price in
this Lesson, let alone any mention of the criterion for judging free
competition to be the best method. Rather, I think, he meant something
much narrower by it. And that is, that given the equilibrium price
under perfect competition, holders will adjust their bids and offers
so as to "obtain the greatest possible satisfaction", i.e. by making
the ratio of their "raretés" equal to the price.[2] This inter-
pretation fits much more neatly into the context of Walras' general
discussion of rareté. But, it makes the welfare proposition extremely

---

1. _Elements_, Lesson 10, p. 143

2. 'Rareté' was the term used by Walras to represent marginal utility
"i.e. the intensities of the last wants satisfied" (ibid., p. 143)
In a two sector, general equilibrium exchange economy, the equili-
brium conditions are

$$p_a = \frac{r_{a,i}}{r_{b,i}}$$

$$p_b = \frac{r_{b,i}}{r_{a,i}}$$

where p = prices, r = raretés, a and b are commodities, and there are
n individuals (i = 1...n). We shall only just touch on Walras'
important discussion of rareté as "the cause of value", since it is
outside the bounds of our topic.

limited. Since holders of commodities are assumed to "desire to
obtain maximum satisfaction", they will do so at whatever price is
set. Hence, free competition is not shown to be superior to any
other method of determining price, which allows individuals to adjust
the ratio of their raretes to the price ratio.[1]

Walras repeats his welfare proposition in the case of several
commodities in an exchange economy (Lesson 13); in the case of
production (Lesson 22); and in the case of capital formation (Lesson 27).
Each statement is similar in wording, and reveals no more clearly the
sense in which Walras held that free competition was a welfare ideal.
Thus, for example, in the case of production he says

"Production in a market ruled by free competition is an operation
by which services can be combined and converted into products of such
a nature and in such quantities as will give the greatest possible
satisfaction of wants within the limits of the double condition,
that each service and each product have only one price in the market,
namely the price at which the quantity supplied equals the quantity
demanded, and that the selling price of the products be equal to the
cost of the services employed in making them."[2]

---

1. Jaffé (translator's note (1) to Lesson 10 of the Elements:
ibid., pp. 510-11) suggests that Walras may have had a premonition of
the Paretian welfare principle that a move from competitive equili-
brium would reduce the welfare of at least one individual. Whilst
we must agree with Jaffé that there is no evidence to contradict
this interpretation, there is also no evidence in support of it.

2. Elements, Lesson 22, p. 255. This Lesson contains Walras' main
views on the welfare implications of free competition.

Again there is no explanation of the sense in which free competition is superior to other hypotheses, so that Walras' welfare theorem is of only a very limited sort, whose practical application is negligible.

Walras, however, felt that he had proved something of great practical import. Starting from an hypothesis about reality, he had studied the nature, causes and consequences of free competition. One of these consequences, it turned out, was that free competition ensures the attainment, within certain limits, of maximum utility. Thus Walras felt that he had proved a second justification for general competitive analysis which those who argued that free competition was unrealistic could not ignore:-

"Even supposing that the future development of our science will never allow these disturbing factors (frictions) to be incorporated into our equations of exchange - certainly a useless prognostic, if not a rash one - nevertheless, the equations we have developed do show freedom of production to be the superior general rule. Freedom procures, within certain limits, the maximum of utility; and since the factors which interfere with freedom are obstacles to the attainment of this maximum, they should, without exception, be eliminated as completely as possible."[1]

Walras clearly states the view that perfect competition is a welfare ideal, but despite his assertions to the contrary he did not show in what sense it was so. Such a proof had to wait for the work of Pareto.[2]

---

1. ibid., p. 256. Note the looseness of terminology in this quotation. Competition is here referred to simply as "freedom", whilst in the subsequent paragraph it is equated with "laissez-faire, laisser-passer". This again presents evidence for the case that despite the rigour of his analysis, Walras, like the literary economists he condemned, failed to eradicate his ideological biases from his work.

2. Since our concern is with the development of positive as opposed to welfare economics, we shall not pursue further Walras' perceptive comments on welfare economics. The interested reader is referred to Lesson 22, pp. 255-7 of the Elements.

II. Walras' Theory of Exchange

Walras builds up his general theory of competitive price deter-
mination in successive stages. The first stage in this process is
the mathematical theory of exchange, which he unfolds first in terms
of two commodities, and then in terms of several commodities.[1] This
theory abstracts from production, and assumes that commodities just
exist, and are held by individuals as stocks. Individuals exchange
these commodities in a market, and the problem is to determine the
current equilibrium price at which they exchange. In his theory of
exchange, Walras provided the first explicit and systematic treatment
of offer[2] and demand in the economic literature, and it is this which
for our purposes is his central contribution to competitive analysis.
In this section we shall examine his contribution, first in terms of
two commodities and then in terms of m commodities.[3]

---

1. Elements, Pts. II and III respectively.

2. Walras follows the French tradition of referring to "offre"
in relation to demand. In the context of the theory of exchange, this
is more appropriately translated as offer than supply (see Translator's
Notes, ibid., p. 498, note 2) and we shall adhere to this translation.
This in no way diminishes the importance of Walras' contribution to
the analysis of what Marshall was to call the blades of a pair of
scissors.

3. Some readers may be puzzled in that the two main things for which
Walras is famous - the notion that marginal utility (rarete) is the
"cause" of value, and the notion of general equilibrium - receive only
peripheral mention in what follows. I have taken the view, however,
that our main concern is with Walras' analytical contribution to
supply and demand analysis, and from this viewpoint his other important
contributions can only be recognised in passing.

Assume there are only two commodities in existence: (A) and (B).[1]
Individuals are assumed to be initially endowed with either one or the
other of these commodities. Consider an individual who initially
holds commodity (B). Walras assumes his demand for commodity (A),
d_a, varies as the price of (A) in terms of (B) varies. Let p_a be
the price of (A) in terms of (B), and $p_b = 1/p_a$. Walras then asserts
that our individual's demand for (A) is always a negative function of
price, p_a. He makes the further special assumption that at a zero
price demand is finite, while at some finite price demand is zero,
i.e. that the demand curve intersects the axes.[2] On the other side
of the coin, our individual's demand for (A) implies an offer of (B)
o_b, at price P_a as follows:-

$$O_b = d_a \cdot P_a \qquad (6.1)$$

If price is zero, offer is zero. But also at some high price, demand
is zero and hence offer is again zero. It thus follows that the
effective offer of (B) by our individual "starts at zero, increases,
attains at least one maximum, then decreases and returns to zero."[3]
It is important to remember the assumed shapes of the demand and offer
curves in what follows.

Individual 1 has a demand function for (A) of

$$d_a = f_{a,1}(p_a) \qquad (6.2)$$

which Walras draws as follows[4]:-

Figure 6.1

---

1. *Elements*, Lesson 6, pp. 92-106.
2. This assumption is relaxed briefly later: ibid., Lesson 7, pp.113-4.
3. ibid., p. 92.
4. ibid., p. 94. Unlike Marshall, he puts price on the abscissa, as
is more appropriate for equation (6.2).

Each individual possessing (B) has a similar demand function. If we sum all these functions we derive "the <u>demand curve</u> or the <u>demand equation</u> of (A) in exchange for (B)"[1]

$$D_a = f_{a,1}(p_a) + f_{a,2}(p_a) + \dots = F_a(p_a) \qquad (6.3)$$

Walras admits that the individual demand functions "are often discontinuous". However, he argues like Cournot (from whom a great deal of this analysis is borrowed), that the market curve "can, for all practical purposes, be considered as continuous by virtue of the so-called <u>law of large numbers</u>". For each small rise in price, some individual will reduce demand, so that in total the demand curve will have a continuous downward slope.

The aggregate demand curve for (A) also reveals the offer of (B) as a function of p_a. This follows from the fact that
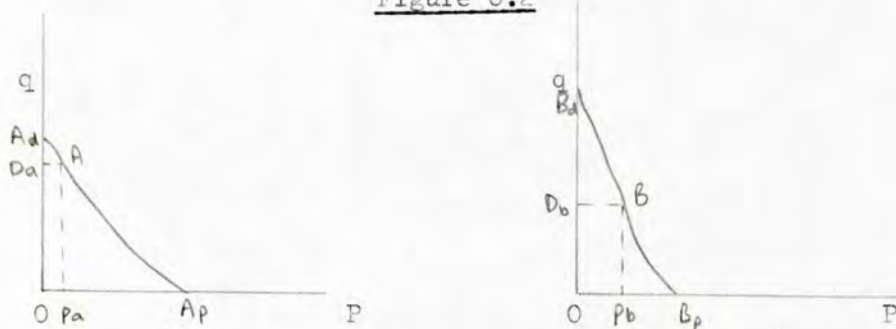
$$O_b = D_a \cdot p_a \qquad (6.4)$$

In terms of geometry, the offer of (B) at a price p_a is equal to the area $OD_a A p_a$ (see figure 6.2). If we construct an aggregate demand curve for (B) from the individual demand curves of holders of (A), then it too will reveal the offer of (A), as a function of p_b, since

$$O_a = D_b \cdot p_b \qquad (6.5)$$

The offer of (A) at a price p_b is equal to the area $OD_b B p_b$ (see figure 6.2).

Figure 6.2

---

1. ibid., p. 95.

Having set up his model of two commodities traded under a system
of perfect competition, Walras proceeds to solve it for the equili-
brium prices of (A) and (B). The equilibrium condition requires that
$O_a = D_a$ and $O_b = D_b$. In terms of figure 6.2 this requires that the
rectangles OD_aAp_a and OD_bBp_b are such that their bases are reciprocals
of each other, whilst their altitudes are such that the altitude of
the first equals the area of the second, and conversely. If this is
so, then p_a and p_b are the equilibrium prices. Algebraicly, the
equilibrium conditions are that
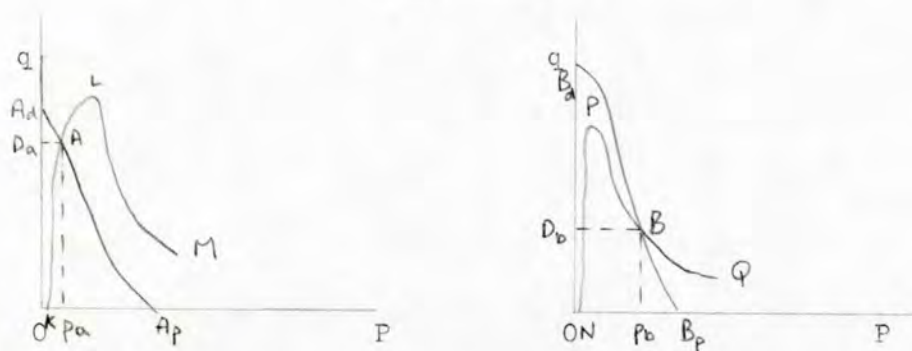
$$D_a = F_b(F_b) \cdot p_b \qquad\qquad (6.6)$$
$$p_a p_b = 1$$

The solution may be written in more familiar form as $D_a = O_a$ and $D_b = O_b$:-

$$F_a(p_a) = F_b(\frac{1}{p_a}) \cdot \frac{-1}{p_a} \qquad\qquad (6.7)$$
$$F_b(p_b) = F_a(\frac{1}{p_b}) \cdot \frac{1}{p_b}$$

This last formulation leads Walras to depict equilibrium in the fami-
liar way as the intersection of offer and demand curves:-

<div align="center">Figure 6.3</div>

For commodity (A) the demand curve A_dA_p intersects the offer curve KLM
at point A, giving an equilibrium price p_a. For commodity (B) the
point of intersection is B, and the equilibrium price is p_b. With
reference to this diagram Walras now states "the law of effective offer
and effective demand or the law of the establishment of equilibrium
prices":-

"Given two commodities, for the market to be in equilibrium with
respect to these commodities, or for the price of either commodity
to be stationary in terms of the other, it is necessary and sufficient
that the effective demand be equal (to) the effective offer of each

commodity. Where this equality does not obtain, in order to reach equilibrium price, the commodity having an effective demand greater than its effective offer must rise in price, and the commodity having an effective offer greater than its effective demand must fall in price".[1]

These assertions can be clearly verified in figure 6.3. They had been a feature of economic analysis at least since Adam Smith, but Walras was amongst the first to demonstrate them correctly and explicitly by means of geometry and algebra.[2]

Further his mathematical approach allowed him to discuss issues, which had been hidden from the view of the literary economist. In Walras' Elements we find the first discussion in the economic literature of the problems of existence, uniqueness and stability of competitive equilibrium.[3] This discussion is only in terms of the simple two commodity case. Further it is restricted to the case illustrated by Figure 6.3. This case involves all curves being continuous; the demand curves having a negative slope throughout, and cutting both axes; and the offer curves having but a single maximum.

We can see in figure 6.3 that it is possible that the offer and demand curves have no point of intersection.

"If, for example, $B_d B_p$ converged on the price axis to the left of the point N, it would not intersect the curve NPQ. In that case the curve KLM would start on the price axis at a point situated to the right of the point A_p and it would not intersect the curve $A_d A_p$. There would be no solution."[4]

---

1. ibid., p. 106.

2. We have already seen that Cournot depicted the equilibrium of supply and demand in his discussion of unlimited competition. (see chapter 5 above). Walras' treatment was, however, much more systematic than Cournot's. Note also that Fleeming Jenkin, working in the English tradition deriving from J.S. Mill, successfully treated the geometry of supply and demand in 1870, four years prior to the publication of the Elements, (see chapter 8).

3. Elements, Lesson 7, pp. 107-114.

4. ibid., p. 108.

In words, the **price** which is high enough to induce the first seller
to sell is too high for the last buyer to buy. Offer and demand are
incompatible, and no transactions will occur.

The possibility of multiple equilibria is not so trivial. Walras
considers the case of 3 equilibrium positions (Figure 6.4).[1]
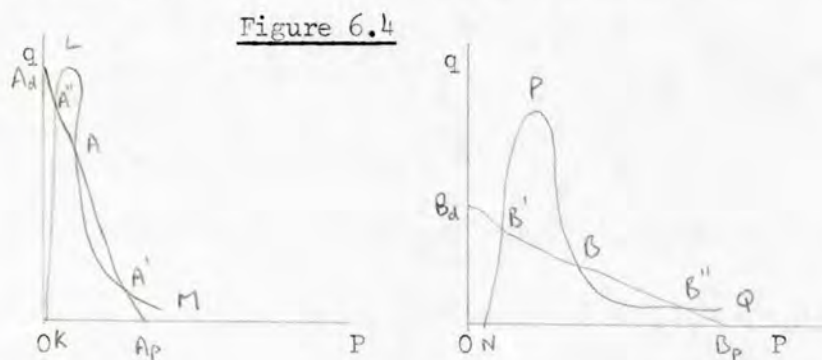
Figure 6.4

Comparing figure 6.4 with figure 6.3, $B_d B_p$ is shifted to intersect
NPQ at three points, and consequently KLM is shifted to intersect $A_d A_p$
at three points. It is now possible for there to be three different
pairs of equilibrium price solutions: points A and B; A' and B'; and
A" and B". Walras' mathematical approach has allowed him to demonstr-
ate this clearly.

And it allows him to go further and discuss the nature of these
solutions. The outer pairs of solutions in figure 6.4 correspond to
"the law of effective offer and effective demand" as stated above.
At any of these points offer equals demand, while at a lower (higher)
price, demand exceeds (is less than) offer, so that price rises (falls)
to restore the equilibrium position. Walras calls such an equilibrium
"stable".[2] On the other hand, the middle solution is "unstable" because,
although offer equals demand at it, at a lower price, offer exceeds
demand, so that price will fall, moving us away from this equilibrium
solution; and vice versa. The solution corresponding to A and B in
figure 6.4 "merely marks the boundary separating each of the respec-
tive fields of the two solutions". Thus Walras, because of his

---

1. ibid., pp. 109-113.

2. Since the model under discussion is a purely static one, stability
is only conceived of in the static sense.

mathematical approach, was able not only to formulate the laws of
offer and demand, but also to make the first attempts to discuss the
important problems of existence, uniqueness and stability.[1] He did
not go far, but his importance was to distinguish the problems, and
lay the foundations upon which future generations of mathematical
economists could build.

Walras does not neglect to provide a comparative static analysis
of price determination in a two commodity competitive world.[2]

"The theorist has the right to assume that the underlying price
determinants are invariant over the period he has chosen to use in
his formulation of the law of equilibrium prices. But, once this
formulation has been completed, it is his duty to remember that the
forces which underlie prices are by their nature variable, and
consequently he must formulate the law of the variation of
equilibrium prices".

A change in price may be the result of a change in one or more of
four factors: the utility of (A) or (B); and the quantity initially
possessed of (A) or (B).

"if, all other things being equal, the utility of one of these
two commodities increases or decreases for one or more parties, the
value of this commodity in relation to the value of the other
commodity, i.e. its price, will increase or decrease.

----

1. Marshall laid prior claim to the analysis of stability in
a letter to Walras dated 1 November 1883. Whilst, he clearly dealt
with stability independently of Walras' work (see the Pure theory of
foreign trade (1879), L.S.E. reprints no. 1. (London, 1930).),
it appears that he treated a separate case, and that he cannot claim
priority of publication (see Translators Notes, Elements, pp. 502-4,
note 5).

2. Elements, Lesson 10, pp. 146-9.

If, all other things being equal, the quantity of one of the two commodities in the hands of one or more holders increases or decreases, the price of this commodity will decrease or increase".

Conversely, a stable price does not necessarily imply the stability of the forces behind it, since it may be that such forces balance themselves out.

Turning to the case of m commodities, we refer the reader to the appropriate Lessons of the Elements, for Walras treatment of general equilibrium.[1] Here we shall just refer to certain aspects of his analysis which are of interest as far as the development of competition theory is concerned. The first point of interest is that in the general case the demand functions include m - 1 prices, so that it is no longer possible to strictly represent equilibrium geometrically.[2] In the m commodity case we have m commodities (A), (B), (C), (D)... and m(m - 1) total demand functions. The m - 1 demand functions for (B), (C), (D)... in exchange for A are

$$D_{ba} = F_{ba}(p_{ba}, p_{ca}, p_{da} \ldots)$$
$$D_{ca} = F_{ca}(p_{ba}, p_{ca}, p_{da} \ldots)$$
$$D_{da} = F_{da}(p_{ba}, p_{ca}, p_{da} \ldots)$$

Whilst those for (A), (C),(D) ... in exchange for B are

$$D_{ab} = F_{ab}(p_{ab}, p_{cb}, p_{db} \ldots)$$
$$D_{cb} = F_{cb}(p_{ab}, p_{cb}, p_{db} \ldots)$$
$$D_{db} = F_{db}(p_{ab}, p_{cb}, p_{db} \ldots)$$

---

1. Elements, Lessons 11 and 12, pp. 153-172.

2. Walras expresses this as follows:-

"In the general case... the demand functions are functions of m - 1 variables which are too numerous to be represented in space." (ibid., p. 157).

Walras later proposed a geometrical method of dealing with the m commodity case: see Elements, Appendix I, which was added to the third edition (1896).

and so on. These demand functions, together with the $m(m - 1)$ equations of exchange of the form

$$D_{ab} = D_{ba} \cdot p_{ba} \qquad D_{ac} = D_{ca} \cdot p_{ca} \qquad D_{ad} = D_{da} \cdot p_{da} \cdots$$

and

$$D_{ba} = D_{ab} \cdot p_{ab} \qquad D_{bc} = D_{cb} \cdot p_{cb} \qquad D_{bd} = D_{db} \cdot p_{db} \cdots$$

and so on, give a total of $2m(m - 1)$ equations sufficient to determine the $m(m - 1)$ prices and $m(m - 1)$ quantities when the m commodities are considered two at a time.[1] Clearly, the representation of m commodity equilibrium requires the use of algebra, and cannot be strictly demonstrated geometrically. Walras was quick to point out this virtue of algebra in general equilibrium analysis

"From our point of view, not only is the algebraic solution as good as the geometrical solution; but we may go so far as to say that in adopting the analytical form of mathematical expression we are using a form that is general and scientific par excellence."[2]

Walras did, however, accept that equilibrium could be shown geometrically as an approximation.[3] Consider a situation of general equilibrium of $m - 1$ commodities, (A), (C), (D)... and let commodity (A) be the numeraire. Now consider the introduction of a new commodity, (B) into the market. Theoretically, this requires us to set up a new system of exchange equations incorporating a new unknown, p_b, and an additional equation

$$\Delta_b(p_b, p_c, p_d \cdots) = \Omega_b(p_b, p_c, p_d \cdots)$$

where Δ_b is demand and Ω_b is offer. However, if we treat all other prices as constants, then demand becomes a decreasing function of a single variable, p_b, whilst offer is a function of p_b also.

---

1. ibid., Lesson 11, pp. 153-157. As Walras points out, however, this only solves half of the equilibrium problem. General equilibrium requires that the price of one commodity in terms of another is equal to the ratio of the prices of these two commodities in terms of any third commodity. See Elements, Lessons 11 and 12 for Walras' general solution.

2. ibid., p. 157.   3.   ibid., Lesson 15, pp. 192-200.

These curves can then be represented geometrically as in Figure 6.5. The curve of demand, with all other prices given, $B_d B_p$, Walras calls a _purchase curve_ whilst the offer curve, NP, is referred to as a _sales curve_. The equilibrium price of commodity (B) is p_b, at the point of intersection of these two curves.[1]

Figure 6.5
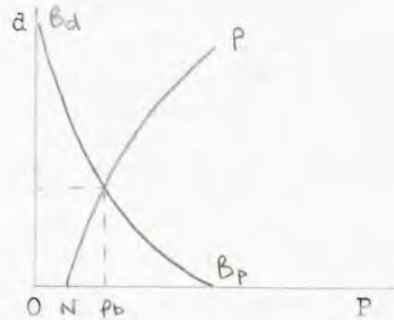
Walras was aware that p_b would not be the final equilibrium price of (B) since the introduction of the new commodity will generally affect demand and offer for commodities (A), (C), (D)..., so that other prices cannot be taken as given. However, Walras argued that as long as commodity (B) was not a close substitute for the other commodities, and that these latter were of "many different kinds and large in quantity", the effect of the introduction of (B) on the prices of other commodities would be small, so that the solution depicted in Figure 6.5 would hold as an approximation. This is, of course, the classic case for partial equilibrium analysis, and it is perhaps surprising that Walras, the pioneer of general equilibrium analysis, should also have dealt with partial equilibrium. Nevertheless, it is clear that Walras saw the practical importance of the partial approach just as clearly as did Marshall, and that his _purchase_ and _sales_ curves were drawn on explicit _ceteris paribus_ assumptions. Walras' view of the partial approach is neatly summed up in Lesson 28 as follows:

"Theoretically, all the unknowns of an economic problem depend on all the equations of economic equilibrium. Nevertheless, even from

---

1. It seems likely that Walras was led to deal with this problem of the relation of general and partial equilibrium by the desire to relate his work on the former with Cournot's work on the latter. See the _Elements_, pp. 197-9.

the viewpoint of static theory, it is permissible to consider some of
these unknowns as especially dependent on the equations which were
introduced at the same time as the unknowns when the problem of
determination was first raised. It is all the more legitimate to do
this when we pass from the static to the dynamic point of view, or,
better still, when we pass from the realm of pure theory to that
applied theory or actual practice, for then the variations in the
unknown quantities will be effects of either the first or second order,
that is to say, effects which need or need not be taken into consider-
ation, according as they arise from variations in the special or the
general data."[1]

It is necessary to look no further than Walras' Elements for a complete
discussion of the place of partial equilibrium in economic analysis.

Besides offering a mathematical formulation of general equilibrium
in the m commodity case, Walras also offered an explanation of the
determination of prices "empirically on the market by the mechanism of
free competition".[2] Assume that all prices are cried at random in
terms of commodity (A), which we select as the numéraire. Generally
total offer and demand will not be equal for each and every commodity
at these prices. Walras argued that the market would adjust prices to
the equilibrium solution by a process of "groping". This was his
famous theory of tâtonnement. The competitive market, he contended,
automatically corrected disequilibrium situations by a continual
iterative process of trial and error. For each commodity, price will
rise if demand exceeds offer; and vice versa. Each price change will
have effects throughout the system, but since the effects via other
commodities are secondary and operate in both directions, Walras argued
that there was a presumption that at each successive stage of the
process the system would be closer to general equilibrium. Hence the
blind mechanism of tâtonnement was sufficient to ensure the attainment
of competitive equilibrium in the market for several commodities, and
"the law of the establishment of equilibrium prices" generalises to
this case:-

"Given several commodities, which are exchanged for one another
through the medium of a numéraire, for the market to be in a state of
equilibrium or for the price of each and every commodity in terms of
the numéraire to be stationary, it is necessary and sufficient that
at these prices the effective demand for each commodity equal its

---

1. Elements, Lesson 28, pp. 307-8.
2. ibid., Lesson 12, pp. 164-72.

effective offer. When this equality is absent, the attainment of equilibrium prices requires a rise in the prices of those commodities, the effective demand for which is greater than the effective offer, and a fall in the prices of those commodities, the effective offer of which is greater than the effective demand."[1]

Walras also generalises the comparative static analysis from two to n commodities.[2] Again a change in the equilibrium position is due to a change in utility or the quantity possessed. Consider an initial position of general equilibrium, disturbed by an increase in the utility of commodity (B). This would cause the demand for (B) to exceed the offer of (B), and also inequality of offer and demand for other commodities. The process of tatonnement now comes into operation, raising the prices of commodities for which demand exceeds offer, and vice versa. This process will take the system to a new equilibrium position, in which the price of commodity (B) will be higher than it was before. Other prices will also be different, but if there are many commodities these differences are likely to be small, and, moreover, in some cases, prices will have risen and in others they will have fallen. Hence

"Given a state of general equilibrium in a market for several commodities where exchanges take place with the aid of a numeraire, if the utility of one of these commodities increases or decreases for one or more of the parties, everything else remaining equal, the price of this commodity in terms of the numeraire will increase or decrease.

If the quantity of one of the commodities in the hands of one or more holders increases or decreases, all other things remaining equal, the price of this commodity will decrease or increase."[3]

The combination of the above "law of the variation of equilibrium prices" with the "law of the establishment of equilibrium prices", gives us "the scientific formulation of what is known in economics as the Law of Supply and Demand". Walras claimed to be the first

---

1. ibid., p. 172. 2. ibid., Lesson 13, pp. 173-81.

3. ibid., p. 180.

to formulate this law correctly

"I venture... to assert that, up to the present, this fundamental law of economics has neither been demonstrated nor even correctly formulated".[1]

All previous statements of it were "stated either erroneously or in a form devoid of meaning". Specifically he alleges that supply and demand have not been correctly defined and explained in the literature; and furthermore, that the continual use of the concept of the ratio, as in "the ratio between supply and demand", is incorrect or meaningless. Such judgement may be harsh, and we have seen that some writers prior to Walras had correctly formulated parts of the theory. But it must be conceded that Walras was the first to give a comperhensive and formal statement and demonstration of the static and comparative static theory of offer and demand under perfect competition. The "law of supply and demand" received its first adequate formal demonstration, in Walras' Elements, after many years of regular but vague use by economic writers.[2]

---

1.   ibid., pp. 180-1.

2.   As was noted above, Walras' claim over Cournot and Jenkin rests on the comprehensiveness of his treatment rather than his precedence in time.

III. Walras' Theory of Production

Walras introduces production into his model in Part IV of the
Elements. The problem in this expanded model is to determine the
equilibrium values of both the prices of products and the prices of
productive services. We shall see in this section that Walras'
general solution to this problem, despite his attempts to differ-
entiate his product, follows closely the Classical solution, in the
sense that the crucial mechanism which establishes equilibrium is
free competition. For our purposes, Walras' contribution in this
field was to provide a rigorous treatment of free competition in a
general equilibrium framework, rather than to make any substantial
advance on the Classical conception of free competition.[1]

He starts by assuming that products are produced by combining
certain productive services in production.[2] These productive services
can be divided into three types: land-services provided by the landowner;
labour provided by the worker; and capital-services provided by the
capitalist. In addition, a fourth category of individual, the
entrepreneur, is assumed to undertake production. He buys productive
services in the services market, in order to convert them into a
product, which he sells in the products market. The sellers of
productive services, the landowners, workers and capitalists, appear
again in the products market as buyers.

---

1. For our purposes, Walras' claim that this analysis showed that the
price of productive services were derived from product prices, in
contrast to the reverse causal process postulated by the Classical
economists, is outside our terms of reference, (see Elements, Lesson
17, pp. 211-2). It is now widely accepted that the causal order
argument was largely a spurious one since product and factor prices
are mutually and simultaneously determined in general equilibrium.
(See Mark Blaug, Economic Theory in Retrospect, pp. 302-4).

2. Elements, Lesson 18, pp. 222-6.

Walras next assumes that the mechanism of free competition operates in both markets. In the services market, the effective demand for productive services comes from the entrepreneurs, whilst the effective offer comes from the land-owners, workers and capitalists, and "the current price of each service is the one at which effective demand and effective offer are equal". On the other hand, in the products market the effective offer is made by the entrepreneur, whilst the effective demand is made by the landowners, workers and cpaitalists, whilst again, "the current price of each product is the one at which effective demand equals effective offer". Walras thus extended his analysis of offer and demand as developed in the theory of exchange to the case where production occurs. This extension he argued was "in exact conformity with the facts as revealed by observation and experience".[1]

Turning to the relation of product prices to costs, Walras notes in Lesson 17:

"It is a truth long acknowledged by economists - and I hope I may be believed when I say that this point has not completely escaped me - that under certain normal and ideal conditions, the selling price of commodities are equal to their costs of production".[2]

In Lesson 18, he takes up this Classical assumption and makes it the third equilibrium condition of his theory of production:-

"First, it (equilibrium) is a state in which the effective demand and offer of productive services are equal and there is a stationary current price in the market for these services. Secondly, it is a state in which the effective demand and supply of products are also equal and there is a stationary current price in the products market. Finally, it is a state in which the selling prices of products equal the costs of the productive services that enter into them. The first two conditions relate to equilibrium in exchange; the third to equilibrium in production."[3]

---

1. ibid., pp. 223-4.   2.   ibid., Lesson 17, p. 211.

3. ibid., Lesson 18, p. 224.

Walras' discussion of the cost-price condition is very reminiscent of that given by Adam Smith a century earlier. Firstly, he argues that equilibrium in exchange and production is "an ideal and not a real state":

"It never happens in the real world that the selling price of any given product is absolutely equal to the cost of the productive services that enter into that product, or that the effective demand and supply of services or products are absolutely equal. Yet equilibrium is the normal state, in the sense that it is the state towards which things spontaneously tend under a regime of free competition in exchange and in production".

Secondly, the mechanism which moves the system towards equilibrium is the movement of resources in response to profit and loss.

"In fact, under free competition, if the selling price of a product exceeds the cost of the productive services for certain firms and a profit results, entrepreneurs will flow towards this branch of production or expand their output, so that the quantity of the product (on the market) will increase, its price will fall, and the difference between price and cost will be reduced; and, if (on the contrary), the cost of the productive services exceeds the selling price for certain firms, so that a loss results, entrepreneurs will leave this branch of production or curtail their output, so that the quantity of the product (on the market) will decrease, its price will rise and the difference between price and cost will again be reduced."[1]

---

1. ibid., pp. 224-5. In edition 4 of the Elements, published in 1900, Walras added the following sentence to the quotation in the text:-
"It is to be observed, however, that although the multiplicity of firms conduces to equilibrium in production, such multiplicity is not absolutely necessary in order to bring about this equilibrium, for, theoretically, one entrepreneur alone might do so, if he .bought his services and sold his products by auction, and if, in addition, he always decreased his output in case of loss and always increased it in case of a profit."
Walras did not pursue this interesting observation further, however.

We thus have the paradox that "the desire to avoid losses and to make profits is the mainspring of the entrepreneur's actions", but in equilibrium, under free competition, " entrepreneurs make neither profit nor loss (les entrepreneurs ne font ni benefice ni perte)". Walras' discussion of competitive equilibrium in the theory of production clearly follows closely in the Classical tradition. Whereas Cournot, as we have seen, did not consider the Classical cost-price assumption, for Walras it was basic to his general equilibrium solution. It is to this solution, which is best viewed as a rigorous statement of Classical competition thoery, that we now turn.

As for the theory of exchange, the reader is referred to the relevant Lessons of the Elements for the details of Walras' general equilibrium solution.[1] Here we shall just sketch the nature of the solution, before proceeding to several points of more immediate concern for our purposes. Walras assumes that there are n productive services: land services (T), (T'), (T")...; labour (P), (P'), (P")..; and capital services (K), (K'), (K")... These are combined directly, or applied to raw materials, to produce the m products (A), (B), (C), (D)... In this situation, there are a total of 2m + 2n - 1 unknowns to be determined: the n prices of these services; the m total quantities of the products demanded; and the m - 1 prices of these products in terms of the mth. These unknowns will be determined by 2m + 2n - 1 equations as follows.[2] We have n equations of total offer of productive services

$$O_t = F_t(P_t, P_p, P_k \cdots P_b, P_c, P_d \cdots),$$
$$O_p = F_p(P_t, P_p, P_k \cdots P_b, P_c, P_d \cdots),$$
$$O_k = F_k(P_t, P_p, P_k \cdots P_b, P_c, P_d \cdots),$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

(6.3)

---

1. ibid., Lessons 20 and 21.

2. ibid., Lesson 20, pp. 237-40.

and m equations of total demand for products

$$D_b = F_b(P_t, P_p, P_k \ldots P_b, P_c, P_d \ldots),$$
$$D_c = F_c(P_t, P_p, P_k \ldots P_b, P_c, P_d \ldots),$$
$$D_d = F_d(P_t, P_p, P_k \ldots P_b, P_c, P_d \ldots),$$

(6.9)

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

To these Walras adds the following equations, on the simplifying assumption (to be discussed below) of fixed coefficients of production: $a_t, a_p, a_k \ldots b_t, b_p, b_k \ldots c_t, c_p, c_k \ldots d_t, d_p, d_k \ldots$, where a_t is the quantity of input (T) used in the production of one unit of output (A), and so on. Firstly, there are n equations expressing the fact that the quantities of productive services used are equal to the quantities effectively offered

$$a_t D_a + b_t D_b + c_t D_c + d_t D_d \ldots = O_t$$
$$a_p D_a + b_p D_b + c_p D_c + d_p D_d \ldots = O_p$$
$$a_k D_a + b_k D_b + c_k D_c + d_k D_d \ldots = O_k$$

(6.10)

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

And secondly, there are m equations expressing the fact that the selling prices of the products are equal to the (unit) cost of the productive services employed in their manufacture

$$a_t P_t + a_p P_p + a_k P_k \ldots = 1,$$
$$b_t P_t + b_p P_p + b_k P_k \ldots = P_b,$$
$$c_t P_t + c_p P_p + c_k P_k \ldots = P_c,$$
$$d_t P_t + d_p P_p + d_k P_k \ldots = P_d,$$

(6.11)

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

One of these 2m + 2n equations is not independent, so that we eliminate one equation, and are left with 2m + 2n - 1 equations and unknowns. Walras' demonstration that the number of equations and unknowns in his model was equal, represents a crude proof of the existence of competitive equilibrium.[1]

---

1. See K.J. Arrow and F.H. Hahn, <u>General Competitive Analysis</u>, Chapter 1, p. 4. Interest in the problem of existence was revived in the 1930s when the work of three writers: Zeuthen, Neisser and von Stackelberg showed that the problem of existence went deeper than merely counting equations and unknowns. See Arrow and Hahn, op. cit., pp. 8-11.

Walras' "solution of the equations of production" in Lesson 21
amounts to a demonstration that if prices are cried at random, and a
round of readjustments are made in the markets, then at the end of
this round the system will be closer to general equilibrium than
at the beginning of the round.[1] Walras clearly believed that the
price changes on different markets occurred simultaneously, but for
expositional purposes he took them in turn. Consider the case of
product prices as an example. Let the prices of productive services,
p'_t, p'_p, p'_k,..., be determined at random, and fixed. Denote the
costs of production, p'_a, p'_b, p'_c, p'_d..., so that

$$p'_a = a_t p'_t + a_p p'_p + a_k p'_k \cdots,$$

$$p'_b = b_t p'_t + b_p p'_p + b_k p'_k \cdots,$$

$$p'_c = c_t p'_t + c_p p'_p + c_k p'_k \cdots,$$

$$p'_d = d_t p'_t + d_p p'_p + d_k p'_k, \cdots,$$

$$\cdot \quad \cdot \cdot \quad \cdot \cdot \quad \cdot \cdot$$

The quantities of products, Ω_b, Ω_c, Ω_d..., will sell at product
prices, π_b, π_c, π_d,..., initially, according to the equations [2]

$$\Omega_b = F_b(p'_t, p'_p, p'_k \cdots \pi_b, \pi_c, \pi_d \cdots),$$

$$\Omega_c = F_c(p'_t, p'_p, p'_k \cdots \pi_b, \pi_c, \pi_d \cdots),$$

$$\Omega_d = F_d(p'_t, p'_p, p'_k \cdots \pi_b, \pi_c, \pi_d \cdots),$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \cdot$$

These product prices will in general be different from costs of
production, so that profits and losses will be made. These profits
and losses for products (B), (C), (D)... are

$$\Omega_b(\pi_b - p'_b), \quad \Omega_c(\pi_c - p'_c), \quad \Omega_d(\pi_d - p'_d), \cdots$$

Since the quantities, Ω_b, Ω_c, Ω_d..., are functions of the prices,

---

1. This is, of course, the issue of the stability of equilibrium.
See Arrow and Hahn, op. cit., pp. 4-5.
2. For special consideration of product (A), the _numeraire_, see the
Elements, pp. 247-8.

π_b, π_c, π_d..., the latter must be functions of the former. Thus, if product (B) is such that $\pi_b > p'_b$, then Ω_b will be increased, and its price will fall. Conversely, if a loss is made ($p'_b > \pi_b$), less will be produced, and price will rise. The same will be true for all commodities, and Walras refers to this as an adjustment of "the first order".[1] Second order adjustments occur because the change in consumption of (B) implies changes in consumption of all commodities, and hence changes in their prices. These changes will in turn affect product (B), but Walras argues that they will tend to balance each other out, and be of minor importance, so that at the end of the round of _tatonnement_ there will exist new quantities, Ω'_b, Ω'_c, Ω'_d,... and prices, p'_b, p'_c, p'_d, which will be closer to the equilibrium values. Thus as the process of tatonnement continues the system will approach competitive equilibrium. Walras contended that

"this is precisely the sort of groping which takes place spontaneously in the products market under conditions of free competition, as entrepreneurs increase or decrease their output according as they make profits or losses".[2]

The first thing to note about Walras' competitive theory of production is that, like the Classical economists, Walras was concerned with inter-industry equilibrium rather than intra-industry equilibrium. His analysis demonstrated explicitly the Classical view that, in competitive equilibrium, rates of return were equalised in all directions. Like the Classical economists the main focus of Walras' attention was on the industry, rather than the firm, and the latter tended to be largely ignored in the _Elements_. This is somewhat surprising since Walras, by his own admission, was heavily influenced by Cournot's work[3], and, as we have seen, Cournot was primarily interested in the theory of the firm. Further, as we shall see in section IV below, Walras' analysis of the monopoly firm is no more than a restatement of Cournot's analysis. Why then didn't Walras at least give more attention to the competitive firm than he did, since Cournot had also analysed this case, albeit less exhaustively than he had the monopoly case?

1. ibid., p. 246.   2. ibid., p. 247.

3. See the Introduction to this chapter.

Clearly part of the answer must lie in the fact that Walras
was not concerned directly with the theory of the firm but with
general equilibrium. Again, he may have overlooked Cournot's treat-
ment of the competitive firm. Nevertheless, we may suggest another
factor which may have had an influence on his omission, namely,
his simplifying assumption of fixed coefficients of production.
Walras clearly made this assumption in order to simplify his analysis
by reducing the number of unknowns to be determined. In the more
general case, productive services can be substituted in production,
so that the coefficients are variables determined by efficiency
considerations:-

"The respective quantities of each of the productive services
which thus enter into the making of a single unit of each of the
products are determined, along with the prices of the productive
services, by the condition that the cost of production of the products
be a minimum."[1]

Having made the fixed coefficients assumption, however, Walras, by
definition, restricted himself to the case in which production
functions are homogeneous of degree one. In other words, all the
firms in a given industry were assumed to operate under (presumably
the same) constant costs. But it is just this case, as Professor
Samuelson has pointed out, where the theory of the competitive firm
is indeterminate:

"Unit costs being constant, and demand being horizontal, there
are only three possibilities: price being everywhere greater than
marginal cost, it will pay the firm to expand indefinitely, i.e.
until competition ceases to be pure; or if price is less than marginal
cost, no output will be produced; or, finally, if price is identically
equal to marginal cost, the exact output of the firm will be a matter
of indifference."[2]

The additional assumption of zero profits or losses reduces these
possibilities to the third one; namely, that the output of the firm
is indeterminate.

---

1. Elements, Lesson 20, p. 240.
2. Paul A. Samuelson, Foundations of Economic Analysis (Cambridge,
Harvard University Press, 1947), p. 78.

Figure 6.6
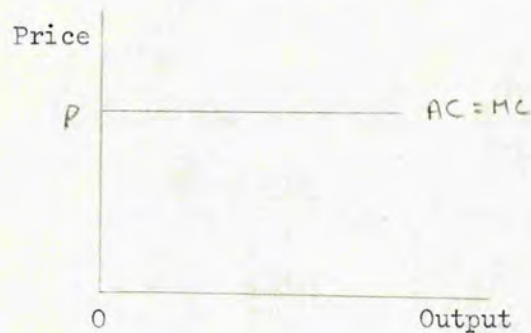
In figure 6.6, every output is consistent with profit maximisation
(MR = MC) and zero profits (p = AC). Thus, Walras' simplified produc-
tion function leads him to consider the case where the theory of the
firm is indeterminate, and basically uninteresting, since all costs
and revenues are equal. As Samuelson suggests it may be

"no accident that Walras and Marshall paid so little attention
to the firm and so much to the industry. For under the purest
conditions of competition the boundaries of the former become vague
and ill-defined and also unimportant, since through reactions to
prices the factors of production adjust themselves in the right
proportions and in the right total amounts for the industry".[1]

_____

1. ibid., p. 79. It should be noted that the indeterminacy of firm
size in this case in no way upsets the consistency of the theory,
since if some firms expand output, others will contract it, or
otherwise competitive equilibrium will be upset. Or to use Samuelson's
metaphor:

"To an infinitely near-sighted olive the bottom of the cocktail
glass appears level, and it no doubt regards itself as being in
neutral equilibrium. Actually, the equilibrium is stable, as any
finite movement will show" (ibid., p. 80.).

The theory still works in the constant cost case; it is just that the
firm becomes a shadowy participant in competitive theory in this case.

Given that the competitive firm is but vaguely defined when the coefficients of production are fixed, the question arises as to Walras' treatment of it when they are allowed to vary. This occurs in Lesson 36 of the Elements.[1] In this Lesson, Walras demonstrates that when the coefficients of production are treated as variables they are determined by the assumption of cost minimisation, such that their prices are proportional to their marginal productivities. Formally, the problem is to minimise the cost function of, say, product (B)

$$Q\pi_b = Qb_t p_t + Qb_p p_p + Qb_k p_k + \dots \tag{6.12}$$

where Q is the fixed output; p_t, p_p, p_k ... are the fixed input prices; b_t, b_p, b_k ... are the unknown coefficients; and π_b is, following Jaffé,[2] the unit cost of production. Equation (6.12) is minimised subject to the constraint of the production function

$$Q = \phi(Qb_t, \ Qb_p, \ Qb_k \dots) \tag{6.13}$$

Forming the Lagrangean

$$\Pi = Qb_t p_t + Qb_p p_p + Qb_k p_k \dots + \lambda\{\phi(Qb_t, Qb_p, \ Qb_k \dots) - Q\}$$

The equilibrium conditions are [3]

---

1. The part of this Lesson which is of interest to us, namely §326 did not appear in the Elements until relatively late on. It was added to edition 4 (1900),being based on the postscript to Appendix III, this appendix only appearing in edition 3(1896). It will be our contention, in this and the next paragraph, that even given the late date of its addition, this section provides evidence of some confusion in Walras' mind over the theory of the competitive firm.

2. Translator's Note 1 to Lesson 36, Elements, pp. 549-53. Walras denotes both the price and unit cost of product (B) by p_b in §326. By denoting the latter, π_b, we hope to clarify our discussion below.

3. We differentiate the Lagrangean with respect to the total quantities of productive services: $Qb_t = T$, $Qb_p = P$, $Qb_k = K \dots$

$$p_t = \phi_t \cdot \lambda, \quad p_p = \phi_p \cdot \lambda, \quad p_k = \phi_k \cdot \lambda, \quad \ldots$$

or,

$$\frac{p_t}{\phi_t} = \frac{p_p}{\phi_p} = \frac{p_k}{\phi_k} = \ldots \tag{6.14}$$

For our purposes, however, the interesting equations are Walras' system (3),[1] which he apparently regarded as an alternative to equations (6.14); namely

$$\phi_t = \frac{p_t}{p_b}, \qquad \phi_p = \frac{p_p}{p_b}, \qquad \phi_k = \frac{p_k}{p_b}, \quad \ldots \tag{6.15}$$

where p_b is the price of product (B). It is apparently these equations upon which Walras bases his assertions that free competition, or the cost price theorem, is the basis of the marginal productivity theory:-

"Thus: 1. Free competition brings the cost of production down to a minimum.

2. In a state of equilibrium, when cost of production and selling price are equal, the prices of the services are proportional to their marginal productivities, i.e. to the partial derivatives of the production function.

These two propositions taken together constitute the theory of marginal productivity."[2]

The first point to note is that, as Jaffé has pointed out, the marginal productivity theory as expressed in equations (6.15) is in no way dependent on the free competition or cost-price assumptions, but follows directly from minimising equation (6.12) subject to equation (6.13). There is thus evidence that Walras was confused

---

1. _Elements_, p. 385; These are our equations (6.15).

2. ibid., p. 385. We shall not pursue here the question of Walras' priority with regard to this theory, vis-a-vis, Philip Wicksteed, _An Essay on the Coordination of the Laws of Distribution_ (1894) (L.S.E. Reprint, no. 12, 1932). See Translator's Note 1, ibid., pp. 549-53 and the references therein cited.

even at this relatively late date (1900) as to the place of free
competition within his analysis. This must be borne in mind when we
consider the relation of his equations (6.15) and (6.14). Given
that λ is marginal cost[1], the equations are only the same if the price
of the product, p_b, equals marginal cost, λ. Should we infer, there-
fore, that Walras clearly saw that the competitive firm would marginal
cost price? In my opinion, there are grounds for suggesting that
Walras arrived at equations (6.15) by another route. If we start
from his assertion (quoted above) about the importance of the assumption
that price equals unit cost, $p_b = \pi_b$, then the problem becomes one
of explaining why average cost, π_b, should equal marginal cost, λ. One
possible explanation might be that Walras was still implicitly
assuming constant costs, so that he did not distinguish average and
marginal cost. A second explanation might be, as suggested by
Jaffé, that Walras was confused over the phrase minimum cost. Costs
are minimised at each output level according to equations (6.14), but
this is a different thing from suggesting that average cost might be
a minimum (and hence equal to marginal cost). Walras' treatment of the
marginal productivity theory is terse and obscure, and offers no
positive case in favour of any of these interpretations. Rather, it
tends to support the conclusion that, as far as the competitive firm
is concerned, there is evidence that Walras was not entirely clear
in his own mind over the theory. And, certainly, no clear statement
of it can be found in the Eléments.

Returning to Walras' solution of the theory of production in
Part IV of the Eléments, two other points are worthy of note.
Firstly, whilst the model is assumed to grope its way towards
equilibrium by the familiar process of tâtonnement, an additional
problem is introduced when production occurs:

"In exchange, (the total existing quantities of) commodities do
not undergo any change. When a price is cried, and the effective
demand and offer corresponding to this price are not equal, another
price is cried for which there is another corresponding effective
demand and offer. In production, productive services are transformed

---

1. Samuelson, op. cit., pp. 65-6.

230.

into products. After certain prices for services have been cried
and certain quantities of products have been manufactured, if these
prices and quantities are not the equilibrium prices and quantities
it will be necessary not only to cry new prices but also to manufacture
revised quantities of products."[1]

Walras got over this problem by introducing the simplifying device
of tickets (bons) into his analysis. Entrepreneurs are assumed to
use these to represent quantities of products they offer; whilst
landowners, workers and capitalists use them to represent the produc-
tive services they offer. The process of tâtonnement is then carried
out in terms of these tickets until general equilibrium is established,
at which point contracts are closed. It is only at this point, when
the required quantities of products are known, that production actually
takes place. The problem that production takes time is resolved "purely
and simply by ignoring the time element at this point".

The grossly unrealistic nature of this simplifying device high-
lights a point we have made before; namely, Walras' tendency to
sacrifice reality for mathematical tractability. The use of tickets
enables Walras to circumvent the problem of over, or under, production.
More generally, the whole process of tâtonnement, in the theory of
exchange as well as production, enables him to abstract from the
possibility of trading at disequilibrium prices. Such an abstraction
is clearly useful in the high theoretical plane on which Walras
carries on his argument. It basically allows him to postulate that
the path to equilibrium has no effect on the equilibrium solution,
since no trading or production occurs out of equilibrium. Nevertheless,
it is a simplifying device which abstracts from an important part of
reality. Production and exchange do occur in disequilibrium situations,
and this will affect the equilibrium solution. As with the problems
of existence and stability, Walras' achievement was to expose the
problem of "false trading" (in this case by his explicit denial of
it), rather than to offer the definitive treatment of it himself.[2]

---

1. Eléments, Lesson 20, p. 242.

2. Even today, analysis of this possibility has not progressed far.
See Arrow and Hahn, op. cit., chapter 13 for a modern mathematical
discussion in terms of a pure-exchange economy.

The second point is that as with the theory of exchange, Walras considered the comparative static aspects of the theory of production. We can do no better than to quote Walras' own statement of the "law of the variation of equilibrium prices":-

"Given several products or services and given a state of general equilibrium in a market where exchange is effected with the aid of a numéraire, if, all other things remaining equal, the utility of one of these products or services increases or decreases for one or more of the parties to the exchange, the price of this product or service in terms of the numéraire will increase or decrease.

If, all other things being equal, the quantity of one of these products or services in the hands of one or more holders increases or decreases, the price of this product or service will decrease or increase....

If, all other things being equal, the quantity of a service owned by one or more individuals increases or decreases (its effective offer the increasing or decreasing so that its price falls or rises), the prices of those products in the production of which this service is employed will fall or rise.

If, all other things being equal, the utility of a product increases or decreases for one or more consumers (its effective demand then increasing or decreasing so that its price rises or falls), the prices of the services employed in its production will rise or fall."[1]

The combination of the "law of the establishment of equilibrium prices" with "the law of the variation of equilibrium prices" in the theory of production, gives what Walras calls "the scientific formulation of the double Law of Supply and Demand, and of Cost of Production."[2] This double Law, as we have seen, is no less than an explicit statement in rigorous form of the Classical theory of free competition. Walras' achievement in making this theory explicit was clearly tremendous. Walras did not solve all the problems of

---

1. Eléments, Lesson 22, p. 260.

2. ibid., Lesson 21, p. 254.

competitive equilibrium, but his work brought many of those problems
to light, presenting future mathematical economists with a sound
basis from which to pursue their research. Just as Smith a century
before him, had brought free competition to the centre of the
stage, Walras' work is the true foundation of subsequent general
competitive analysis.

IV. Walras' Theory of Monopoly

Walras considers monopoly amongst a number of exceptions to
the general rule of free competition in the final part of the
Eléments.[1] His discussion relies heavily on Cournot's work for the
pure monopoly case, and upon Dupuit's for the price discrimination
case. In this section we shall briefly examine Walras' version of
Cournot's theory, and in particular consider the place accorded it
by Walras vis-à-vis free competition. The relative shortness of
this section mirrors the fact that Walras only devoted a part of
one Lesson of the Eléments to the monopoly case.

Walras begins his discussion of monopoly by noting the confused
nature of monopoly theory in the work of the earlier (Classical)
economists:-

"Unfortunately, economists have not thought it worth their
while to look into this theory, with the result that their ideas
on the subject of monopoly are reduced to a state of confusion which
is accurately reflected in their verbal obfuscations. They have given
the name of monopoly to enterprises (i.e. industries) which are not
under a single control, but under the (divided) control of a limited
number of persons. And, by analogy, they have even applied the term
monopoly to the ownership of certain productive services that are
limited in quantity like, for example, land. But all productive
services are limited in quantity; so that, if land-owners have a
monopoly of land, labourers have a monopoly of personal faculties, and
capitalists have a monopoly of capital goods. When the meaning of
the term monopoly is broadened to this extent, so that it includes
everything, it means nothing."[2]

Walras therefore proposed to use the term monopoly, as Cournot had
done, to mean "an exclusive single control over a productive service
or a product".[3] In this way, he, like Cournot, side-stepped the
confusions of the Classical treatment of monopoly.

---

1. Eléments, Part VIII, 'Price Fixing, Monopoly, Taxation'. The first
two of these topics are dealt with in Lesson 41.

2. ibid., pp. 435-6.   3. ibid., p. 436.

Walras then proceeds to give an exposition of Cournot's monopoly theory in terms of a numerical example.[1] In this example, he determines the equilibrium price when costs are zero, and when they are positive, and also shows that the introduction of fixed costs has no effect on equilibrium price. This example is presented in Table 6.1.

Table 6.1

Price (francs)	Demand (units)	Gross Receipts (francs)	Expenses (francs)	Net Receipts (francs)
100	0	0	0	0
50	10	500	20	480
20	50	1,000	100	900
5	1,000	5,000	2,000	3,000
3	2,500	7,500	5,000	2,500
2	5,000	10,000	10,000	0
1	12,000	12,000	24,000	-12,000
$\frac{1}{2}$	20,000	10,000	40,000	-30,000
0	50,000	0	100,000	-100,000

Clearly, the demand function in this example is monotonically decreasing, and crosses both axes. There must, therefore, exist at least one maximum of the gross receipts function.[2] This maximum occurs in the example at a price of one franc, and this is the price which maximises the monopolist's profits when costs are zero. The introduction of costs (in this case simply variable costs proportional to output of the amount of 2 francs per unit) makes it necessary to maximise the net receipts function, which in this case implies a price of 5 francs. The effect of introducing fixed costs of say 1,000 francs into the example, would be to increase costs and reduce net receipts by 1,000 francs at each price. This would clearly not alter the profit maximising price of 5 francs, although the monopolists's profit would now fall from 3,000 to 2,000 francs.

---

1. ibid., pp. 436-9.

2. See Cournot, Recherches, p. 53.

Clearly in this example Walras was not interested in extending Cournot's analysis, but rather in presenting it in a more easily intelligible form for the non-mathematical reader. In doing this Walras was the first of several economists (of which the most notable was Marshall) who attempted to present Cournot's work to a wider audience.[1] We must not expect, therefore, any important contribution in this work, and indeed there is none.[2]

One point worthy of mention, however, is Walras' discussion of how the monopolist finds the profit maximising price. Following Cournot[3] he notes:-

"He (the monopolist) would first try very high prices and he would observe that the quantity demanded was zero or very small and that his receipts were also zero or very small. Then gradually lowering his price, he would observe that both the quantity demanded and his receipts increased. In this way he would come to the price of one franc (in the zero cost case). If he lowered his price still further, he would find that although the quantity demanded increased, his receipts would start diminishing. And he would immediately raise his price to one franc again and hold it there."[4]

Thus the monopolist, finds the equilibrium price by experimenting with different prices. But this is the same process of groping, or tâtonnement, which establishes the equilibrium price under free competition. Thus, Walras believed that the concept of tâtonnement was applicable to monopoly just as to free competition, and further that "it is done all the time in ordinary business".

---

1.   Marshall's version of Cournot's theory is discussed in Chapter 9 below. See also Edgeworth's contribution, discussed in Chapter 8 below.

2.   Walras does consider the zero cost case algebraicly and geometrically (Eléments, pp. 439-40), but this treatment consists mainly of a reproduction of Cournot's Recherches, pp. 52-3 and Figure 1. Walras' comments on this passage are purely expositional.

3.   Recherches, p. 56.   4.   Eléments, p. 437.

Turning to the role of monopoly vis-a-vis competition in Walras' thought, an interesting contrast with Cournot's price schema emerges. Walras notes that Cournot "makes the transition from the case of a single monopolist to that of two monopolists (duopoly), and, finally from monopoly to unlimited competition".[1] Walras, on the other hand, characterises his book as moving in the opposite direction

"I have preferred, for my part, to start with unlimited competition as the general case, and then to work towards monopoly as a special case."

Thus, Walras suggests a unity between his work and Cournot's, the distinction being that they started at different ends of the price schema.

This apparent unity is superficial, however. In the first place, Walras, unlike Cournot, did not consider the oligopoly case, so that there is no indication of movement from monopoly to competition, in the Eléments. Walras, like the Classical economists, treated monopoly as an exception to the general competitive rule, despite his adoption of Cournot's monopoly theory. In the second place, Walras did not use competition in the same sense as did Cournot. For Cournot, unlimited competition meant a large number of producers, who were price-takers. Walras, in contrast, was primarily concerned with free competition and the zero-profit condition. His use of the phrase "unlimited competition" to cover his analysis, indicates the hint of an implicit fusion of these separate ideas in Walras' mind. As we have seen, Walras did not make this fusion explicit, largely because of his neglect of the competitive firm. Nevertheless, his implicit fusion of these ideas heralded the future development of perfect competition theory.

It is not surprising that given competition for Walras meant zero profits, the distinction between competition and monopoly for him centred on profits. Like the Classical economists, he argued that monopoly led to high prices and positive profits in contrast to free competition.

---

1. ibid., p. 440.

"We now see the difference between monopoly and free competition.
The principle of laisser-faire, laisser-passer, when applied to an
industry operating under the regime of unlimited competition,
enables consumers to obtain the greatest possible satisfaction of
their desires consistent with the condition of uniformity of price for
each product in the market, the price in each case being equal to
the cost of production so that producers make neither profit nor loss.
The same principle of laisser-faire, laisser-passer, when applied
to a monopolized industry, enables consumers to obtain (only) that
maximum satisfaction which is consistent with the (double) condition
that selling price be higher than cost of production and that the
producers make the greatest possible profit."[1]

The interesting aspect of this essentially Classical distinction
of competition and monopoly is that it represents a compromise between
the Classical approach to competition and monopoly and Cournot's
theory of monopoly. On the one hand, Walras reached the Classical
conclusions on competition and monopoly, whilst dropping the restricted
supply definition of monopoly in favour of Cournot's single seller
theory. On the other, Walras took only Cournot's monopoly theory, and
jettisoned his price schema and proof that price falls as more producers
are added to the market. In terms of Table 6.1, Walras argument ran
as follows:

"Having thus found the price 5 francs which yields maximum
profits, our entrepreneur would keep it there in so far as he had
exclusive control over the product. If the product were not monopolised,
the profits of the firm would attract competitors, the quantity sold
and consumed would increase to 5,000 units and the price would fall
to 2 francs which is equal to the cost of production. Hence the
consequence of monopoly is that consumers have only 1,000 units at
5 francs each instead of 5,000 units at 2 francs each."[2]

---

1. ibid., p. 438.

2. ibid., p. 438.

This comparison could be represented geometrically (Figure 6.7)[1]

Figure 6.7
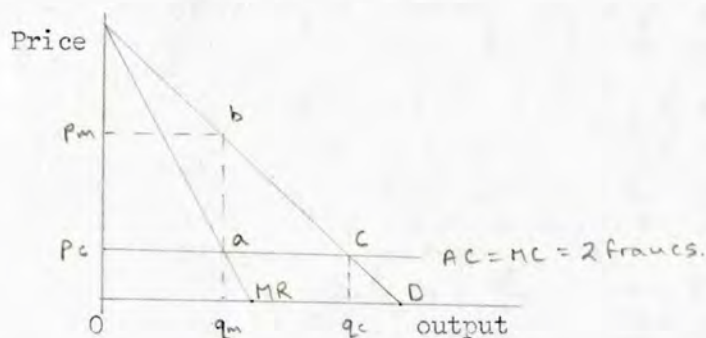
The monopoly price is pm and the entrepreneur receives a profit of the
area pcabpm. The lower competitive price, pc, yields no profits.
Whilst the anti-trust welfare argument today is more sophisticated
than was Walras', nevertheless, Figure 6.7 still represents the basic
welfare comparison between competition and monopoly.[2] Such a comparison
was first made by Walras, who was the first economist to bring Cournot's
monopoly analysis into the mainstream of free competition theory.

---

1.   I have used a linear demand curve in Figure 6.7, although
Walras' demand curve in Table 6.1 is clearly not linear. This change
is purely expositional and does not affect the argument.

2.   The modern argument against monopoly is, of course, not that
price exceeds average cost so that profits are made, but rather that
price exceeds marginal cost so that there is a deadweight loss of
consumers' surplus, approximated by the area abc in figure 6.7. This
argument rests on Paretian welfare foundations, and was to be
formulated only in the present century. For a discussion of
various problems associated with making a welfare comparison of
competition and monopoly, see C.A. Tisdell, Microeconomics: the theory
of economic allocation (Wiley: Sydney, 1972), pp. 201-207.

V. Conclusions

Walras' Eléments for our p .poses represents the first explicit
formulation of general competitive equilibrium. Whereas the Classical
notion of equilibrium under the assumption of free competition was
literary and in places vague, Walras successfully employed mathematics
to present this analysis explicitly. In so doing he made a number
of important analytical achievements the most important, in our view,
being his "scientific formulation of what is known in economics as the
Law of Supply and Demand".[1]

In making the analysis of competitive equilibrium explicit,
Walras uncovered and attempted to solve a number of problems which
the Classical economists had at best been only dimly aware of.
We have noted some of these problems in this chapter, such as the
problems of existence and false trading. That Walras' methods of
dealing with these problems were crude must be readily admitted.
But his work is important for bringing these problems to light rather
than for his solutions to them. His work opened the door to future
generations of mathematical economists to improve on his solutions,
but without his work such problems would have been realised only
much more slowly.

Walras' Eléments, I have argued, dealt with Classical free
competition rather than with perfect competition. Like the Classical
economists, the weakest part of his analysis was in the areas of
market structure and the competitive firm. On the other hand, Walras
broke with Classical tradition by adopting Cournot's analysis of
pure monopoly. We have seen in this chapter that Walras made some
attempt to integrate this theory in a price schema with free competition.
This attempt was to be the first of several in the second half of the
19th century. Over the same period, there arose an awareness that
a theory of the competitive firm needed also to be integrated with free
competition. Such an integration was not to be fully appreciated
until the beginnings of the 20th century. Walras' work in this
context represented an early pointer towards the future development
of competition and monopoly analysis.

---

1.   See section II above.

Chapter 7

The Austrian Economists

With Carl Menger's Grundsätze (1871) as its foundation, the
Austrian School built up a distinctive approach to the problems of
economics. This distinctive approach is evident in the School's
price theory as elsewhere, and for this reason we have singled out
the School for discussion. Two contradictory trends will emerge in
what follows.

On the one hand, the School developed their price theory along
lines mapped out by Menger. Menger, writing in 1871, not having read
Cournot's work, developed his own original theories of monopoly and
competition. These theories, particularly the monopoly analysis,
had some merits at the time[1], although they did not attain the high
level of Cournot's work. Nevertheless Menger's theories were used by
his disciples, notably Böhm-Bawerk and Wieser[2], as a basis for their
discussions, right into the twentieth century. These theories thus
had a parallel development with the development of competition and
monopoly analysis in the English tradition.

At the same time, the passing of time saw a tendency to synthesise
the Menger-based theories, with the usual supply and demand analysis
as presented in England. In this process the Austrian theories lost
some, though not all, of their originality. A notable example is the
failure of Böhm-Bawerk and Wieser to give Menger's monopoly analysis
the same emphasis that he did. Again, we may note the conversion of
the marginal pairs analysis into simple supply and demand analysis
by Wieser.

The reader must judge for himself the merits of the Austrian
theories, particularly the marginal pairs theorem. As far as perfect
competition and monopoly are concerned, however, we shall see that the
Austrians cannot be credited with any advances in these theories,
precisely for the reason that the theories they developed separated

---

1. It is appropriate here to compare Menger's ideas with those of the
Classical economists.

2. We shall represent the Austrian school by these three writers.

them from them. Rather their importance is to show that the development of these theories was not linear and straightforward and that similar but not identical theories could be held by an important group of economists well into this century.

I. Carl Menger

We shall start our investigation of the Austrian school's
treatment of monopoly and competition with the work of its founder,
Carl Menger. In the fifth chapter of his Grundsätze der
Volkwirthschaftslehre[1], Menger set the pattern for the Austrian
treatment of price theory by considering the three cases of isolated
exchange, monopoly and bilateral competition. For our purposes, it
is Menger's theory of monopoly which is of most interest, and we
shall examine this first. We shall argue that, setting aside Cournot,
Menger provided a highly original treatment of monopoly when set
against the background of the rather confused Classical treatment
of the case. Menger's rather sketchy ideas on bilateral competition
are considered in the second part of this section.

We shall begin our discussion by noting several points about
Menger's general approach. In the first place, Menger starts from
the fundamental priciple that no individual will engage in exchange
unless he hopes to gain thereby:-

"Economising individuals strive to better their economic positions
as much as possible. To this end they engage in economic activity
in general. And to this end also, whenever it can be attained by
means of trade, they exchange goods."[2]

This principle, in turn, implies certain limits to prices, where
exchanges are possible:-

"The mere statement of this condition, however, strongly implies
the existence of limits within which price formation must, in any
given instance, take place."[3]

---

1. First published in German in 1871. I have used the English
translation, Principles of Economics (Glencoe, Illinois: The Free
Press, 1950). All references in this section are to this translation,
and unless otherwise stated references are to chapter 5.

2. ibid., p. 191.

3. ibid., p. 194.

If individual A owns 100 units of grain which he values at 40 units
of wine, whilst individual B owns 40 units of wine which he values
at 80 units of grain, the foundations of exchange exist for both
individuals; and, further, the price range of 40 units of wine
will be 80-100 units of grain. Menger argued that these laws of
price not only hold in this "simplest possible case" of isolated
exchange, but generally.[1] If more buyers are introduced into our
example (monopoly) and if, also, more sellers are introduced
(bilateral competition), "we have to deal with much more complicated
relationships", but the same principles apply. Whatever the market
structure each individual will only engage in exchange to his advan-
tage, and this condition always imposes limitations on the possible
price range.[2]

Secondly, and this follows in large part from his adoption of
the above approach, Menger deals almost exclusively with individuals
exchanging in a market. He ignores previous problems of production,
and the costs incurred therein. Each seller, like each buyer, is
assumed to trade or not trade, solely depending on his subjective
valuations in each situation. Costs of production are not incorpora-
ted into these valuations. This, as we shall see, imposes severe
limitations on the value of Menger's analysis.

The third and final point concerning Menger's general approach is
more technical. It concerns his method of dealing with the possibility
of large numbers of buyers or sellers. Instead of deriving a continu-
ous, downward sloping demand curve, say, for the many buyers case,

---

1. ibid., pp. 197-8.

2. Note that Menger's choice of these three cases of price formation,
and the order in which he deals with them is determined by this
element of his approach. Starting with the simple case of isolated
exchange where the general principles are most evident, monopoly
and competition are defined simply by increasing the number of
buyers and/or sellers.

he assumes buyers can be divided into a limited number of classes, and then conducts his argument in terms of their valuations of goods. Such a procedure besides being technically unsatisfactory, involves problems as far as analytical results are concerned. These difficulties would have been avoided had Menger conducted his analysis in terms of a demand curve. We shall note these difficulties when they first occur, but then continue our exposition by assuming their absence.

As we have seen, Menger defines monopoly as the case where a single seller sells a good to several buyers. This literal definition markedly contrasts with the limited supply definition of the Classical economists, offering the prospect of a useful analysis of the case.[1] And indeed Menger provides an analysis which is both original and interesting. He divides this analysis into four sections, and we shall deal with each section in turn.

The first section deals with the case of "a single indivisible monopolized good". If seller A possesses a horse which he values at 10 bushels of grain, while B values a horse at 80 bushels, then "provided that A and B both recognise this relationship and have the power actually to perform the exchange of these goods", they will do so, within the price range 10-80 bushels.[2] If we now give B_1 a rival, B_2, who values A's horse at 30 bushels, then under appropriate market conditions (which Menger does not specify),[3] B_1 will still get the horse, but within a narrower price range of 30-80 bushels.

---

1. Cournot, of course, also used the single seller definition. It seems highly unlikely that Menger was aware of Cournot's contribution to monopoly analysis. Certainly, his exposition of the theory is radically different from Cournot's and in particular his approach does not employ the calculus.
2. Grundsätze, p. 199.
3. Menger does say that he is not assuming sale by auction, since in this case the price will be 30 bushels (ibid., p. 201n).

B_1 and B_2 will compete till the price has risen to 30 bushels, at which point B_2 is economically excluded. Within the price range 30-80 bushels, isolated exchange reappears, and price is determined by bargaining.

The introduction of further possible buyers, B_3, B_4 etc., does not upset the general principles of the analysis. These are that the horse will go to the buyer with the highest valuation, and that the price limits within which bargaining takes place are formed by the valuations of the two strongest possible buyers.[1] Menger thus demonstrates that the case of monopoly in the sale of a unique object reduces to the case of isolated exchange. He next proceeds to drop the assumption that the monopolist only has a unique object for sale.

In section B, Menger assumes that seller A has "a _quantity_ of a monopolized good" for sale. In this case there will generally be more than one actual buyer of the good. We shall look at this case in some detail, since it is here that the technical problems noted above first crop up. Assume that there are 8 possible buyers B_i ($i = 1...8$) who value a first horse in bushels of grain respectively at 80, 70...10. A second horse is valued at 10 bushels less by each (reflecting diminishing marginal utility); and so on.

"By imagining the symbols B_1, B_2, etc., to stand, not for single individuals, but for groups of the population of a country... we obtain a model of monopoly trade as it actually appears under the conditions of everyday life."[2]

We shall at present ignore the monopolist's policy, and see what happens as he brings given quantities to market. It is clear that if we constructed a normal downward sloping demand curve, we would find that we could read off a unique price for each quantity that was supplied, and that this price would be lower the greater

---

1. Menger felt that there was a tendency for price to be established at the mean of the price limits (ibid., pp. 195-7).

2. _Grundsätze_, p. 206.

the quantity. Menger's analysis, because it fails to employ such
a curve, points to the same conclusions but in a much less satisfac-
tory way.

If seller A offers only one horse for sale, then as we have seen
it will be bought by B_1 at a price within the range 70-80 bushels.
If A offers 3 horses for sale, they will, under appropriate conditions,
be sold at a price between 60 and 70 bushels, B_1 buying 2 and B_2 one
horse.[1] This is because at a higher price than 70 bushels only
one horse at most can be sold; while at a price below 60 bushels
there would be a demand for at least 6 horses. Similar results may
be deduced if A offers six or ten horses for sale, the price range
falling as the monopolist offers more horses for sale.

This model implies a demand curve in the form of a step function.

Figure 7.1
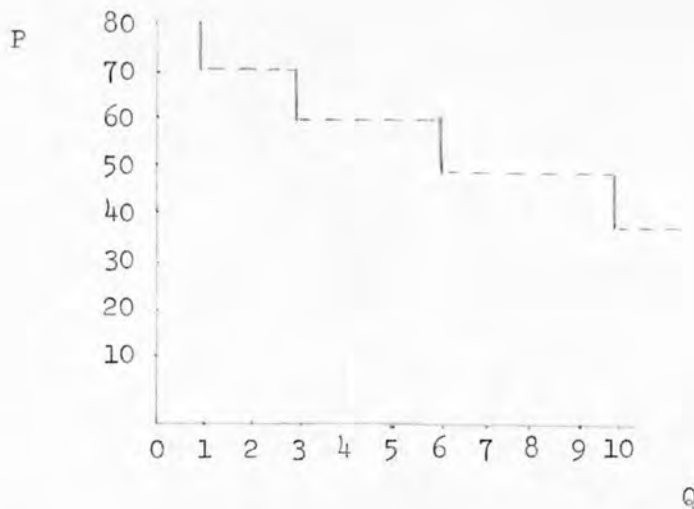
This function is discontinuous over certain quantity ranges e.g. over
quantities 4 and 5, or 7, 8 and 9. We may deduce the following
conclusions from it. Firstly, for quantities of the commodity
where price is not indeterminate, demand is inelastic over a
range of possible prices. This range is determined by the valuation

---

1. When there are a number of horses for sale it is necessary to
assume that market conditions are such that there is only one price
in the market.

of one unit of the good by the last actual buyer, and the valuation
of one unit of the good by the highest excluded buyer. Within this
range, price is determined by bargaining of buyers and seller.
Secondly, as the quantity of the good increases, ignoring quantities
where price is not determined, each actual buyer buys more, the
numbers of actual buyers increase, and the possible price range
gets lower. If the symbols B_i are taken to represent classes of
buyers, a greater supply implies the lower classes are excluded less
from buying.

In section C, Menger considers the case of the monopolist who
sets price rather than the quantity he sells. He argues that this is
usually what happens in practice, since it is necessary that various
(unspecified) market conditions exist, for the monopolist to be
a quantity-fixer. In the particular cases, such as an auction,
where this is so, he will fix quantity supplied; but generally he
fixes price.[1] If Menger had assumed a continuous and smooth demand
curve, it is clear that it would make no difference to the analysis
whether the monopolist is assumed to fix quantity or price. In
Menger's model as it stands, however, the assumption that the seller
sets price does affect the analysis, as can be readily seen from
the fact that price must now be a point rather than a range. When
the monopolist sets price, the demand curve implied by Menger's
analysis is now continuous (Figure 7.2).

Figure 7.2

---
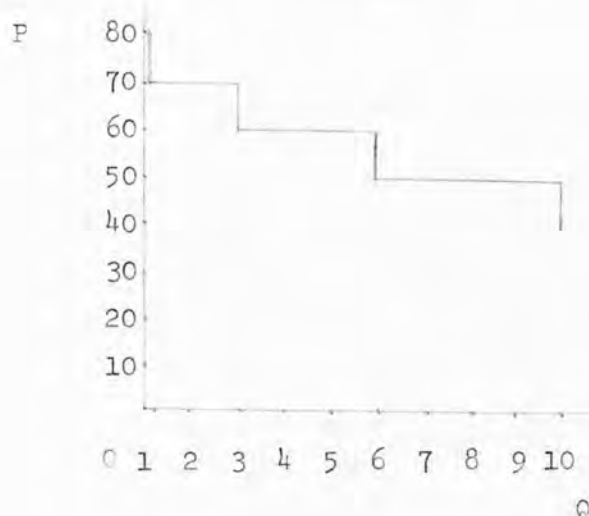
1. Grandsätze, pp. 207-8.

In this case, every price determines a unique quantity.[1] The
demand curve is a continuous, negatively sloped, step-function.
Consequently the conclusions that can be drawn from it are more in
accord with usual analysis. Firstly, for each price set there is
a determinate quantity purchased. There is no room for bargaining
in this model. And secondly, as price is lowered, the quantity
bought will either remain unchanged or increase. If the quantity
is increased by a price cut, each actual buyer will buy more, and
the number of actual buyers will increase. This formulation is
clearly more appropriate because it removes the phenomenon of bargain-
ing within a price range from the model.

Menger considers "the policy of a monopolist" in section D of
his analysis. He clearly sees that the monopolist's power is not
unlimited. In the first place, the fundamental principle, that all
who exchange must gain thereby, still holds. In the second place,
the monopolist cannot fix both price and sales at a high level. In
other words, he must accept the implied demand curve as given. But
he does have an exceptional position in that he can fix the price
or the sales of the good himself and in his own interest. And

"If it is assumed that all monopolists are economizing individuals
aware of their advantage, then their policy is directed... to making
a maximum profit."[2]

Menger clearly sets up the problem of monopoly equilibrium. What
then of his solution?

In the first place, as noted above, Menger completely ignored
the problem of costs in his analysis. Hence by saying that the
monopolist maximises profit he means that he maximises total receipts.
We have seen in our above analysis that Menger does not formulate the
usual smooth, continuous demand curve in his analysis. Hence we
would expect similar problems over the total revenue curve. In fact,
however, Menger's analysis in this section is much closer to modern

---

1. Price has been drawn on the y axis in Figure 7.2 to facilitate
comparison with Figure 7.1.

2. Grundsätze, p. 213.

analysis. He assumes each price the monopolist sets determines a
quantity; and the reverse is true. And further he associates high
prices with low sales; and vice versa. Hence he implies a continuous
total revenue curve, and he gets rid of the asymmetry between the price
and quantity setting monopolist. Further he implies the function has
but one maximum, and that, neglecting aberrations caused by "error
and imperfect knowledge", the monopolist will attain it.[1]

As to the actual price or quantity the monopolist will choose,
Menger considers three alternatives. He may set price high firstly,
or, secondly, he may set it low. In the former case

"he may even have occasion to abandon part of the quantity of the
monopolized good at his disposal to destruction instead of bringing
it to market, or, with the same result, to leave unused or to destroy
part of the corresponding means of production at his command instead
of employing them for the production of the monopolized good."[2]

This possibility was discounted by Adam Smith, but Menger gives
examples of its occurrence in real life, and suggests it is important.
In Menger's framework it obviously has welfare implications, since
the supply is considered as a stock (rather than a variable flow), so
that this case implies the actual destruction of goods. Menger is
aware that the monopolist's choice of fixing a high or low price will
depend on the demand curve. But he goes no further in considering
whether the monopolist will set price high or low. The third alterna-
tive policy the monopolist may follow may be called price discrimina-
tion by time. Menger explains this as follows:-

"In the beginning, he will set the price as high as possible and
thus market only small quantities of the monopolized good, later
lowering the price step by step to increase sales and thereby
exploiting all classes of the population in succession."[3]

Obviously for such a policy to work it must be assumed that no class
anticipates a future fall in price, so that the highest class buy at
a high price, and so on.

1. ibid., pp. 215-6.
2. ibid., p. 212.   3. ibid., p. 212.

What then can we say in sum about Menger's monopoly analysis? In the first place, we can recognise that as an individual achievement it was important. Menger set up the monopoly problem "correctly" in his definition of monopoly and in his assumption of profit maximisation. This was no mean achievement when his work is compared to that of the English classical economists. On the other hand, his conception of demand was inadequate, and also he ignored the problem of costs. Further, he was not able to deduce the equilibrium result that marginal revenue should be zero. This result, so obvious if mathematics is used, was not seen by the essentially literary economist, Menger. Menger was able to set up the perfect monopoly model, but unlike Cournot he did not possess the technique to solve it.

Menger's analysis of bilateral competition is much more scanty, and less satisfactory, than his monopoly analysis. He argues that it is logically the most complex case, since it involves both a number of buyers <u>and</u> a number of sellers. Further, he argues that historically competition is antecedent to monopoly. Originally, in primitive economies, isolated exchange is the rule:-

(isolated exchange) "is the most common form of human trade in the early stages of the development of civilization. Its importance has survived to later times in sparsely populated backward regions and it is not completely absent even under advanced economic conditions, ... But with the progress of civilization, instances ... occur less frequently".[1]

It comes to be replaced by monopoly and bilateral competition. But, arguing from the typical case of a seller who sets up shop in a locality where before there was no seller of that food, Menger suggests monopoly is the earlier rule:-

"Monopoly, interpreted as an actual condition and not as a social restriction on free competition, is therefore, as a rule, the earlier and more primitive phenomenon, and competition the phenomenon coming later in time."[2]

---

1. ibid., p. 197.   2.   ibid., p. 217.

As economic progress occurs, the local monopolists are less able to
meet increasing demand, so that prices rise and more classes of
buyers are excluded.

"The economic situation just described is usually such that the
need for competition itself calls forth competition, provided there
are no social or other barriers in the way."[1]

Menger suggests, later in the book, that in modern economies bilateral
competition is the general rule.[2]

Menger first deals with the question of competing sellers
bringing given quantities of a good to market. Referring to the
example used to depict this case when there was one seller,[3] he
assumes that there are now two sellers A_1 and A_2. If A_1 offers two
horses and A_2 one horse, then the total supply is three horses.
In this case, as in monopoly, the price range, under appropriate
conditions, will be 60-70 bushels, B_1 buying two horses and B_2 one.
Similar results occur if a total of 6 or 10 horses are supplied.[4]
Menger therefore concludes:

"Whether a given quantity of a commodity is sold by a monopolist
or by several competitors in supply, and independent of the way in
which the commodity was originally distributed among the competing
sellers, the effect on price formation and on the resultant distribu-
tion of the commodity among the competing buyers is exactly the same."[5]

In terms of figure 7.1 the price range is read off the implied demand
curve for appropriate total quantities in both cases. Likewise it is
clear that if the competing sellers fix a price, the total sales of
the commodity are determined by reference to the implied demand
curve of figure 7.2. Menger therefore stresses the complete analogy

---

1. ibid., p. 217.
2. ibid., chapter vii, p. 248.
3. This is case B of the monopoly analysis discussed above.
4. In these cases it is possible to have more than two sellers.
5. Grundsätze, p. 219.

of monopoly and bilateral competition, as far as price goes if total
sales are the same, or as far as total sales go if price is the same.[1]
All this, of course, amounts to saying that there is an implied demand
curve in the case of bilateral competition, as there is in monopoly.

Since given the total supply, price is fixed; and given the price,
total supply is fixed under monopoly and competition, Menger argues
that differences between the two cases in terms of total supply or
price can only be accounted for in terms of different quantity or
price policies being pursued by the competitors in contrast to the
monopolist. The crucial difference is that whereas the monopolist
controls the total supply or the price, each competitive seller only
controls his own supply or price. Menger recognises that the competi-
tors may collude in various ways, and so control total supply or
price, but he argues that in this case we again have monopoly. He is
concerned with the case where the competing sellers act independently.[2]

Assume for concreteness the sellers are quantity fixers. Further
assume that there are two sellers A_1 and A_2 who have inherited in
equal shares the stock and means of production of a deceased monop-
olist. In the case of monopoly we noted that the seller may try
to price discriminate by time. Menger argues that such a policy
for a competing seller, A_1, would not be possible:-

"If A_1 were to attempt a stepwise exploitation of the social
classes of this sort in spite of the competition of A_2, and market only
small initial quantities of the good, he would probably not be able
to raise the price sufficiently to elicit a gain for himself, but
instead would only permit his competitor to fill the gaps created
by his action and to capture the intended economic gain."[3]

What then would be the policy of each competing seller? Menger
answers that the sellers will each supply the whole of their stock.

_____

1. Note that whilst, given price, total sales are determined in
bilateral competition, the sales of individual sellers are not.
2. op. cit., pp. 220-1.   3. ibid., p. 223.

He argues that if say A_1 destroyed a part of his stock, the result would be a higher price but "only in very rare instances, would he be able to obtain a greater profit by so doing". All that is clear is that A_2's profit will rise. Menger argues generally that neither seller will withdraw some of his stock from exchange or leave means of production unused. Since it is "frequently" in the monopolist's interest to do this, Menger argues that competition of sellers leads to a lower price. This is obviously a very superficial demonstration of the theorem that competition lowers price.[1] Menger also argues that competition gets rid of "two of the socially most injurious outgrowths of monopoly": the destruction of supply and price discrimination.[2]

Further Menger argues that the supply of the two sellers will also tend to be higher than the full supply of the monopolist. He gives as the reason for this that the two sellers together are likely to possess more means of production than the one seller, and so their physical production possibilities are greater. They will use these possibilities to increase supply, lower price and ensure "that the provisioning of society in general becomes ever more complete".[3]

---

1. Generally, Menger is incorrect to believe that neither seller would gain by restricting output. In the simplest case, if A_2's output was given, A_1 could select an output to maximise profit and this would not generally be the total stock he possessed. The possibility of reaction from seller A_2 complicates the issue, but it is not at all clear that equilibrium would involve both sellers supplying all their stock. Whilst filled with insight, Menger's analysis failed to come to grips with the essential feature of the oligopoly case: the problem of conjectural variations. Again, in contrast to Cournot, Menger did not possess the mathematical tools necessary to deal with this problem.

2. Grundsätze, p. 223.

3. ibid., p. 224.

Again the supposed beneficial results of competition are derived rather superficially. Similar results are posited if the sellers fix price.[1]

The basic point with regard to Menger's analysis of bilateral competition was that he was concerned with the oligopoly problem. This in itself was original, given that the Classical economists tended to ignore the behaviour of firms within a market, and rather concentrate on free competition and "the law of costs". Menger in contrast ignored costs of production and hence free competition. His actual analysis of two-sided competition, whilst full of insight, failed to come to grips with the problem of conjectural variations, and so was not up to the standard of analysis set by Cournot. Hence his proof that competition lowers price was not based on firm analytical foundations. Nevertheless, his competition theory by its very originality offered scope for further development. We shall see, however, that his followers in the Austrian school were not able to advance his consideration of the oligopoly problem in the decades that followed.[2]

Both Menger's analyses of monopoly and competition are notable for their originality, and, in particular in the former, for their contribution to economic analysis. Both were developed in a highly original framework of exchange based on subjective valuations. This framework, however, posed problems in its neglect of costs of production, and in its emphasis on price zones and discontinuities in functions. In the remaining sections of this chapter we will examine the ways in which Bohm-Bawerk and Wieser developed Menger's analysis, and attempted to deal with such problems.

---

1. Menger again demonstrates his insight by suggesting that competition leads to less waste and the quicker adoption of improved methods: ibid., p. 225.

2. Indeed they tended to ignore the essential problem of oligopoly in their development of his competition analysis. Wieser dealt with it in his Social Economics (1914) (see section III below) but he made no advance on Menger's analysis.

II. Eugen von Böhm-Bowerk

The second major Austrian economist we shall mention is Eugen von Böhm-Bawerk. In his important work <u>Capital and Interest,</u> Böhm-Bawerk devotes some space to the analysis of price formation.[1] Whilst his analysis starts from a Mengerian viewpoint, it differs from Menger's analysis in that Böhm-Bawerk is primarily concerned with bilateral competition and devotes little attention to monopoly. In this section, we shall be primarily concerned with Böhm-Bawerk's analysis of two-sided competition. In particular, we shall notice the attempt by Böhm-Bawerk in the third edition to generalise his Mengerian analysis, and in so doing bring it more into line with English competitive analysis.

Like Menger Böhm-Bawerk begins with the proposition that "he who transacts an exchange (does so) with the aim of attaining a direct advantage."[2] This motive he in turn breaks down into three rules of practical behaviour. The trader

"will make an exchange only (1) <u>if he can exchange to advantage</u>; (2) <u>he will exchange to greater advantage in preference to exchanging to lesser advantage</u>; (3) <u>he will</u>, finally, <u>exchange to lesser advantage in preference to not exchanging at all</u>."[3]

Given these principles of behaviour, Böhm-Bawerk argues like Menger that price will be determined according to the market structure which is assumed.

Given this starting point, he examines four models of price

---

1. All references in this section are to Eugen von Böhm-Bawerk, <u>Capital and Interest</u> (volume II): <u>The Positive Theory of Capital</u> (First edition 1889; posthumous edition (one used) 1921) translated by G.D. Huncke and Hans F. Sennholz (South Holland, Illinois: Libertarian Press, 1959), Book III, Part B.

2. ibid., p. 215.

3. ibid., p. 220.

determination. These he calls "isolated exchange"; "one-sided competition among buyers"; "one-sided competition among sellers"; and "two-sided competition". The first thing we may say about this price schema is that it is Menger's, with the addition of the third category, which was added for symmetrical reasons. The second thing we may say about it is that each of the cases is not given equal treatment by Böhm-Bawerk. In fact, he concentrates almost solely on the fourth case, giving the others but cursory treatment. The first three cases are treated as but stepping stones to the case of two-sided competition, which "is both the most frequent occurrence in practical life and also the most important for the development of the law of price".[1] Böhm-Bawerk's schema contrasts markedly with Menger's here, in that the latter gave much greater attention to the "monopoly" case. Böhm-Bawerk chose, however, to sink it back to a minor position, in line with pre-Mengerian thinking. Hence the Austrian school turned its back on the important insights of Menger in this field.

A central feature of Böhm-Bawerk's analysis is that he deals with the special case where each dealer may trade in only one unit of the commodity. This procedure is a simplification which he later drops, for the two-sided competition case. However, it is kept intact in his analysis of the other three cases. In the case of isolated exchange B has one horse, which he values at $100, and A values a horse at $300. Böhm-Bawerk draws Menger's conclusions for this case: price will be determined by bargaining in the range $100-300, and "if both parties are equally proficient in bargaining" then price will be about $200.[2] The "monopoly" case is analysed by introducing another buyer Aa, who values a horse at $200. In this case, as Menger showed, the price range, under appropriate conditions, will be narrowed to $200-300. Böhm-Bawerk concludes that

"the effect of competition among buyers is to restrict the range within which the finally determined price will fall; and such restriction will be toward the upper end of the range".[3]

---

1. ibid., p. 220

2. ibid., p. 218.

3. ibid., p. 219.

He does not attempt to cover the ground in Menger's cases B, C and
D, which as we have already noted was a sad omission. Böhm-Bawerk's
analysis of the "monopsony" case contains nothing further of interest
for our purposes.

It is the case of two-sided competition which is of most interest
to us. Böhm-Bawerk gives an example of "ten willing buyers and eight
willing sellers each of whom wishes to buy or to sell, as the case
may be, one horse".[1] He assumes that each trader has a definite val-
uation of a horse. He further describes the market situation he
is assuming, as follows:-

"all parties are present in the same market at the same time,
that all the horses offered are equal in quality, and finally,
that all the candidates for exchange are free from any misconception
regarding the market situation which could prevent them from effect-
ively pursuing their own interest."[2]

Given these conditions, he envisages a "sounding out" process
on price, with sellers offering high prices and buyers low prices
initially:

"The more experienced in business and the more familiar with
the state of the market the people are who are seeking to do business
on the open market, the more quickly do they terminate the preliminary
sounding out."[3]

The buyers' initial bids attract less sellers than the number of
buyers. Rather than risk the possibility of being excluded from
a purchase at this low price, the buyers will try to outbid each
other. As price rises the number of willing buyers falls and the
number of willing sellers rises, until price reaches a level where
the last excess buyer is excluded. Between this price and the price
where another seller enters (or buyer leaves) the market, is the pos-
sible price zone. It is reached by a simultaneous process of bids
and offers amongst buyers and sellers.

---

1. ibid., p. 220.   2.   ibid., pp. 220-1.

3. ibid., p. 221, n.9. This sounding out process is the same process
which Walras called tâtonnement.

258.

Böhm-Bawerk was aware of the idealised nature of his model. In particular he noted that sellers may fix prices, thus eliminating the sounding out process. Such a policy, in a regime of two-sided competition, invites the possibility of error in the selection of the equilibrium price range. However, " 'fixed prices' are concededly less customary in an open market than in shops", and in the latter, error is not so important as here "sales are never made under the direct pressure of competition".[1] He also noted that the real world was one of less than perfect knowledge, due to the separation of individuals in time and space. This imperfection has the effect of making the real-world price zone only approximate to the theoretical zone.[2]

Böhm-Bawerk draws a number of results from his model. Firstly, the traders who succeed in exchanging are "the competitors in both groups possessing the greatest capacity for exchange".[3] Secondly, since in his model each trader deals in only one horse, it is easy to see that

"The number of competitors of each class - buyers and sellers - who actually effect an exchange may be determined by pairing off the competitors in descending order of capacity for exchange. The number of pairs making an exchange will then be equal to the number of pairs in which... the willing buyer places a higher valuation on the commodity than does the seller."[4]

Whereas the first theorem holds generally for the perfect competition model, it is clear that, as it stands, the second is derived from Böhm-Bawerk's special assumption that each trader deals in only one horse. Thirdly he concludes that

"exchanges effected under the influence of competition at any

---

1. ibid., p. 221, n. 9. Böhm-Bawerk apparently did not feel that this admission lessened the empirical relevance of his bilateral competition model.

2. ibid., p. 223, n. 12.

3. ibid., p. 223.   4.   ibid., p. 224.

one given time are consummated <u>at an approximately uniform price</u>."

By this he means that all exchanges take place within the possible price zone. The model yields a price zone rather than a price point, but as we shall see later this again is due to the special assumptions he makes. This is hinted at by the fact that two-sided competition, in comparison with isolated exchange, tends to produce a much narrower possible price range. Competition tends to narrow the range from both sides.[1]

The fourth theorem Böhm-Bawerk derives is his famous theorem on marginal pairs:-

"Market price is established at a point within a range which is limited and determined by the valuations by the two marginal pairs."[2]

The marginal pair at the upper price limit are the last buyer to come to terms and the excluded willing seller with the greatest capacity for exchange; while at the lower limit is the other marginal pair: the last seller to come to terms and the excluded willing buyer with the greatest capacity for exchange. At each limit the valuation prevails which makes the price range narrower. Given this law it is clear that all traders excluded from exchanging except those on the margin do not affect price, be there n of them or 20n of them. On the other hand, all traders who do exchange, except those on the margin, only indirectly affect price by neutralising each other and so reserving the position of the marginal pairs to definite traders. The price range is determined by the valuations of the marginal pairs alone.

From this Böhm-Bawerk deduces a very important corollary, namely that not "every disturbance in the reciprocal relation of both exchanging parties (or in what so many like to call " the relation between supply and demand") brings with it a disturbance of the market price".

"all those changes are without effect which fail to disturb the situation of the marginal pairs... Any increase or decrease in the number of excluded competitors is irrelevant; every increase or decrease in the intensity of valuation on the part of those persons is

---

1. ibid., p. 225, n. 16.   2. ibid., p. 225.

likewise irrelevant, provided it is not of such magnitude that they cease to be "excluded" competitors. And, finally, every increase or decrease, (even a unilateral one), in the intensity of the valuations on the part of competitors actually effecting an exchange - except for the marginal pair - is also irrelevant provided only that such persons are not thereby removed from the ranks of effective buyers and sellers."[1]

It is the latter part of this statement which relies heavily on the assumptions of Böhm-Bawerk's model, and leads to the apparent contradiction between it and the perfect competition model where changes in supply and demand do affect price.

The law of marginal pairs not only applies to bilateral competition but also to his three earlier models of price. Hence Böhm-Bawerk argues that it is the general law of price. In early editions of the Positive Theory of Capital he concluded his analysis at this point. However, in response to criticism by Edgeworth, in the third edition (1912) he added a passage to get rid of his special assumptions and make the model more general.[2] He argued in doing this that he was only replacing the simple case, with its ease of exposition, with a more complex case which was in essence no different.[3] He is aiming to bring his analysis into line with analysis in other countries, particularly England, in this way. What he does not see is that with the relaxation of his special assumptions, some of the results of his model are modified, and in particular his theory of marginal pairs loses the prominent position it attained in his special theory.

---

1. ibid., p. 228.

2. See F.Y. Edgeworth, 'Theory of Distribution', Quarterly Journal of Economics, vol. 18, no. 2, February 1904. The passages added by Böhm-Bawerk are listed in 'the Preface to the Third Edition': Positive Theory, p. 395.

3. Böhm-Bawerk notes that the complex case could be handled at once mathematically, but argues that there is still a case for moving from the simple to the more complex: ibid., p. 233.

He identifies the special features of his model as the assumption
of a limited number of trades; the assumption that each buyer or
seller may buy or sell only one commodity; and the assumption that
the commodity is large and indivisible. If we relax the first of
these assumptions and allow a great number of buyers and sellers,
the effect is to get a ranking of the valuations of buyers and sellers,
which much more closely approximates a continuous series. Hence the
equilibrium price zone will be narrowed, we assume to a point. This
tendency is also likely to be enhanced by the dropping of the second
and third assumptions. All three assumptions, in terms of geometry,
bring smooth continuity to the variables, and supply and demand
functions. But what happens to the law of marginal pairs? Bohm-Bawerk
notes that with these three assumptions dropped, the marginal pairs
can no longer be identified with definite people. But he does not
note also that since price is a point not a zone, both marginal pairs
will determine the same price point i.e. the upper and lower price
limits coincide. Hence in the "complex" model, although, as he says,
the law of marginal pairs may still be formulated so as to remain
true, it no longer has the significance it possessed in the "special"
case. In the same way, the important corollary that not all
distrubances may affect price is also devalued. Since Bohm-Bawerk
added the generalisation of his model as an afterthought, it is
not surprising that he did not bring out clearly these important
changes from his special model, that were involved.

Böhm-Bawerk tries to show that his analysis was consistent with
the law of supply and demand of the English economists. He argues
that since price is forced by market competition to a zone at which
the amount offered for sale equals the amount there is a desire to
buy, then in this price zone "supply and demand are quantitatively
in exact equilibrium".[1] Böhm-Bawerk does not however refer to demand
and supply functions in this passage, so that there is some ambiguity
as to whether he is referring to an ex-ante equilibrium condition or
an ex-post identity in this discussion.[2] The suggestion that he was

1. ibid., p. 224.

2. Böhm-Bawerk explicitly refers to J.S. Mill's treatment of demand
and supply as the model for his own, but he does not present as good
an analysis as did Mill.

confused over the meaning of supply and demand analysis is further
supported by his use of the decidedly old-fashioned ideas of
"extensiveness" and "intensiveness" of supply and demand when he
considers the comparative statics of price changes.[1] One is left
with the impression that Böhm-Bawerk did not fully understand
supply and demand analysis, despite the late date of his work, and
that certainly his integration of the idea with his model of two-
sided competition was not entirely successful.

A further modification of his theory arises from the consideration
that sellers typically possess much more of a commodity than they
have a personal need for. It follows that the bulk of the supply
of a commodity is valued by the sellers at practically zero.
Bohm-Bawerk argues from this that sellers will, to all intents and
purposes, offer their whole stock for sale, rather than offer less
as price falls.[2] Since the supply of each seller is given, so will
be total supply when account is taken of this modification. It
follows that price is fixed by the buyers, i.e. where demand
intersects supply, and it is determined not by the valuations of
the two marginal pairs, but by the valuation of the last buyer.
Böhm-Bawerk thus argued that when price is above the valuation at
which sellers' valuations come into play, as will generally be the
case, price depends on demand alone.[3]

Whilst Böhm-Bawerk's assumption, that the valuation of the
commodity by the sellers is not an important determinant of price,
seems reasonable, his conclusion that supply is therefore inelastic
is much more suspect. This is because Bohm-Bawerk, like Menger,

---

1. Positive Theory, Book III, Part B, chapter 3.

2. This is not strictly correct, since presumably sellers will
hold back the first few units of a commodity if price is low,
releasing some of them as price rises. That is supply would not be
completely inelastic with respect to price.
3. If supply is not completely inelastic (see the previous footnote)
then price would be determined by the valuations of the last seller
and buyer.

ignored the role of costs of production as a determinant of supply.
Böhm-Bawerk's few comments on cost of production go no further than
suggesting a superficial integration of his model with the free
competition model.[1] He accepts that the "law of costs" is "deeply
rooted in economic literature" as well as being "empirically so well
attested". Despite the fact that he had assumed supply is fixed, he
argued that under "normal" production and selling conditions sellers
will earn only a normal profit.[2] But he goes no further towards exam-
ining the basis of the supply curve in costs, so that we are left
with the rather peculiar conclusion that supply is simply given.
Clearly in this form, Böhm-Bawerk's theory of bilateral competition
is rather weak, and certainly adds little to the development of the
perfect competition model.

Böhm-Bawerk's models of price, although conceived in a Mengerian
framework, go their own way. We have already noted his failure to
pursue Menger's insights on monopoly. His model of bilateral
competition, although employing Menger's ideas, goes far beyond his
model.[3] The resultant theory, in its special form, marks a great
individual intellectual achievement. However, its further generalisation
at the same time brings it into the main line of thought on competition
theory and decreases its stature. Because of the structure of his
argument Bohm-Bawerk fails to provide an analysis of the firm and the
way in which costs underlie supply in perfect competition. His major
contribution, the law of marginal pairs, becomes of less significance
in the general model. His work was a great achievement, but in the
event the course he chose was not as productive as it might have been.

1. Positive Theory, Book III, Part B, chapter 4, p. 248.

2. This is due to the movement of resources in response to unequal
rates of return. Böhm-Bawerk argued that "frictions", which are
"infinite in number", ensure that the law of costs holds only approx-
imately. These frictions are the source of profit and loss in the
actual economy: ibid., pp. 255-6.

3. In particular, even in its special form, Böhm-Bawerk essentially
discussed "competition" in contrast to Menger's emphasis on oligopoly.

III. Friedrich von Wieser.

Friedrich von Wieser's work is illustrative of several themes.
Firstly, Wieser was a literary economist and as such typified the
often vague conceptions of competition and monopoly held by literary
economists even at the turn of the century. Secondly, and linked to
the first point, he was neither technically accomplished, nor did
he possess the intellectual originality of a Menger or a Bohm-Bawerk.
He was well-read, and from all of this emerges the dominant theme of
his writing on competition and monopoly, the attempt to synthesise
the thought of Menger with that of other school of thought. In doing
this, many of the interesting pointers of Menger's thought were lost,
and Austrian thought merged into the mainstream of economic thought.
These points are illustrated in the two of his works we shall
consider: Natural Value (1889) and Social Economics (1914).[1]

In Natural Value Wieser ignores monopoly to a greater extent even
than did Bohm-Bawerk. When it is mentioned, Wieser ignores the lead
provided by Menger, in favour of a Classical approach to the subject.
He implies that a monopoly good is one which is limited in supply,
rather than one for which there is only one seller:-

"The first group is composed of those goods to which attaches
a natural monopoly (as opposed to a legal monopoly). Characteristic
of this group is the comparative rarity of such goods as compared
with the demand for them, or, it may be, the comparatively small
quantity that can be produced."[2]

He gives examples such as "scarce raw materials" and "land exception-
ally situated" of monopoly goods. Such goods are contrasted with
"cost goods" which are "goods easily accessible and abundant, or goods
whose production can be indefinitely increased". Such a classification
immediately brings the work of Ricardo to mind, rather than that of

---

1. Friedrich von Wieser, Der Naturliche Werth (1889), edited by
William Smart and translated by C.A. Malloch (London; Macmillan,
1893), and Theorie der Gesellschaftlichen Wirtschaft (1914), translated
by A.F. Hinrichs (London: Allen and Unwin, 1927).
2. Natural Value, Book III, Chapter XII, p. 108.

Menger or Böhm-Bawerk.[1]

Wieser argues that

"it will be sufficient to describe that particular case of the
formation of price in which its peculiar principle can be most
clearly discerned. This is at the same time the normal formation
of price under the organised division of labour."[2]

The particular case he has in mind is the competitive case, and the
whole of his discussion of price in Natural Value centres on it:

"On the one side, we have numerous sellers, whose aim is the sale
of stocks which they have produced for the market, and which they
could not possibly use themselves; on the other side, we have numerous
buyers who compete with each other in buying, just as the others
compete in selling."[3]

The basic analysis of competition follows Menger, and more parti-
cularly, Böhm-Bawerk.[4] Like Böhm-Bawerk, Wieser initially assumes
each buyer only wants to buy "one single good or one single item."

---

1. We shall see below that Wieser was to transfer his allegiance to
Menger's view of monopoly in his later Social Economics, however.

2. Natural Value, Book II, chapter i, p. 39.

3. ibid., pp. 39-40.

4. The reference here is to Böhm-Bawerk's Grundzüge der Theorie des
Wirthschaftlichen Güterwerths in Conrad's Jahrbücher (1886). This
work contains an earlier version of Böhm-Bawerk's price theory, which
he rewrote in the Positive Theory of Capital, in the same year as
Wieser's Natural Value was published.

However, he drops the symmetry, initially adopted by Böhm-Bawerk, and
assumes that sellers sell a quantity of the good, and, furthermore,
that it has no personal use for them, so that they put it all up
for sale at whatever price the market decides upon. Each buyer is
assumed to have a fixed valuation of the good in terms of money.

"The endeavour of a seller, who is honest but looks to his own
advantage and acts purely according to his own interest, will be to
find out those, among all the buyers who can pay most, and to drive
them, if possible, to the margin of their purchasing power. On the
other hand, the would-be buyers will try to buy as much below that
as is possible. The inter-competition of buyers, therefore, is to
the advantage of sellers, and the inter-competition of sellers is
to the advantage of buyers."[1]

Having set the scene, Wieser argues that if only one item is
supplied, it will go to the buyer who can offer the most, at a
price between his top bid and top bid of the buyer next in rank.
As with the other Austrian economists insufficient attention is paid
to the market institutional framework which accomplishes this result.
Setting aside this problem, we can see that a supply of n goods will
go to the n buyers who can offer most for them. Further, Wieser
argues that

"Whoever buys in an open market, and from competing sellers,
pays for the same article the same price as is paid by everyone else."[2]

By this he means that each contract will be in the price range set
by the bids of the nth and $(n+1)^{th}$ buyer, when buyers are ranked
according to their valuations of the commodity. None of the buyers
will pay more than n^{th} buyer's valuation in order to exclude him.
This proposition obviously relies on certain assumptions as to the
knowledge of market conditions of the traders, which, however, are
not discussed. Wieser now arrives at a formulation of Böhm-Bawerk's
marginal pairs theorem, which states that the price range is determined
by the valuations of the marginal buyers. If we further assume that

---

1. op. cit., p. 41.   2.   ibid., p. 42.

there are large quantities of the good available, and hence many
buyers, then the price range may be regarded as reducing to a single
point determined by the valuation of the last buyer.

Wieser next proceeds to drop the assumption that each buyer only
buys one item. Little substantive change occurs if we assume each
buyer can buy a number of goods, the marginal utility of each further
good diminishing. The analysis is then readily transformed into
terms of supply and demand. For each price, total demand can be
derived, demand falling as price rises, and given that supply is
fixed, price is fixed at the level where the quantity demanded
equals the supply.

"It is demand and supply... that decide the exchange value."[1]

Thus Wieser's analysis of price, summarised above, synthesises
the Austrian approach with a simple model of supply and demand, in
which supply is fixed.[2] In this final form it goes no further than
many other supply and demand analyses. To it Wieser adds two other
contributions. Firstly, is the law of costs:-

"producers are not willing to sell under cost, and - where there
is free competition - are not able to sell over cost."

This law applies when goods are produced "frequently, regularly and
in large amounts" as opposed to when there is monopoly (a limited
supply). Again, Wieser's analysis relies heavily on Classical,
particularly Ricardian, concepts here. Secondly, Wieser also discusses
firms under competition.

---

1. ibid., p. 46.

2. The similarity between this model and Böhm-Bawerk's amended
model discussed above suggests that Böhm-Bawerk may have drawn on
Wieser's work to effect his reconciliation with English competitive
analysis.

"Under free competition, social utility will be - as it ought
to be - the first principle of economic life. Here each of the
competing undertakers is bound to strive to widen to the utmost the
compass of his undertaking. The increase of supply which the
individual producer causes is, in relation to supply as a whole,
too trifling to have any material effect in lowering prices, while
it materially increases the amount which the individuals have to
sell. Thus every one calculates, and, on the strength of this
calculation, production is stretched to the utmost possible extent".[1]

This passage is of interest since Wieser is clearly assuming that
sellers are too small to individually affect price. This idea as
we shall see in the next chapter began to be more widely accepted
towards the end of the 19th century. Wieser, however, is unable
to use it to give an adequate analysis of the firm, and too much
should not be read into his discussion of the firm.[2]

Wieser's analysis of competition and monopoly in Natural Value
synthesises the Mengerian approach into a rather weak mainstream
model. In his later Social Economics, he improves on this analysis
in certain respects. Most notable is his awareness of the importance
of the inequality of power in the real world.[3] He argues that this
feature had risen dramatically in importance at the end of the
19th century as opposed to when the Classical economists were writing.
This leads him in the theoretical field to adopt a three fold
classification of market structure into monopoly, competition and
monopoloid positions.[4]

---

1. ibid., Book II, Chapter IV, pp. 55-6.

2. In particular, Wieser follows Menger and Böhm-Bawerk in ignoring
cost of production as a determinant of the firm's output decision.

3. This awareness permeates the whole of Social Economics: See for
example ibid., pp. 9-13. As far as realistic description of the
capitalist economy is concerned, the book is of the first rank.

4. All references are to Social Economics, Book II, Part II.

Taking the latter first, Wieser calls all positions in the market
"monopoloid" when parties have power in the market but are not strictly
monopolies. There are a large number of types of these "favoured
positions in the market" and

"Neither the theory of pure monopoly nor the theory of pure
competition... will do them entire justice."[1]

Although he devotes a whole section to a discussion of them, he
limits himself to description rather than theory, and so we shall not
go into more detail. The important point is that Wieser was becoming
aware, as were other economists at the turn of the century, that the
theories of competition and monopoly could not explain a large
number of real-world situations, and in particular there were
"numerous intermediary forms" of market structure in which "monopolistic
power" was present. It seems clear that this thinking was influenced
chiefly by the wave of trusts and cartels which occurred in America
and elsewhere in the 1890s. And it led in the 1930s to attempts to
construct a theory to cover these "monopoloid" situations.

Wieser changes his definition of monopoly in Social Economics from
that which he used in Natural Value.

"A monopoly is the exclusive control of supply or of demand by
a single subject, as well as by a single will."[2]

He thus drops his 'Classical' definition for the single seller
(or buyer) definition used by Menger and Cournot. And indeed his
analysis follows Menger's closely.[3] Firstly, he argues that "pure
monopolies are very unusual", most "private monopolies" in fact
being monopoloid. Secondly, as did Menger, he deals with the case
of a single seller neglecting costs. Such a seller cannot dictate
price, but he may choose price or output to maximise profits.
In that he must accept the market demand curve as given, he obeys
the fundamental law of the formation of price, that the marginal
buyers decide price or output. This analysis just follows Menger,
as does the comment that the monopolist is not subject to the law of
costs and is also free to price discriminate, contrary to the seller

1. ibid., p. 221.   2. ibid., p. 174.
3. ibid., pp. 40-41.

in the competitive case. To Menger's analysis Wieser adds a discussion
of the advantages and disadvantages of monopoly, concluding that
monopoly is not always anti-social; and the peculiar proposition
that no demand monopolist is not also a supply monopolist. Although
not original, his discussion of monopoly represents an attempt to
revive interest in Menger's ideas on the subject, even though these
ideas had been supplanted by Cournot's superior analysis amongst
the leading theoreticians.[1]

Despite his emphasis on the inequality of power, Wieser continues
in Social Economics to present his basic model in terms of the
competitive case. He argues that it is necessary to do this to
simplify a complex World, and to be able to derive "the fundamental
law of price formation".[2] The word "competition", in line with all
Austrian writing, is defined structurally, although Wieser also
notes its behavioural use.[3] His basic model differs from his 1889
one in that he follows Menger more closely in his later work. We
may mention a couple of points of interest. Firstly, it emerges
clearly in Social Economics that the theory of marginal buyers is
in a sense more general than the perfect competition model.
It is still true that price is determined by the marginal buyers
when buyers are few, such as in the case of a market for antiques.

---

1. Such as Walras, Wicksell, Edgeworth and Marshall. It may well
be that Wieser, like other economists, adopted the single seller
definition in response to its adoption by the leading economists
of the era. But whereas they followed Cournot's treatment of the
problem, Wieser followed Menger's in his Social Economics.

2. Social Economics, p. 179.

3. ibid., p. 174.

The theory of perfect competition assumes many buyers, so that a continuous smooth demand curve can be drawn; but this is not required by the Austrian theory. Again, marginal buyers determine price in the case of monopoly of supply (though not of demand). Hence we must not assume the Austrian approach was but another way of stating the perfect competition theory. It is distinct, even though there was a tendency, particularly by Wieser, to develop the theory into the usual supply and demand terms.

Secondly, Wieser, following Menger, provides a primitive and inadequate theory of competition. If under monopoly it may be to a seller's advantage to restrict supply, "competitive sellers can never afford to do this".[1] Wieser assumes each seller has a given stock on hand. If one seller withheld some of his stock from the market, price would rise, all the other sellers would increase their supply, prices would drop below the original price, and the seller who withheld his stock would be "compelled to dispose at disadvantageous prices." Hence "each man will bend his efforts on selling whatever can be sold". Similarly over time, with the progress of production, each seller will increase his output to the maximum, by becoming more efficient. Production increases until price equals average cost. This "price-cost-law" may temporarily not hold,

"But there are movements of equalization constantly at work, if we assume the absence of friction, which in time will re-establish its validity."[2]

We can see here the essentially synthetic nature of Wieser's work in this field. Starting with Menger's proposition that no competitor will withold supply, Wieser adds a twist of his own by suggesting that to do so will cause price to _fall_.[3]

---

1. ibid., p. 204. See Menger's treatment in section I above.

2. ibid., p. 207.

3. Menger had suggested with more plausibility that the withdrawal of a seller's supply would cause price to rise.

It was noted above that Menger's treatment of this oligopoly problem
was superficial compared to Cournot's and it is clear that even by
1914 Wieser can lay no claim to have improved upon it. Wieser then
goes on to add the "price-cost-law" of the Classical economists to
this basically Mengerian oligopoly theory, and this is his theory
of competitive price. Clearly, the theory is only second rate, and
is moreover a compromise between the work of Menger and the Classical
economists. By 1914, in the work of Wieser, but also Böhm-Bawerk,
Menger's original views on price had largely been fitted into the
Classical mainstream view of competition and monopoly.

Chapter 8

Jenkin, Jevons and Edgeworth.

This chapter is concerned with the development of competition and monopoly analysis in England between the publication of J.S. Mill's Principles in 1848 and Marshall's Principles in 1890. As has been noted by Schumpeter, most economists of this period "continued to dwell in the post-Millian stratum of analysis".[1] Whilst there may have been some disagreement over doctrines, the general framework of approach was the Classical one derived from Mill.[2] The English economists were fairly insular, and new ideas from the Continent, such as those of Menger, made only a small impact on their work. In addition, the mathematical writings of Cournot and Walras were inaccessible to the mainly literary economists of the period. Whilst it is true that Jevons' work made some impact on English economics, this effect did not extend to competition and monopoly analysis. In this chapter, therefore, we have decided to single out three economists whose work is of importance for our purposes: Jevons, Jenkin and Edgeworth. In this introductory section, we shall briefly try to place their work in the context of the mainstream approach to competition and monopoly.

1. Schumpeter, History of Economic Analysis, p. 830. We are concerned in this introductory section with generalities, so that whilst objection may be taken to some of the points made, and exceptions be found, it is hoped that the reader will forbear from doing this, bearing in mind the limited space available to the author.

2. This evidenced by the almost universal reference to Mill's Principles in the prefaces of the works of this period, or, again, the familiar Classical structure of these texts, progressing from Production to Distribution to Exchange.

The reader is by now familiar with the Classical competitive
analysis so that there is no need to go into depth with regard to
its treatment in the period. Whilst fundamentally the analysis
was unaltered, there were however one or two changes of emphasis
which are worthy of note. The first one concerns the distinction
made by Sidgwick between Cairnes' concept of "commercial competition",
and what he calls "industrial competition":-

"The theory of market values or prices, as determined by Supply
and Demand, depends on the assumption of Commercial Competition (so
far as combination is excluded); while the theory of "natural"
or "normal" values or prices, so far as they are determined by
Cost of Production, depends on the assumption of Industrial Competition".[1]

Sidgwick points out that these are "two quite different kinds of
competition", the first referring to the behaviour of traders, and
the second to the movement of capital and labour between employments.
Whilst Sidgwick's recognition of this distinction is important,
he does not make use of it in the development of his analysis.
The second point is the switch in emphasis amongst some of the
writers in the period towards the market, and away from the Classical
"free competition" idea. This tendency was by no means general. But
it can be found, perhaps not surprisingly, in Jevons' work, where
the emphasis is on exchange in the market to the almost complete
neglect of cost of production.[2] And Edgeworth, heavily influenced

---

1. Henry Sidgwick, The Principles of Political Economy (London:
Macmillan, 1883), p. 183. The reference is to J.E. Cairnes, Some
Leading Principles of Political Economy, Newly Expounded (London:
Macmillan, 1874)

2. See section II below. Jevons saw his work as refuting Ricardo's
position that labour is the "cause" of value, by demonstrating that
marginal utility determines value without reference to production.
Inevitably in this argument, cost of production was de-emphasised.

by Jevons, defined "a perfect field of competition" in terms of
market conditions (and in particular that there be large numbers of
traders) also without reference to resource mobility.[1] Too much
weight should not be put on such changes of emphasis, but it is
possible to argue that writers in the second half of the 19th century
were becoming more aware of the need for a competitive market structure
for the supply and demand analysis to hold.[2] That such an argument
should not be taken too far, however, will be illustrated in the
next chapter by Marshall's rather vague ideas on market structure.[3]

Given that competitive analysis remained fairly Classical in
approach, the contributions of Fleeming Jenkin and William Stanley
Jevons may be categorized as clarificatory. Jenkin, as we shall see
in section I below, made the important contribution of representing
the Classical model graphically by means of supply and demand curves,
and so clarified the usual literary treatment of competitive theory.
At the same time, however, his work also illustrates the Classical
neglect of the theory of the firm and market structure, and so is
itself essentially Classical in approach. Jevons' work, on the
other hand, is notable for its non-Millian approach, although, as
we shall see, his analysis of competition and monopoly was extremely
poor. His clarificatory contribution was his discussion of the
perfect market which gives rise to the law of indifference.

---

1. See section III below. The relationship between Jevons' "perfect
market" and Edgeworth's "perfect field of competition" is also
touched on in section III.

2. A counter-example is, however, provided by the work of Fleeming
Jenkin (see section I), who applies supply and demand analysis to all
kinds of non-competitive market structures.

3. Another change in the period was the more frequent use of the
phrase "perfect competition" in the literature. This more widespread
use in no way implies that writers used the phrase in the same way:
compare Sidgwick who used it to mean self-interest (op.cit., pp. 180-1);
Jevons, who used it to mean the freedom to contract (see section II);
and Edgeworth, who used it to mean a competitive market (see
section III).

It will be argued in section II below, that Jevons did not confuse
the ideas of a perfect market and competition in his work, this
confusion being a product of subsequent work. Whilst the perfect
market is an entirely separate idea from competition, we have
included a discussion of Jevons' treatment of it just because of
this confusion in the subsequent literature.

One feature of the literature of the period which was new, was
the increased space devoted to discussion of trade unions and,
towards the end of the century, large companies. This, or course,
reflected historical trends: the rise in trades unions, marked by the
first meeting of a limited Trades Union Congress in Manchester in
1868; and the concentration of capital, which was made possible by
the formation of joint stock companies with limited liability,
following the company legislation of 1855 and 1862.[1] Whilst
J.S. Mill had emphasised the replacement of custom by competition as
capitalism developed; towards the end of the century there was a
growing awareness that concentrations of labour and capital might be
giving rise to monopoloid situations. Up to 1890, however, discussion
of these trends tended to be descriptive rather than analytical, and
moreover treated in a separate place from the analysis.[2] This latter
remained competitive in the Classical sense, and possible imperfections
were treated as frictions, which hamper but do not overturn the
Classical results.[3]

---

1. See David Thomson, Europe Since Napoleon, (Penguin, 1968),
pp. 264-5.

2. See, for example, Sidgwick, op. cit., Book II, chapter 10,
pp. 348-365, or Henry Fawcett, Manual of Political Economy (1863),
6th edition (London: Macmillan, 1883), Book II, chapter 9, pp.
238-254.

3. The idea of frictions of course derives from the analogy of the
laws of competition to the laws of physics. It does not involve
any operationally distinct view on competition from that of the
Classical economists.

Edgworth's work, however, stands out against this background for his explicit analysis of imperfect competition.[1] In his _Mathematical Psychics_ of 1881, he argued that the trend towards combination on both sides of the market gave rise to the problem of indeterminacy of contract. Starting from a proof that bilateral exchange is indeterminate, he showed that the implication of more or less imperfect competition was less or more indeterminacy of contract. In contrast to the neutral determination of price when competition is perfect, the indeterminacy of imperfect competition gives rise to the need for a principle of arbitration. This highly original analysis is, of course, beyond our brief in this thesis, although it will be touched on further in section III below. Its importance here is that it indicates that economists were becoming aware of imperfections of competition in the late 19th century. Edgeworth's analytical performance is outstanding, but it was a response to real-world trends which were also occupying the attention of other economists as the century wore on.[2]

Edgeworth's work is also important as far as the analysis of monopoly is concerned. Most of the economists of the period, being non-mathematical did not have access to Cournot's theory directly. Whilst there is some evidence of a switch to the single seller definition from the Classical limited supply idea,[3] much of the discussion of monopoly remained vague and confused. Edgeworth, in contrast, was able to master Cournot's model and, moreover, suggest

---

1. By "imperfect competition" Edgeworth meant essentially limitations on the number of traders trading in the market, (see section III below).

2. As is well known, Mrs. Robinson's response to this situation was made in 1933. It will be argued in the next chapter that the delay in this response may in part be explained by the peculiarities of Marshall's _Principles_, which came to dominate English economics after 1890.

3. Sidgwick, for example, eschewed the Classical view of monopoly, for the single seller view in 1883 (op. cit., pp. 191-3). It may be that he was following Marshall in this, however.

a number of important extensions to it, which are also reviewed in
section III below. This work, together with that of Marshall,
discussed in the next chapter, represents the most important develop-
ment of the pure monopoly model in the 19th century literature. In
addition, Marshall's analysis in Book V, chapter 14 of the _Principles_
became the standard reference on the subject for students of economics
after 1890. The result of this was that Cournot's analysis largely
replaced the Classical notion of monopoly in English economics after
this date. The implications of this with reference to the popular
competition/monopoly dichotomy will be explored further in chapter 10
below.

It is to be hoped that the three sections below represent fairly
self-contained assessments of the contributions of Jenkin, Jevons
and Edgeworth, respectively. I have not attempted to integrate their
work within a synthesised account of the period, and the reader is
reminded again that insofar as their work is original, they are not
typical representatives of English competition and monopoly analysis
in the second half of the 19th century.

I. Fleeming Jenkin

Fleeming Jenkin was, like several other important economic writers we have encountered, trained as an engineer.[1] He made a number of important contributions to economics, of which we shall deal here with one. This was his representation of "the laws of supply and demand" by means of geometry, which he published in a paper in 1870.[2] As far as I am aware this was the first attempt at the graphical representation of supply and demand by an English economist.[3] As such it represented an important clarification of the Classical analysis of competition. It largely went unnoticed, although we do know that Marshall, who was to use similar diagrams, had read Jenkin's paper.[4]

We shall emphasise two themes with respect to Jenkin's work. In the first place, Jenkin's essay is important for its technical contribution. Being an engineer, Jenkin was conscious of the vagueness attached to the so-called laws of supply and demand, in the work of the Classical economists:-

-----

1. Jenkin was at first a practical engineer, but then took up the post of Professor of Engineering at Edinburgh University.

2. 'The Graphic Representation of the Laws of Supply and Demand, and their Application to Labour', in Recess Studies, edited by Sir Alexander Grant (Edinburgh, 1870). I have used the L.S.E. reprint of Jenkin's economic essays (London: L.S.E., 1931); and all references are to 'The Graphic Representation' in this book.

3. Supply and demand curves were not unknown in Germany, however, and they appear in the fourth edition of Rau's Grundsatze (1844) and Mangoldt's Grundrisse (1863) see Blaug, Economic Theory in Retrospect, p. 309. And, of course, Cournot also drew them in his Recherches (1838). There is no evidence, however, that Jenkin was acquainted with any of these works.

4. Marshall claimed, however, that he had drawn them independently before coming across Jenkin's work. See Guilleband's edition of the Principles, vol. II (Notes), pp. 533-4.

"Recent discussions on the laws determining the price of commodities seem to show that these laws are neither so well understood nor so clearly expressed in the writings of economists as is sometimes supposed."[1]

Jenkin took the view that there were <u>laws</u> in economics as in the physical sciences, so that there was a need to state them rigorously like "any mathematical laws affecting quantities of any description."[2] He therefore set himself the task of representing the Classical analysis of price determination graphically, and as we shall see his work is important because of his success in accomplishing this task.

The second point we shall make is that Jenkin's work, despite its superior technique, was still essentially in the Classical tradition. Jenkin distinguishes three laws of supply and demand in his essay. In developing these laws it is true that his approach is partial (i.e. he concentrates on a single commodity) in contrast to the inter-industry emphasis of the Classical economists. But given this, his laws are best viewed as more rigorous statements of the Classical results with respect to market price (laws one and two) and natural price (law three). In particular, whilst he does concentrate on determining equilibrium in a single industry, he, like the Classical economists, pays no attention to the problem of equilibrium of the firm. Rather both his market price and natural price analyses are conducted in terms of industry supply and demand curves and he makes no attempt to give these underpinnings. With regard to the theory of the firm therefore, Jenkin's work is important for making this gap in Classical analysis more explicit, rather than for adding anything of his own to fill the gap.

We shall follow Jenkin in dealing first with market price, and then with the cost price. He begins with some definitions.[3] "The <u>whole supply</u> of an article" is the whole quantity for sale, there and then. "<u>Supply at a price</u>" is the quantity which at a given price
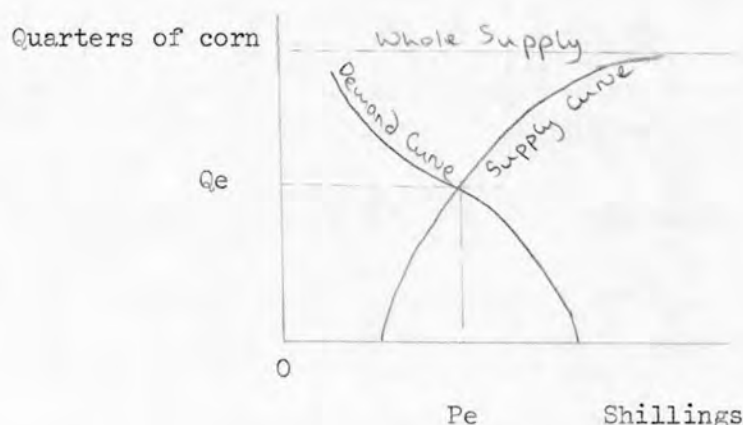
---

1. The Graphic Representation, p. 76.

2. ibid., p. 76   3. ibid., pp. 76-7.

buyers would buy. <u>Supply at a price</u> and <u>demand at a price</u> are both functions of price, and hence can be represented on a diagram by a <u>supply curve</u> and a <u>demand curve.</u>[1] This Jenkin does for a hypothetical corn market (Figure 8.1)[2]

<div align="center">Figure 8.1</div>

Several points are worthy of note with respect to Figure 8.1. In the first place, Jenkin makes no attempt to derive the market supply and demand curves from underlying theories of consumer and producer behaviour. Rather, he just asserts their existence, and moreover, takes their slopes as self-evident. This omission is regrettable, although we have seen that Cournot also treated the

---

1. In a later paper ('On the Principles which regulate the incidence of taxes' (1871-2)) Jenkin represents demand and supply functions algebraicly. If y is supply and y_1 is demand, then the model is simply that

$$y = \phi(x)$$
$$y_1 = \phi_1(x)$$
$$y = y_1$$

where x is price. Jenkin did not pursue this algebraic formulation, however, arguing that in practice functions were likely to be complex, and so it was better to draw curves from statistical observation (ibid., pp. 107-8).

2. All the diagrams in this section are reproduced from Jenkin's essay. Figures 8.1 to 8.6 are numbered as in Jenkin's essay, whilst our diagrams 8.7 and 8.8 are his diagrams 12 and 13.

market demand curve as given.[1] Secondly, Jenkin drew what he called the whole supply on his demand and supply diagram, meaning by this the stock of the commodity available for sale in the market. This concept creates no problems when only the determination of market price is considered, and as we shall see it has an important role to play with respect to Jenkin's second law of supply and demand. Finally, like Cournot, but unlike Marshall, Jenkin follows the mathematical convention of putting the independent variable, price, on the x - axis.

We are now in a position to state what Jenkin calls "the first law of demand and supply". It is that

"In a given market, at a given time, the market price of the commodity will be that at which the supply and demand curves cut."[2]

At this price demand and supply are equal. As a corollary of this law, we have

"At this price a greater quantity of the commodity will change hands than at any other price."[3]

Thus, Jenkin states clearly and concisely the equilibrium solution of the supply and demand model.

Jenkin goes on, in a manner similar to Walras, to show how in practice this theoretical solution is approximately arrived at "by competition". The problem is that the supply and demand curves, and hence the market price, are not known by the traders. We have seen that Walras, when faced with this problem, side-stepped it with the artificial device of recontracting. Jenkin suggests a similar way out when he says:

"If every man were openly to write down beforehand exactly what he would sell or buy at each price, the market price might be computed immediately, and the transactions be then and there closed."[4]

---

1. See chapter 5 above.   2.   op. cit., p. 78.

3. ibid., p. 78.   4.   ibid., p. 79.

But it is clear that in practice this does not happen. What does happen, according to Jenkin, is that, on the one hand, if some sellers offer their wares below the theoretical price, they attract many buyers, so that other sellers are prepared to charge a higher price, without fear of having goods left on their hands; whilst on the other hand, buyers who offer less than the theoretical price find so few sellers, that they or others are forced to offer a higher price. In this way, buyers and sellers estimate the theoretical price by watching the briskness of sales, and this tentative behaviour Jenkin calls "competition"[1]. Thus Jenkin is asserting that transactions take place in the market in practice at a variety of prices, and not only at the theoretical price.

But if this be so, then it is true, generally, that the theoretical price will not remain what it was before any transactions had occurred. Jenkin, however, contends that as long as we assume that no man changes his individual demand or supply functions, "the market price will not be changed by the sales"[2]. At the end of the dealings the actual price will be equal to the theoretical price, and the equilibrium quantity will have been exactly sold. This he represents graphically by gradually raising the base line of figure 8.1, which we may call the _ex ante_ diagram, until it is at the level of the equilibrium quantity as in figure 8.2, the _ex post_ diagram.

Figure 8.2

Quarters of corn

Qe

Pe   shillings
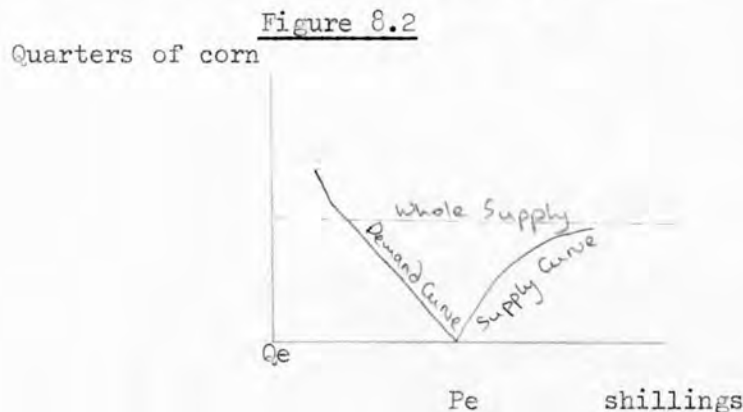
In Jenkin's view, although "the actual price at which each quarter is sold will be a mere tentative approximation to the theoretical price", at the end of the day the original equilibrium quantity will be sold, and the original equilibrium price will rule. It is clear that to assume the preferences of traders are unchanged in the

1. Jenkin is using the term in the sense of rivalrous competition here.
2. op. cit., p, 78

market period is insufficient to guarantee this result. Nevertheless, if he did not solve the problem, Jenkin must be credited with the most direct attack on it up to that time.

Having dealt with static equilibrium, Jenkin next turns to comparative statics. He divides possible changes in the situation into two types: changes in traders' preferences and changes in external factors. We shall take changes in preferences first. Up to now he has assumed that traders' preferences are fixed, "but, in practice, men's minds do not remain constant for five minutes together".[1] On the supply side, this factor may cause the supply curve to take up any position, as long as it is below the whole supply. On the demand side, demand is limited at each price by the funds available for purchase, (the purchase fund), but may also vary indefinitely within this limit. Shifts in the curves will affect market price, and we can derive five further corollaries from the first law of supply and demand:-

"If the supply at a price increases at prices near the market price, ... prices fall, and more is sold.

If the demand at a price increases at prices near the market price, ... prices rise, and more is sold.

If the supply at a price decreases at prices near the market price, ... prices rise, and less is sold.

If the demand at a price decreases at prices near the market price, ... prices fall, and less is sold.

It is possible that both the demand at a price and supply at a price may increase simultaneously, so that the price shall be unaltered, while more of the commodity is bought and sold, or less of the commodity may change hands with an unaltered price, demand and supply decreasing simultaneously."[2]

These propositions, of course, were well known, and Jenkin's contribution was to show them graphically (figures 8.3 and 8.4).

---

1. ibid., p. 79.   2. ibid., p. 80.
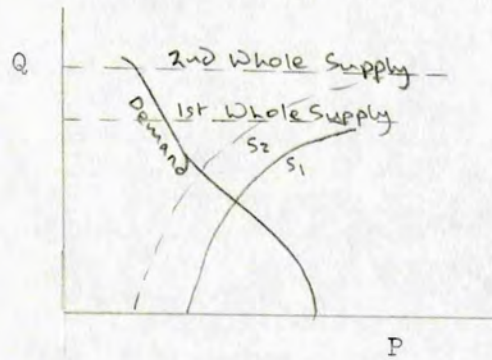
Figure 8.3
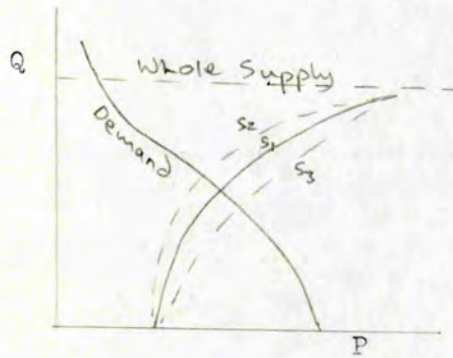
Figure 8.4
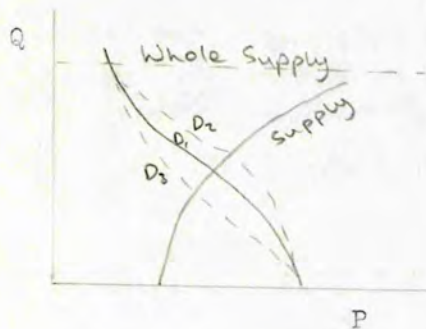
These diagrams succinctly demonstrate the comparative statics of
supply and demand, and need no further explanation.

A change in preferences directly leads to a shift in one or
other of the curves, and a change in market price. Changes in the
whole supply or the whole purchase fund, on the other hand, do not
have such a definite and direct result. This brings Jenkin to what
he calls "the second law of supply and demand":

"If the whole supply be increased, it will most frequently,
but not always, happen that the supply at a price will, throughout
the whole scale, be increased; prices will then fall,...

If the purchase fund be increased it will often happen that the
demand at a price will rise throughout the whole scale; prices will
then rise,..."

These propositions are also depicted graphically in Figures 8.5
and 8.6.

Figure 8.5.

Figure 8.6
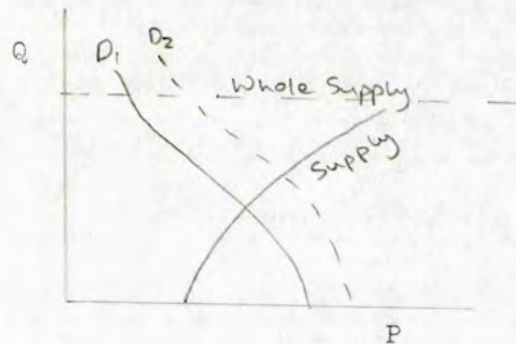
In Jenkin's view "the second law" ought to be kept distinct from the
first law, because while the first, and its corollaries, always
hold true, this "law" was not such a law, but more a probability.

How are we to evaluate this distinction between the comparative
static effects of changes in preferences and changes in external
factors? Formally Jenkin postulates market demand and supply
functions

$$D = D(P,T,M) \qquad (8.1)$$

$$S = S(P,T^1,W) \qquad (8.2)$$

where D is market demand, S is market supply, P is price, T is buyer
preferences, T^1 is seller preferences, M is the purchase fund and
W is the stock available for sale. His distinction then asserts
that it is always true that

$$\frac{\delta D}{\delta T} > 0 \text{ and } \frac{\delta S}{\delta T^1} > 0 \qquad (8.3)$$

whilst it is only probably true that

$$\frac{\delta D}{\delta M} > 0 \text{ and } \frac{\delta S}{\delta W} > 0 \qquad\qquad (8.4)$$

It is clear that T and T^1 can be defined such that inequalities
(8.3) always hold true, whilst this is not the case for inequalities
(8.4). It thus appears that Jenkin's distinction is of a definitional
rather than a behavioural nature. It may be that he based it upon
his insights concerning consumer and producer behaviour. Thus, for
example, he may have observed in reality that for certain "inferior"
goods, consumption is decreased as the "purchase fund" is increased.
But if he did, he offers no explicit theory of such behaviour. In
the absence of such an explicit theory, therefore, we must conclude
that Jenkin's distinction of these comparative static effects, whilst
thought provoking, does not amount to as important a distinction
as may at first sight appear.

Before moving onto Jenkin's discussion of long run equilibrium,
it is perhaps appropriate here to say a few words about his notion
of supply. We have already noted that Jenkin started his analysis
with market demand and supply curves, offering no behavioural theories
to underpin them. This omission is particularly important for our
purposes with respect to supply. Jenkin presents a very agnostic view
of market supply. Traders are simply assumed to possess a stock of
a commodity, offering more of this stock for sale as price rises.
There is no rationale for this, either along Austrian lines in
terms of marginal utility, nor in terms of costs. Whilst this does
not diminish Jenkin's technical achievement with respect to supply
and demand, it does expose an important gap in his competitive
analysis. We shall see that it was not until the present century that
this gap was filled by the suggestion that the market supply curve is
the sum of the individual producers' marginal cost curves.[1]

Turning to his discussion of the long run, Jenkin divides com-
modities into two classes, along the lines of the Classical division:
they are either limited in supply or variable in supply. In both
cases, the first and second laws of demand and supply cannot tell

1. see Chapter 10 below.

288.

us what the theoretical price will be. The price level and price changes "depend on the state of mind of the buyers and sellers simply, and not on any material quantity, or on any law hitherto stated".[1] If supply is limited, (he gives the familiar example of pictures by an old master) there is no law which can improve on this situation. Always the price level and changes of price will depend on the preferences of buyers and sellers, and we will not be able to pinpoint them from any knowledge of external circumstances.[2]

As for the competitive case, he then says:-

"Leaving on one side the case of a limited supply as unapproachable, let us consider the case of an article, the manufacture of which continues, and of which the quantity made depends ultimately on the price obtainable."[3]

This is the case of most manufactured goods. And in this case it is possible to find another law which will fix the probable price. Although demand may still vary as before, "the average supply curve will be found in the long run to depend simply on the cost of production". Supply will adjust to bring equilibrium at cost price:-

"If in a given market, or series of markets, they (manufacturers) find no demand, or an insufficient demand, for their produce, at cost price (including what they think a fair profit), they will cease to produce, or produce only as much as the demand at that price requires. While, if the demand equals or exceeds the supply at a higher price than cost price as above defined, makers will be tempted to produce more, until by the action of the second law the demand and supply at cost price become equal."[4]

---

1. ibid., p. 87.

2. Although Jenkin does not use the terms monopoly and free competition, it is clear that he is dealing with these cases. Just as clearly he believes that the first two laws of supply and demand are applicable to both cases.

3. op. cit., p. 88.

4. ibid., pp. 88-9. The second law of demand and supply is relevant here since in the long run it is changes in the whole supply which cause the supply curve to shift to bring price equal to costs.

Given this assumption it is possible to formulate a "third law of demand and supply" for manufactured products:

"In the long run, the price of the manufactured article is chiefly determined by the cost of its production, and the quantity manufactured is chiefly determined by the demand at that price."[1]

Jenkin recognised two problems which stood in the way of fixing the price by looking at the costs of producing a commodity. In the first place, the third law of supply and demand was only a long run law:

"The average height of the supply curve, over a number of years, depends on the cost of production alone; but at any moment its position above or below that average depends on the estimate formed by producers whether the actual demand curve is above or below the average..."[2]

Hence on any one day the actual supply will diverge more or less from the average supply curve fixed by cost of production, and it is with these departures alone, "which may be considerable", that the first and second laws come into play. Formally, Jenkin suggests that any observed market price will not only reflect a "permanent" supply curve, but also a "transitory" one.[3]

On top of this, ambiguity arises with the concept "average supply", because this depends on cost of production, including a profit to producers, which they determine themselves:-

---

1. ibid., p. 89. Jenkin's analysis of this third law is discussed below.

2. ibid., p. 89.

3. Whilst Smith argued that market price tends towards natural price over time, Jenkin argued that the observed supply curve differed from the natural supply curve by transitory amounts from day to day.

"This profit may vary, and does vary immensely, in different
countries, and at different times. Competition at any one time
prevents wide divergence from the average rate of profit expected
by manufacturers: but what profit is sufficient to induce a man
to produce is none the less a mere matter of opinion."[1]

Nevertheless, Jenkin felt that it was still possible to estimate the
"probable price of an article using the third law, by observing over
a long range of years the general opinion in a given country of
what the profit rate should be.

Jenkin next proceeds to represent the long run Classical model
graphically.[2] In this case we are concerned with average demand and
supply curves. The average demand curve "represents the average
quantity wanted, say in a year, at the several prices".[3] Like the
demand curve of Figure 6.1 above, it is negatively sloped, but its
shape and position vary from commodity to commodity.[4] The average
supply curve on the other hand, represents the "quantity which will
be produced in a year at each price". But since we are here concerned
with the Classical competitive equilibrium, the average supply
curve is determined by cost of production. Specifically,

----

1. ibid., p. 89.

2. ibid., pp. 89-93

3. ibid., p. 90.

4. Jenkin makes the interesting observation that the demand curve
may be nearly horizontal, "the total demand being little affected
by price", or sharply inclined, "showing that the demand increases
rapidly as price is lowered". Also in a very Marshallian passage he
suggests that

"Statistics collected over several years might also show whether
the general character of the curve was convex or concave to the base,
and at what rate approximately the average height of the curve
increased year by year." (ibid., p. 90).

"The price corresponding to each point in the supply curve is the cost of production of the article in that quantity, including in the words cost of production, sufficient profit to labour and capital to induce the production of that quantity.

In other words, the price is the lowest price at which that given quantity will be produced."[1]

Like the demand curve, the shape of the supply curve will vary between commodities. Jenkin illustrates two possible shapes (Figure 8.7).

<u>Figure 8.7</u>[2]
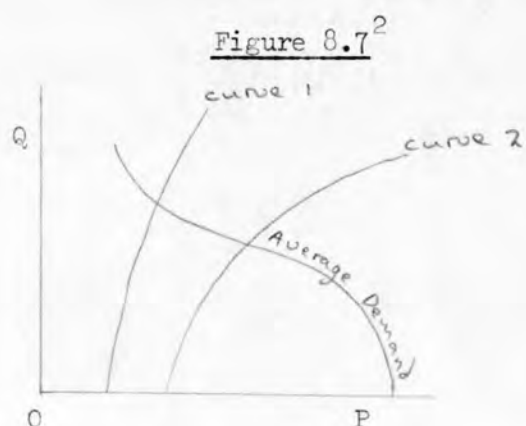
Curve 1 "characterises the case of articles which, at a given price, can be produced in almost unlimited quantities".[3] This is the case of approximately constant costs, and Jenkin suggests that articles such as toys which require "little capital, moderate skill, and common raw materials" fall in this category. On the other hand, curve 2 exemplifies increasing costs and according to Jenkin is the most frequent case. In this case:

"The cost of production will gradually increase with the quantity produced, owing to the limitation of labour, of capital, and of raw material... as more is wanted a higher price is generally required to tempt more capital and more labour into the given walk."[4]

---

1. ibid., p. 90, notes to Figure 12. By cost of production, Jenkin is clearly referring to average cost.
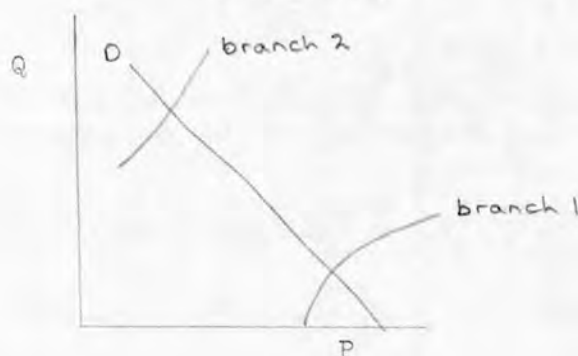2. This is Jenkin's Figure 12, (ibid., p. 90).
3. ibid., p. 91.   4. ibid., pp. 91-92.

Jenkin also admitted that "occasionally a commodity may be dearer to produce in small quantities than in large".[1] He represented this case, however, by drawing two branches of the supply curve, rather than by drawing a backward-bending supply curve (Figure 8.8).

Figure 8.8[2]

Implicit in this diagram is the assumption that there exist two technologies for the production of the commodity. One technology produces small quantities at high cost as indicated by branch 1 in Figure 8.8. The second technology is only capable of producing large quantities at a lower cost (branch 2). In both cases, given the technology, costs increase. Clearly this is not the usual case of decreasing costs found in the modern literature. Jenkin shows no awareness that his diagram refers to this rather special case, and he makes no further use of this diagram in his Essay.

Given the average supply and demand curve for a commodity, "the probable average price" is determined by their intersection. For the third law of supply and deamnd to hold it is, therefore, necessary to make the additional assumption that costs are approximately constant:

"Only in the case in which the supply curve is a vertical line at one price is it strictly true that the cost of production determines price without reference to demand; but for all those cases in which the cost of production varies little with the quantity produced, the statement is approximately true. When the average supply curve is a vertical line, it is strictly true that demand has no influence on the average price, but only determines the quantity which will be sold."[3]

1. ibid., p. 92.
2. This is Jenkin's Figure 13, (ibid., p. 91).   3.   ibid., p. 92.

Jenkin's graphical analysis thus enabled him to clearly demonstrate
that the Classical economists were implicitly assuming constant costs
in asserting that price would equal cost in the long run. Such a
demonstration marked an important advance in understanding the
Classical model, and opened the door on the possibility of reinter-
pretation if costs are not constant. Jenkin, however, supported the
Classical result in his third law of supply and demand, arguing that

"Average demand curves will in general approach horizontal lines,
and average supply curves will in general approach vertical lines."[1]

He did not, however, explain why he thought this would be so, and
the assumption of long run inelastic demand in particular, whilst
not relevant to the operation of his third law, might well be regarded
as a contentious proposition.

At one level, Jenkin's work amounts to the fairly simple technical
contribution of representing the Classical analysis of market and
natural price geometrically. In this task Jenkin proved highly
competent, demonstrating that a few simple diagrams can cut through
the vagueness and confusions which often marred literary treatments
of the subject. Whilst, as we have indicated, his distinction of the
comparative static effects of changes in preferences and changes in
external factors does not bear close scrutiny, this is but one
exception to a generally excellent exposition of the Classical
competitive model. And, in particular, his demonstration that the
third law of demand and supply implicitly assumes constant costs
was a tremendously important clarification of the Classical analysis
of natural price.

On the other hand, however, Jenkin's more rigorous exposition of
the Classical analysis is also important for the way it highlights
the inadequacies of the latter. Most important of these is the failure
to underpin the supply curve with a theory of the firm. We have
already noted above that the supply curve is just plucked out of the
air with respect to the theory of market price. In the theory of

---

1. ibid., p. 92.

natural price similarly, the supply curve is taken as given with no
discussion of its derivation from the cost curves of individual
firms.   Clearly, if costs are constant, then, as noted in our discus-
sion of Walras in Chapter 6 above, the individual firm becomes a
nebulous concept. Nevertheless, it is still an object worthy of
study, and even more so if costs are not constant. This failure of
Classical competitive analysis to deal with intra-industry equilibrium
was revealed more clearly by Jenkin's graphical analysis. It was
to be, however, through the work of Marshall that this problem was to
provoke remedial action.

II. William Stanley Jevons.

In this section we shall look at the work of the third member
of the marginal triumvirate: William Stanley Jevons. Jevons published
his highly original work, the Theory of Political Economy in 1871,
and we shall confine our comments to this book.[1] Since it is not
our intention to analyse his treatment of the marginal utility
theory of value, we shall rather select topics from this work which
are of interest as far as competition and monopoly theory are concerned.
The first topic we shall discuss is his concept of the "perfect
market" and its relation to competitive theory. Secondly we shall
briefly touch on Jevons' belief that value theory can be generally
treated by a model of bilateral exchange. And finally we shall
indicate that Jevons, despite his originality in other areas, had a
generally poor conception of competition and monopoly.

Jevons begins his discussion of the theory of exchange with the
market:

"Originally a market was a public place in a town where provisions
and other objects were exposed for sale; but the word has been
generalised, so as to mean any body of persons who are in intimate
business relations and carry on extensive transactions in any
commodity."[2]

For Jevons the major characteristic of a market was the communication
between its members. This comes out clearly in his formal definition
of it:-

"By a market I shall mean two or more persons dealing in two or
more commodities, whose stocks of those commodities and intentions of
exchanging are known to all. It is also essential that the ratio of

---

1. I have used the fourth edition of this book: W.S. Jevons,
The Theory of Political Economy, with notes by H.Stanley Jevons
(London: Macmillan, 1911 (reprinted 1931)). This edition basically
reproduces the second edition (1879).

2. Theory, chapter iv, p. 84. All references are to chapter iv
(Theory of Exchange) unless otherwise specified.

exchange between any two persons should be known to all the others. It is only so far as this community of knowledge extends that the market extends."[1]

Jevons is here imposing three heroic knowledge conditions on his definition of a market. These are that every individual in the market must know: the stock position of every other individual, the subjective valuations of every other individual, and the exchange ratios concluded by every pair of individuals.

On top of these stringent conditions, he also requires that each individual acts alone in his own interest, and that each individual is free to contract with every other individual without favour:-

"Every individual must be considered as exchanging from a pure regard to his own requirements or private interests, and there must be perfectly free competition, so that any one will exchange with any one else for the slightest apparent advantage."[2]

Collectively, Jevons calls these five conditions "a perfect market". If they hold then it is possible to derive his famous "Law of Indifference" which states that

"When a commodity is perfectly uniform or homogeneous in quality, any portion may be indifferently used in place of an equal portion: hence, in the same market, and at the same moment, all portions must be exchanged at the same ratio."[3]

Under the conditions postulated there is no possibility that two prices could exist at the same time for the same commodity.

---

1. ibid., pp. 85-6.

2. ibid., p. 86.

3. ibid., pp. 90-91. The name "law of indifference" for the single price result was added to the second edition of the Theory in 1879.

Jevons goes on to use this law in his theory of value. We shall, however, pause here to investigate the nature of his achievement in deriving it.

Firstly, we must credit Jevons with the most explicit statement in the literature of the conditions which ensure the single price result. We have seen in earlier chapters that the single price theorem was not new to the economic literature. J.S. Mill, for instance, says in his Principles:

"There is no proposition which meets us in the field of political economy oftener than this - that there cannot be two prices in the same market."[1]

But whereas earlier economists paid little attention to the assumptions sufficient for this result to hold, Jevons treated these assumptions explicitly in his notion of "the perfect market".

Secondly, whilst Jevons' assumptions guarantee that the "law of indifference" holds, they may in some sense be regarded as over-sufficient. Clearly if traders have access to each other, act in their own interests, and know perfectly the stock positions, subjective valuations and contracts made by each other, then it is unlikely that a homogeneous commodity will sell at two prices at one time in the market. But just as clearly, the possibility of two prices at one time in the market is not substantially affected if we partially relax the assumption (for example) that each trader has access to all others, or that each trader knows the minds of all others. Jevons was concerned to lay down sufficient conditions for the single price result, and hence his assumptions tended to be stronger than

---

1. J.S. Mill, Principles, pp. 242-3. See chapter 4, section I above.

was perhaps necessary.[1]

It is all the more surprising therefore to find that Jevons believed that "the theoretical conception of a perfect market is more or less completely carried out in practice."[2] The role of brokers he saw as crucial in this, particularly with regard to the knowledge conditions:

"It is the work of brokers in any extensive market to organise exchange, so that every purchase shall be made with the most thorough aquaintence with the conditions of the trade."[3]

Jevons saw social advantage in making markets perfect. If the market was perfect there could be no secret stocks, or conspiracies of suppliers to withold stocks, to force up price. Similarly, speculators could not gain from artificially creating price differentials if all conditions of the market were known. Jevons, therefore, favoured compulsory publication of statistics, a move which would be "to the advantage of everybody except perhaps a few speculators and financiers."[4]

---

1. It is inappropriate to push the mathematical notions of necessary and sufficient conditions too far in this context. It is not possible to define necessary and sufficient conditions for the law of indifference to hold in the same way that such conditions can be defined for a maximising problem, such as profit maximisation. Likewise, necessary and sufficient conditions are not defined for the cost-price law: see chapter 4 above. For further discussion of this point see chapter 1 above.

2. ibid., p. 86.

3. ibid., p. 86.

4. ibid., p. 88.

The most important question for our purposes concerns the relationship between competition and the perfect market in Jevons' Theory of Political Economy. As has been pointed out by Stigler,[1] the concept of a perfect market is largely independent of the price theory which is assumed. A perfect market defines the conditions under which the law of indifference holds, and as long as the price theory under consideration is consistent with these conditions it is quite tenable. Thus, pure competition (in which firms are price-takers), free competition (in which normal profits are earned), and monopoly (in which a single seller sets price) are all consistent with the assumption of a perfect market.[2] Likewise, it is quite conceivable that such theories of price are tenable when a market is less than perfect. As Stigler has emphasised, the merging of the notion of the perfect market with competition, typically treating the former as a subsidiary of the latter, has been an unfortunate development in the work of the successors of Jevons.

The question therefore emerges as to how far Jevons was responsible for this development in his Theory of Political Economy. Stigler clearly believed that Jevons did merge the two notions in his work. This belief, however, appears to be largely founded on Jevons assertion (quoted above) that one of the conditions for a perfect market is that there be "perfectly free competition." Whilst Jevons' use of this phrase is open to interpretation, in my opinion the balance is in favour of the meaning that every trader is free to contract with every other. Thus, given self-interest, "any one will exchange with any one else for the slightest apparent advantage."[3] In other words, Jevons was using competition here in the sense of rivalry, and the requirement was that it should be "perfectly free". It follows from this interpretation that Jevons did not take a competitive market structure as a condition of the perfect market as Stigler believed. Stigler was misled in my opinion by

---

1. Stigler,'Perfect Competition, Historically Contemplated', p. 6.

2. Price discrimination, however, is not consistent with a perfect market since it involves more than one price being charged.

3. See the quotation avove, and Theory, p. 86.

the fortuitous phrase "perfectly free competition" which did not mean for Jevons what it means to modern economics. It may well be that Jevons' successors were similarly misled. But if this is the case then the fusion of competition and the perfect market arose from a misinterpretation of Jevons' words, rather than from such a fusion in Jevons thought itself.[1]

The case for Jevons' separation of the concept of "the perfect market" from competitive theory is further supported if one takes into account his development of his marginal utility theory of value in terms of a model of bilateral exchange. This analysis will be discussed briefly below. The essential point here is that Jevons believed that the principles of exchange were generally applicable to all types of market situation, so that they could be treated generally using a model of bilateral exchange in a perfect market. Jevons preferred to aggregate traders on both sides of the market into trading bodies, and analyse exchange in terms of these trading bodies. Thus, his theory of price cannot be regarded as competitive even if one was to accept that one of his assumptions of the perfect market, was a competitive market structure. But even the latter possibility is not acceptable since he states clearly that trading bodies may consist of single individuals, and yet this does not upset his analysis of exchange in the perfect market. These points further support the conclusion that Jevons did not fuse the ideas of competition and the perfect market in his work.[2]

Having considered Jevons' notion of a perfect market, we shall now move on to consider his views on competition. As noted above, Jevons dealt with exchange in terms of bilateral exchange and this important point largely dictates his rather poor contribution to competitive analysis. Central to this theory of exchange was his concept of "a trading body":

---

1. For Stigler's contrary case, see op. cit., p. 6.

2. Stigler seems to have completely overlooked this aspect of Jevons' theory of value: see op. cit., p. 6.

"I find it necessary to adopt some expression for any number of
people whose aggregate influence in a market, either in the way of
supply or demand, we have to consider. By a trading body I mean,
in the most general manner, any body either of buyers or sellers.
The trading body may be a single individual in one case; it may be the
whole inhabitants of a continent in another..."[1]

Jevons then proceeded to analyse the general case of exchange as the
case in which one trading body confronts another in a market. This
reflected his belief that the marginal utility theory of value
was valid whether there be bilateral or competitive exchange

"the principles of exchange are the same in nature, however
wide or narrow may be the market considered. Every trading body is
either an individual or aggregate of individuals, and the law, in
the case of the aggregate, must depend upon the fulfilment of law
in the individuals."[2]

Given that his analysis was conducted in terms of these trading bodies,
there is little point in asserting that his theory was competitive.[3]

It is not the place here to go into detail on Jevons' analysis
of exchange between two trading bodies. Rather we shall just

---

1. Theory, p. 88.

2. ibid., p. 89.

3. Stigler draws attention to a passage in which Jevons assumes
"a great market" in which "any one small trader will not appreciably
affect the ratio of exchange" (Theory, p. 112; see Stigler, op. cit.,
p. 6). Jevons chooses to analyse this case, however, using his
bilateral competition model, so that it would be wrong to infer that
this reference implies his theory was competitive.

sketch his analysis, in the slightly more general terms employed
by Edgeworth in his demonstration in 1881 that, in fact, price is
indeterminate is this case.[1] In Edgeworth's notation, two trading
bodies X and Y confront each other in a market. Individual X has
a utility function P, whilst Y has a function π, and

$$P = F(x,y) \qquad (8.5)$$

$$\pi = \phi(x,y) \qquad (8.6)$$

where x and y are quantities of two goods consumed. If both
individuals are utility maximisers then <u>one</u> condition of equilibrium
will be

$$\frac{dP}{dx}\frac{d\pi}{dy} = \frac{dP}{dy}\frac{d\pi}{dx} \qquad (8.7)$$

i.e.

$$\left(\frac{MU_x}{MU_y}\right)_x = \left(\frac{MU_x}{MU_y}\right)_y$$

The individuals will exchange such that the ratio of their marginal
utilities of x and y are equal, it not being possible to increase P
without decreasing π ; and vice versa.[2]

Jevons, having arrived at an equivalent formula to (8.7) went
on to suggest that this condition of equilibrium was sufficient
to determine price when taken in conjunction with the law of

1. F.Y. Edgeworth, <u>Mathematical Psychics</u>, (London: C. Kegan Paul
and Co., 1881) pp. 20-30. The treatment which follows, follows
closely that in Mark Blaug, <u>Economic Theory in Retrospect</u>, 2nd edition
(London: Heinemann, 1968) pp. 308-13.

2. Edgeworth, op. cit., pp. 20-1.

indifference.[1] Equation (8.7) defines the situation of equilibrium for the trading bodies given price, and Jevons apparently believed that since, by the Law of Indifference, only one price could exist in the market at one time, this price was thus determined so that the model was complete.[2] As Edgeworth pointed out, however, equation (8.7) was not sufficient to determine price, but rather defined a locus of possible equilibrium positions, which he called the contract curve.[3] This curve he drew for the simple case of Robinson Crusoe (X) buying labour for money from Friday (Y) (see Figure 8.9).

Figure 8.9[4]
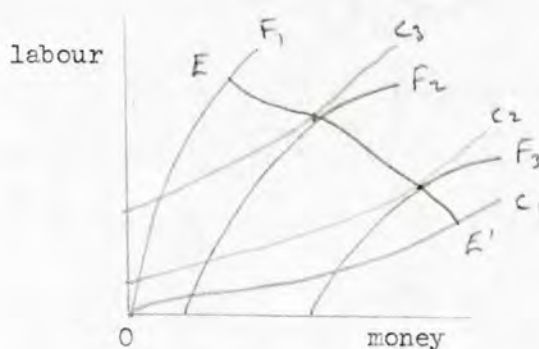
1. Jevons, op. cit., pp. 95-101. Jevons employs slightly less general utility functions, $\phi_1(a-x)+\psi_1(y)$ for individual X, and $\phi_2(x)+\psi_2(b-y)$ for individual Y, where X initially has a stock 'a', and Y a stock 'b', and x is traded for y. Jevons' equilibrium condition is then

$$\frac{\phi_1(a-x)}{\psi_1(y)} = \frac{\phi_2(x)}{\psi_2(b-y)}$$

where ϕ and ψ denote the derivatives of ϕ and ψ .

2. This interpretation appears to be supported in his discussion of the law of indifference (ibid. pp. 90-95) and in particular in his assertion that

"Every... act of indifferent choice gives rise to an equation of degrees of utility, so that in this principle of indifference we have one of the central pivots of the theory". (ibid., p. 92). The actual solution is treated symbolically on pp. 98-100.

3. op. cit., p. 21.

4. ibid., p. 28. Edgeworth only drew the limiting indifference curves F_1 and C_1. I have drawn several others to demonstrate that the contract curve is in fact the locus of tangentcy points of the indifference curves.

In this diagram, F_1, F_2, F_3 represent Friday's indifference curves between labour and money, and his interest is to move as far south-east as possible. Crusoe aims, in contrast, to get onto his highest indifference curve in the north-west direction. The contract curve, EE', is then the locus of tangentcy points which lie between F_1 and C_1, the indifference curves which pass through the origin. Figure 8.9 brings out the fundamental issue for Edgeworth in the case of isolated exchange; the opposition of interests and the consequent indeterminacy of contract.[1]

Jevons' belief that the principles of exchange could generally be represented, regardless of market conditions, by a model of bilateral exchange were thus shown by Edgeworth to be incorrect. It was necessary to introduce conditions to supplement equation 8.7 in order to determine price, and, as Walras had shown, appropriate conditions were the impersonal determination of price by offer and demand in a competitive market.[2] We are thus left with an interesting paradox in Jevons' treatment of value. On the one hand, he stood alone amongst leading nineteenth century economists in not taking competition (in some sense) as his general case, whilst, on the other, his theory of value was only tenable under competitive assumptions. This paradox is but one example of the highly original but flawed nature of Jevons' economic contribution.

Two other aspects of Jevons' analysis bear brief examination. In the first place, we shall consider his discussion of supply and demand. Jevons took the view that his analysis was the basis of the laws of supply and demand.

"Nevertheless, our theory is perfectly consistent with the laws of supply and demand; and if we had the functions of utility determined, it would be possible to throw them into a form clearly expressing the equivalence of supply and demand.... The laws of supply and demand are thus a result of what seems to me the true

---

1. Edgeworth's work will be considered further in the next section of this chapter.

2. See above, chapter 6.

theory of value or exchange."[1]

Jevons, unlike Walras, however, did not convert this plan into action, and neither a demand nor an offer curve appears in his Theory of Political Economy. Moreover, there is evidence to support the contention that Jevons only had a vague comprehension of supply and demand analysis, using these terms loosely to represent "market conditions". Thus, for example, when Jevons says

"A market, then, is theoretically perfect only when all traders have perfect knowledge of the conditions of supply and demand",[2]

he is not postulating that supply and demand curves are known, but simply that the stock positions and subjective valuations of the traders are known. Similar quotations can be found elsewhere in his book, but in each case a similar interpretation seems appropriate.[3] Thus it appears that Jevons treatment of supply and demand was only superficial in the Theory, and clearly he did not add anything to the existing analysis of this topic.[4]

---

1. op. cit., p. 101. Immediately prior to this passage he suggests that J.S. Mill's treatment of supply and demand reduces to a truism. This criticism is unjust, and as we shall see Jevons' conception of supply and demand was inferior to Mill's.

2. ibid., p. 87.

3. See, for example, his comment that "each broker strives to gain the best knowledge of the conditions of supply and demand" (ibid., p. 86). See also: ibid., pp. 108-11.

4. This is surprising since Jevons claims to have read Jenkin's Graphic Representation prior to 1871, (see ibid., Preface to the 4th edition, p. lvii) and indeed says that the appearance of this work encouraged him to publish the Theory as early as 1871. Jevons was clearly more impressed with the mathematical form of Jenkin's work than its content, since he did not incorporate Jenkin's analysis into the Theory, or even demonstrate a clear grasp of it. For a better treatment of supply and demand, however, see Jevons posthumous Principles of Economics (London: Macmillan, 1905).

So far our discussion has centred on exchange, to the complete neglect of cost of production. Jevons, in fact, made a point of dealing with exchange prior to any discussion of "labour or the production of commodities."[1] Since his book was an attack on Ricardo's assertion that labour is the "cause" of value, he demonstrates that utility "causes" value prior to discussing production. However, at the end of his chapter on exchange he does consider production. He adopts an extreme position on costs at first, arguing that

"labour once spent has no influence on the future value of any article: it is gone and lost forever. In commerce bygones are forever bygones; and we are always starting clear at each moment, judging the values of things with a view to future utility."[2]

This is a very immediate view of price, saying that price may be above or below average cost, and that cost has no influence on price since it has already been incurred.

Jevons did, however, admit a role of cost of production, if a slightly less narrow view is taken. Since, in his theory, marginal utility determines value given the commodity supply, it is through variations in this latter that cost of production plays a role. Jevons, however, did not explicitly consider the relationship between production, costs and supply. Rather, as noted by Blaug,[3] he only suggested a rather naive chain of causation:-

"Cost of production determines supply;
Supply determines final degree of utility;
Final degree of utility determines value."[4]

And from this naive catena, he drew the equally superficial conclusion

---

1. Theory, pp. 75-6
2. ibid., p. 164.
3. Mark Blaug, Economic Theory in Retrospect, pp. 312-3.
4. Theory, p. 165.

that

"though labour is never the cause of value, it is in a large
proportion of cases the determining circumstance."[1]

In the absence of a theory of production, statements such as
these cannot be endowed with meaning. Jevons' treatment of costs,
as with his treatment of supply and demand, was poor, particularly
compared with the achievement of that other member of the Marginal
Triumvirate, Walras.[2]

Finally, if Jevons' contribution to competitive analysis was
poor, his contribution to the analysis of monopoly was practically
non-existent. This is perhaps not surprising given that he thought
the bilateral exchange model was generally applicable to value theory.
He does, however, mention monopoly in his Preface to the 2nd edition
of 1879, but only as another name for property:

"In theory the labourer has a monopoly of labour of each particular
kind, as much as the landowner of land, and the capitalist of other
requisite articles. Property is only another name for monopoly.
But when different persons own property of exactly the same kind,
they become subject to the important Law of Indifference...Thus,
monopoly is limited by competition, and no owner, whether of labour,
land, or capital, can, theoretically speaking, obtain a larger share
of produce for it than what other owners of exactly the same kind
of property are willing to accept."[3]

By saying monopoly is limited by competition, Jevons only means to say
that the power of property rights are limited in the market by the
condition of a single price. His view of monopoly as property
demonstrates his poor conception of the case, and as for analysis

---

1. ibid., p. 165.

2. See chapter 6 above.

3. Theory Preface to the 2nd Edition, pp. xlvi - xlvii.

there is none.[1]

In conclusion, therefore, we learn very little about competition and monopoly from Jevons' Theory of Political Economy. Monopoly for him is but another name for property. As far as competitive theory is concerned, production is not adequately treated, whilst Jevons does not treat exchange in terms of a properly formulated law of supply and demand. Moreover, his belief that the principles of exchange could be treated by means of a model of bilateral exchange, leads us to the conclusion that he was not concerned specifically with competition. Rather he felt that the same principles were operative in all markets regardless of what we would call "market structure." Whilst Jevons' work was, therefore, evidently original, his contribution for our purposes was limited to his explicit treatment of the concept of the perfect market. In this treatment, his work was of an important clarificatory nature, and he does not seem to be guilty of the charge of confusion of the ideas of perfect competition and the perfect market. Such a confusion seems to have arisen early in subsequent work, however, and one illustration of this will be given in the next section by the work of Edgeworth.[2]

---

1. Jevons poor performance with respect to monopoly is surprising in that he cites Lardner's Railway Economy, which he was acquainted with as early as 1857, as the major influence on him in forming the idea of "investigating Economics mathematically" (ibid., Preface to the 2nd Edition, p. xviii). Lardner presents in his chapter xiii (cited by Jevons) a geometrical treatment of Cournot-type monopoly. Jevons presumably did not understand the content of Lardner's contribution (as he presumably did not understand Jenkin's treatment of supply and demand; see above) in that he refers to this chapter as representing "the Laws of Supply and Demand treated mathematically" (ibid., p. xviii).

2. That there was confusion over these concepts was not surprising given, for example, the varied use of the phrase "perfect competition" referred to in the introduction to this chapter. The use of Edgeworth's work to illustrate this confusion should not be taken as evidence that he was particularly at fault; indeed his work is characterised by less vagueness and confusion than most over the competitive idea.

III. Francis Ysidro Edgeworth

In this section we shall look at the work of F.Y. Edgeworth. Edgeworth made valuable original contributions to both the analysis of competition and monopoly and we shall take these in turn.

Firstly for his discussion of competition we shall refer exclusively to his enigmatic Mathematical Psychics, published in 1881.[1] This book, as Stigler has noted, is "probably the most elusively written book of importance in the history of economics".[2] In the economic section of it, entitled 'Economical Calculus', Edgeworth employs the Differential Calculus to examine exchange in a Jevonian framework. Whilst, as we shall see, Edgeworth does not explicitly analyse the competitive case, he does offer valuable comments on it. Our discussion will centre around, firstly, his concept of "the perfect field of competition", and secondly, his schema for the analysis of price.

Stigler begins his discussion of Edgeworth by saying that he "was the first to attempt a systematic and rigorous definition of perfect competition".[3] Many writers, of course, gave partial descriptions of the situation they were conceiving of when talking of competition. Edgeworth was concerned to proceed scientifically and so he attempted to make explicit the foundations of his analysis.[4]

---

1. F.Y. Edgeworth, Mathematical Psychics. An Essay on the Application of Mathematics to the Moral Sciences (London: Kegan Paul and Co., 1881)

2. Stigler, "Perfect Competition, Historically Contemplated", pp. 6-7. For Stigler's views on Edgeworth's competitive analysis see ibid., pp. 6-9.

3. ibid., p. 6.

4. Mathematical Psychics, pp. 16-19.

He begins by defining "the field of competition":

"The field of competition with reference to a contract, or contracts, under consideration consists of all the individuals who are willing and able to recontract about the articles under consideration."[1]

In the case of an auction, the field is continually narrowed, until it vanishes, when the contract is made. In general, however, "the field continues indefinitely large" in a "market consisting of an indefinite number of dealers" until equilibrium is determined. Secondly,

"There is free communication throughout a normal competitive field. You might suppose the constituent individuals collected at a point, or connected by telephones - an ideal supposition, but sufficiently approximate to existence or tendency for the purposes of abstract science."[2]

These two definitions, combined with

"the first principle of Economics.... that every agent is actuated only by self-interest"[3]

provide the basis for the introduction of the key concept, as far as we are concerned, of "a perfect field of competition". It is this concept which Edgeworth took as synonymous with perfect competition.[4] He distinguishes two pairs of conditions defining a perfect

---

1. ibid., p. 17.   2.   ibid., p. 18.

3. ibid., p. 16.

4. Edgeworth does not use the phrase "perfect competition" in these pages of definition (ibid., pp. 16-19). However, in several places elsewhere in the book, he uses the phrase and refers back to these pages for its definition (see, for example, ibid., p. 33 and index). We shall discuss the substantive implications of this semantic interchangeability below.

field:

"the first pair referrable to the heading <u>multiplicity</u> or continuity, the second to <u>dividedness</u> or fluidity."[1]

Consider first, the multiplicity conditions:-

"I. Any individual is free to <u>recontract</u> with any out of an indefinite number, ...
    II. Any individual is free to <u>contract</u> (at the same time) with an indefinite number;"[2]

These conditions state that, not only does an individual X have equal access to all other individuals in the field, but also that he has freedom to recontract and contract with whom he pleases. Perhaps more important, they implicitly assume that there are an indefinite number of buyers and sellers within the field of competition. Also, as Edgeworth notes, they imply "the indefinite divisibility of each <u>article</u>" since "if any X deal with an indefinite number of Ys he must give each an indefinitely small portion of X."[3] The second pair of conditions, the dividedness conditions,

---

1. Edgeworth is concerned with these conditions to draw an analogy with physics, and to so define his concepts as to allow the application of the calculus:
    "A <u>perfect</u> field of competition prefesses in addition certain properties peculiarly favourable to mathematical calculation; namely, a certain indefinite <u>multiplicity</u> and <u>dividedness</u>, analogous to that <u>infinity</u> and <u>infinitesimality</u> which facilitates so large a portion of Mathematical Physics (consider the theory of Atoms, and all applications of the Differential Calculus)." (ibid., p. 18).

2. ibid., p. 18.

3. ibid., p. 19.

are:-

    "III. Any individual is free to <u>recontract</u> with another inde-
pendently of, <u>without the consent</u> being required of, any third
party, ...
    IV. Any individual is free to <u>contract</u> with another independently
of a third party;"[1]

These conditions make the additional assumption that each individual,
as well as acting in his own interests, acts independently.

    Setting aside Edgeworth's peculiar exposition of his assumptions,
it is useful to compare them to those made by Jevons in his definition
of the "perfect market". Edgeworth's "perfect field of competition"
requires at least five conditions:-

    1) individuals follow their own interest,
    2) they act independently,
    3) they have equal access to all other individuals,
    4) they are free to contract and recontract as they please, and
    5) there are large numbers of buyers and sellers.

On the other hand, Jevons' perfect market may be represented as
involving

    1) individuals possessing perfect knowledge of all stocks,
subjective valuations, and exchange ratios in the market,
    2) individuals acting in their own interests,
    3) individuals having equal access to all other individuals, and
    4) individuals being free to contract as they please.

    It is clear from the above lists of conditions that Edgeworth,
although undoubtedly starting from Jevons' "perfect market",
arrived at a definition of the perfect field of competition which
differed from that of the perfect market. In particular, two
differences stand out. In the first place, Edgeworth made no mention
of the market knowledge conditions that were so central to Jevons'

---

1. ibid., p. 19.

concept. Likewise Jevons' "law of indifference" which relies on these conditions is not given such a central role by Edgeworth, who, as we shall see, developed his analysis along a different path from Jevons.[1] Secondly, Edgeworth assumes that there are large numbers of buyers and sellers in a perfect field of competition, a condition which, as we have seen, is independent of the perfect market idea, and which, moreover, was not assumed by Jevons. It is this assumption that makes Edgeworth's notion of the perfect field of competition a different one from that of the perfect market. At the same time, however, Edgeworth's use of the terms "perfect market" and "perfect competition" as alternatives to the "perfect field of competition" demonstrates his imprecision over these ideas; an imprecision which was a feature of the literature in the late 19th and early 20th centuries.[2]

As to Stigler's assertion that Edgeworth was the first to attempt a systematic and rigorous definition of perfect competition, we must be sceptical. Certainly Edgeworth aimed at rigour, and moreover, was concerned with what he called "perfect competition". But his "rigorous definition" was limited to the case of pure exchange, and, was only concerned to define the environment within which exchange took place. In this narrow context his definitions are important for their explicitness, if not for their ease of comprehension. In particular, his assumption of many traders is indicative of a growing awareness that such an assumption was bound up with the competitive case. But at the same time there is no mention of costs and production

---

1. Edgeworth does however accept that there will be only one price in the market later in his argument. See ibid., p. 35.
2. We have already noted Edgeworth's use of "perfect competition" as synonymous with the "perfect field of competition". He refers to the competitive case as involving "contract determined by competition in a perfect market" (ibid., p. vi), or, again, envisages the number of traders being increased until we reach "the limiting case of a perfect market" (ibid., p. 42). Clearly the perfect market was synonymous in his mind with both the perfect field of competition and perfect competition.

in his definition, and so no reference to the equilibrium of the firm
nor inter-industry equilibrium under perfect competition. In the
absence of such considerations, it is not possible to support the
view that Edgeworth attempted to provide a rigorous definition of
perfect competition, in the modern sense of this phrase.[1]

Having defined the perfect field of competition, Edgeworth moves
on to tackle the problem of "how far contract is indeterminate".[2]
His general answer to this problem is

"(α) Contract without competition is indeterminate, (β) Contract
with perfect competition is perfectly determinate, (γ) Contract
with more or less perfect competition is less or more indeterminate."[3]

This problem of determinateness and Edgeworth's solution to it, give
rise to a three-fold division of price theory in the Mathematical
Psychics: of bilateral exchange, competitive exchange and imperfect
competition. Whilst not going into the details of Edgeworth's
analysis, we shall consider a number of points of interest in this
schema for our study of the development of competitive theory.

The first point to note is that Edgeworth took the highly
original position that market structures could be distinguished on
the basis of the determinacy of contract. As was noted in the
previous section of this chapter, Edgeworth proved that contract is
indeterminate in the case of isolated exchange, there being an
indefinite number of possible final settlements along the contract
curve. If we were now to increase the number of buyers to two, and,
similarly, the number of sellers, Edgeworth goes on to show that the

---

1. Stigler examines Edgeworth's definitions in terms of necessary
and sufficient conditions for competitive exchange (op. cit., pp. 6-9).
Given this restricted sense his discussion is useful, if a little
hair-splitting at times.

2. This problem takes up the rest of his economic discussion:
Mathematical Psychics, pp. 20-56.

3. ibid., p. 20.

length of the contract curve would be reduced. He, therefore,
postulates that as the number of traders is increased indefinitely,
the contract curve shrinks to a point. Thus, in the limit, we have
perfect competition with a determinate price. The problem of
indeterminacy of contract had been recognised by earlier writers, and
in particular by Turgot,[1] but Edgeworth was the first to explicitly
base a price schema upon it. That nobody took up his suggestion
that indeterminacy should be the basis of distinguishing the cases
of price theory, must be in large part attributed to the extreme
complexity of his argument in the Mathematic Psychics.[2]

Edgeworth's proof that increases in the number of traders
reduces the indeterminacy of contract starts from the case of
isolated exchange between Robinson Crusoe, X, and Friday, Y.[3] He
then introduces a second X and a second Y, assuming at the outset
that the new X has an identical utility function to the first, and
similarly for the Ys. Consider Figure 8.10.

Figure 8.10
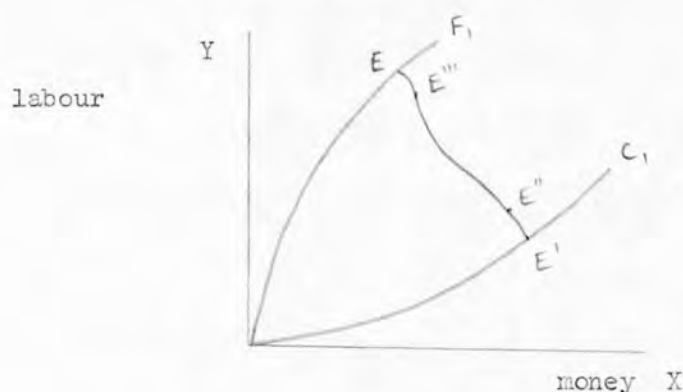
Ostensibly the case is not changed from isolated exchange. The
final price must lie on the contract curve, EE', between the Ys'

---

1. Turgot expressed the point by saying that under bilateral
exchange no price is "le prix veritable" whilst under competitive
conditions a current price is accepted by all. See section IV,
Chapter 2 above.

2. In addition, as we shall see, Edgeworth's handling of the inter-
mediate case of imperfect competition can be criticised.

3. op. cit., pp. 34-42.

lowest indifference curve, F_1, and the Xs' lowest indifference curve, C_1. However, Edgeworth argues that if the price was, say, in the neighbourhood of E' then

"it will in general be possible for one of the Ys (without the consent of the other) to recontract with the two Xs, so that for all those three parties the recontract is more advantageous than the previously existing contract"[1]

The other Y, however, not wishing to be left in the cold, will make the Xs a better offer. Competition between the Ys will follow, until it is not possible for one to gain by making a separate offer to the Xs. At this point we have a new limit to the contract curve at E", such that the possible maximum gain for the two Ys is less than that for the single Y in isolated exchange.

A similar argument being used concerning position E at the other end of the contract curve, the net result of introducing more traders is to shorten the curve. In the limit, therefore, with indefinite numbers of traders, the contract curve is restricted to a point, and we have perfect competition. As has been noted by Stigler,[2] Edgeworth's argument relies on an assumption regarding the competitive behaviour of traders which may be difficult to support. This is that in the neighbourhood of E', say, the Ys will consistently engage in price competition when they know the result will be self-defeating. Such a position would be hard to defend. However, given that bargaining will determine price, it may be possible to argue that the bargain will be in the range E" to E''', since no party will want to go outside this range given the uncertainty that this will create. In such an argument the possibility of collusion would of course have to be excluded. Whilst it does appear possible to recast Edgeworth's analysis in a more acceptable form, such an endeavour would take us well beyond the scope of this thesis.

Instead we shall make a more general point concerning Edgeworth's

---

1. ibid., p. 35.   2.   op. cit., pp. 7-8.

analysis of imperfect competition. Edgeworth argues that his analysis concerning the indeterminateness of imperfect competition does not only apply to the case of a limited number of traders. In fact he identifies four imperfections:-[1]

1) limitation of numbers

2) restrictions on contract such that "each Y can deal at the same time with only n Xs."

3) combinations of Xs into groups, "there being n Xs in each X combination"; and similarly for the Ys.

4) restrictions on contract such that "to every contract made by a Y at least n Xs must be parties".

These imperfections counter the essential assumptions of the perfect field of competition: that there be many traders (imperfection 1); that they be independent (imperfection 3); and that there be freedom of contract (imperfections 2 and 4). Edgeworth asserts that in each such case we have a situation analogous to the case of the first imperfection (limitation of numbers) and contract will be less or more indeterminate. It follows that price is only determinate when no such imperfections exist.

As was noted at the outset, Edgeworth does not explicitly analyse the case of "perfect competition", or "pure Catallactics" as he also calls it, in the Mathematical Psychics.[2]. Rather his concern was "to inquire how far contract is determinate in cases of imperfect competition". For the case of perfect competition he

---

1. Mathematical Psychics, pp. 34-50. Each of these imperfections has the effect of limiting the number of independent parties subject to an exchange, and hence his analysis concerning the length of the contract curve applies to them by analogy.

2. The term Catallactics appears to have been first proposed by Archbishop Whately: see Schumpeter, History of Economic Analysis, p. 536n. Whately proposed that the term be used to refer to economic theory, whilst Edgeworth restricts it to the perfect competition case.

refers the reader to the analyses of other writers:-

"That contract in a state of perfect competition is determined by demand and supply is generally accepted, but it is hardly to be fully understood without mathematics. The mathematics of a perfect market have been worked out by several eminent writers, in particular Messrs. Jevons,[1] Marshall, Walras; to whose varied cultivation of the mathematical science, Catallactics, the reader is referred who wishes to dig down to the root of first principles, to trace out all of the branches of a complete system, to gather fruits rare and only to be reached by a mathematical substructure".[2]

Edgeworth only provides a commentary on the work of these writers, and in particular Walras, and makes no points of interest for our purposes as far as analysis is concerned.

He does, however, (and this will be our final point before turning to Edgeworth's analysis of monopoly) draw an important practical conclusion from his analysis. The advantage in Edgeworth's opinion of perfect over imperfect competition is that the deadlock of indeterminacy, and "the accessory evil... greater than in a full market, towards dissimulation and objectionable arts of higgling",[3] are replaced by "the smooth machinery of the open market":-

---

1. We have seen in the last section that Jevons dealt with the bilateral, rather than competitive, exchange case. Edgeworth, who had great respect for Jevons, was charitable in his interpretation of the latter's work in this respect:-

"It must be carefully remembered that Professor Jevons's Formulae of Exchange apply not to bare individuals, an isolated couple, but.. to individuals clothed with the properties of a market, a typical couple" (op. cit., p. 31, n. See also p. 39 and Appendix V).

2. ibid., p. 30. Edgeworth's reference to Marshall presumably refers to his Pure Theory of Foreign Trade and Pure Theory of Domestic Values which was privately circulated in 1879.

3. ibid., pp. 29-30.

"You might suppose each dealer to write down his <u>demand</u>, how much
of an article he would take at each price, without attempting to
conceal his requirements; and these data having been furnished to
a sort of market-machine, the <u>price</u> to be passionlessly evaluated."[1]

The existence and growth of trades unions and co-operative associations
in the late 19th century, Edgeworth felt, led to market imperfection,
which, if anything, was increasing.[2] The consequence of this was

"to impair, it may be conjectured, the reverence paid to
<u>competition</u>; in whose results - as if worked out by a play of physical
forces, impersonal, impartial - economists have complacently
acquiesced. Of justice and humanity there was no pretence; but there
seemed to command the majestic neutrality of Nature. But if it should
appear that the field of competition is deficient in that <u>continuity</u>
<u>of fluid</u>, that <u>multiety of atoms</u> which constitute the foundations of
the uniformities of Physics; if competition is found wanting,
not only the regularity of law, but even the impartiality of chance -
the throw of a die loaded with villainy - economics would be indeed
a 'dismal science', and the reverence for competition would be no
more."[3]

These words were a harbinger of the debate over imperfect competition
which was to occur in the 1920s and 1930s in England. Whilst
Edgeworth's notion of imperfect competition was different from that
of Joan Robinson, both saw that the rise of real World imperfections
brought into question the reliance of economists on perfect competition
theory, and its supposed normative properties. Edgeworth's work on
imperfect competition and indeterminacy of contract can be regarded

---

1. ibid., p. 30.

2. ibid., p. 50.

3. ibid., p. 50. Edgeworth felt that this problem of indeterminacy
gave rise to the need for a principle of arbitration, and the rest of
his book is concerned with formulating such a principle.

as an early attempt to go beyond the usual analysis of the competitive case, and even today the importance of his work in this field has perhaps not been fully appreciated.[1]

1. Edgeworth, of course, also made important contributions to the analysis of oligopoly which are beyond the scope of this thesis. Oligopoly analysis was regarded, partly due to Edgeworth's work, as a field on its own, and not as a general alternative to competitive analysis, as imperfect competition theory was to be.

321.

In contrast to his highly original treatment of competition
theory, Edgeworth's contribution to monopoly analysis was the more
limited one of extending the analysis presented by Cournot in his
Recherches. This work was carried out with more or less completeness
at a number of places in articles published between 1897 and the
First World War.[1] In the remainder of this section we shall draw

---

1. These papers are reprinted in F.Y. Edgeworth, Papers Relating to
Political Economy, 3 vols. (London: Macmillan, 1925). Edgeworth's
analysis of monopoly is difficult to discuss because of its
scattered and non-unified treatment. (The problem is compounded
by Edgeworth's peculiar writing style, wherein important contributions
are found buried beneath a mixture of Classical quotations, extended
metaphors and terse mathematics). It may be useful, at the outset, to
distinguish the most important articles in what follows, together with
their shortened names:-

I.   'The Pure Theory of Monopoly', translated from Giornale
degli Economisti, 1897. ('Pure Theory' (1897)).

II.   'Professor Seligman on the Mathematical Method in Political
Economy', Economic Journal, 1897. ('Professor Seligman' (1897)).

III. 'The Pure Theory of Taxation', Economic Journal, 1897.
('Taxation' (1897)).

IV.   'Contributions to the Theory of Railway Rates', Economic
Journal, 1912. ('Railway Rates' (1912)).

These articles will all be found in Papers and references are to these
volumes unless otherwise specified in the remainder of this chapter.

together some of these extensions in order to highlight Edgeworth's importance in the development of monopoly analysis. Where Edgeworth has only reproduced results due to Cournot or Marshall, we shall pass on quickly.[1] In addition, no attempt will be made to cover Edgeworth's many important contributions to the analysis of multi-product monopoly, duopoly and price discrimination.[2]

Edgeworth starts his analysis of monopoly directly from the work of Cournot. At one point he writes:

"The classical economists rather anathematised than analysed monopoly. It was reserved for Cournot to cultivate this neglected branch of economics; gathering the first fruits of the mathematical method."[3]

His definition of monopoly, therefore is of Cournot's single seller:-

"I understand by a monopolist an individual or a combination, having the sole control of an article of exchange, and dealing with it solely in the interest of the monopolist. I agree with Professor Walras in thinking that much confusion has been caused by extending

---

1. As we shall see in the next chapter, Marshall's extensions of Cournot's monopoly analysis clearly pre-date those of Edgeworth. We have decided to treat Edgeworth in this chapter because of the historical position of his analysis of competition in Mathematical Psychics vis-a-vis, in particular, Jevons. With regard to monopoly, no great problem of precedence is caused by dealing with Edgeworth before Marshall.

2. This is, of course, to play down the importance of Edgeworth's contribution to price theory, particularly since the work of Cournot left little scope for further development of the simple case of the single seller. As we shall see, however, Edgeworth was able to offer a number of extensions to Cournot's analysis.

3. 'Railway Rates' (1912), Papers, vol. I, p. 172.

the term to cases in which a commodity absolutely limited, such as land of a certain sort, is in the hands of a plurality of uncombined possessors."[1]

The problem of the equilibrium of a monopolist was as we have seen correctly formulated and solved by Cournot. We shall consider here two of Edgeworth's extensions of this analysis: the first suggesting possible alternative interpretations of the problem, and the second presenting a geometric representation of equilibrium. Firstly,[2] consider the equation

$$V = p. D - \phi(D) \qquad (8.8)$$

If we define p as price, $D = F(p)$ as demand and $\phi(D)$ as money cost, then V is money net revenue which the monopolist will maximise. However, suppose we define $\phi(D)$ as a measure of the monopolist's real cost: "the pecuniary equivalent of the efforts and sacrifices incurred by him in the production".[3] On this interpretation, V would measure in money terms the monopolist's real net gains, and the monopolist's behaviour might then be taken as the maximisation of these latter. Conversely, if $D = F(p)$ represents supply and $\phi(D)$ a money measure of total utility then, reversing the signs, V could be interpreted as a measure of the net utility of "a monopolist consumer who deals with producers competing against each other."[4] Thus, equation (8.8) may be interpreted as representing the case of a monopoly buyer or a monopoly seller. It follows that all the comparative static results derived by Cournot with respect to monopoly can, with suitable interpretation, be applied to either case.

Edgeworth, in fact, considers the effects of specific and ad valorem taxes on monopoly equilibrium taking into account his interpretations of V.[5] We shall, however, confine ourselves here

---

1. 'Taxation' (1897), Papers, vol. II, pp. 64-5n. For Walras's views on monopoly, see chapter 6 above.

2. 'Pure Theory' (1897), Papers, vol. I, pp. 112-116.

3. ibid., p. 112.   4.   ibid., p. 112.

5. ibid., pp. 112-116. We shall examine the comparative statics of monopoly more closely below.

to a brief comment on his suggested interpretations. The first
point to note is that Edgeworth was aiming at more generality in
his interpretations of equation (8.8). The monopolist is not concerned
with money costs or money returns, but rather with a money measure
of total costs or total returns. Whilst money costs and returns might
presumably be a part, they would not be the whole of the losses or
gains (respectively) in the monopolist's objective function. In the
limiting case, a consumer, say, would get all his benefits in a non-
monetary form, yet the analysis is still applicable given Edgeworth's
interpretations of equation (8.8). Secondly, Edgeworth was able to
treat the monopoly buyer and seller symmetrically on his interpreta-
tions, so that the analysis could be applied to any "single monopolist
dealing with a group (or groups) of individuals competing against
each other".[1] This too may be regarded as a generalisation of the
analysis, although it is not necessary to take Edgeworth's wider
view of costs and returns to achieve this symmetry.[2]

Any appraisal of Edgeworth's equation (8.8) must centre around
his treatment of the term $\phi(D)$. Clearly, for the equation to have
any meaning, this term must be measured in monetary units. In the
case of a monopoly seller it is a money measure of sacrifice or
effort (disutility), whilst for a monopoly buyer it is a money measure
of total utility. In either case, Edgeworth is implicitly assuming
in forming this variable that not only is utility measurable, but
also that some monetary measure can be attached to it. This latter
assumption in particular gives rise to conceptual problems, not
least when the first assumption, that utility is measurable, is
rejected.[3] Further, given such problems, it appears difficult to
conceive of a practical measure of $\phi(D)$ which would make Edgeworth's
interpretations of equation (8.8) operational. Edgeworth did not

1. ibid., p. 112.

2. That is, symmetry can be attained by simply using the conventional
interpretations of money costs and returns.

3. Edgeworth, of course, believed strongly that utility could be
measured: see Mathematical Psychics, passim.

address himself to these problems in his later work and it may well
be that he himself decided that this line of attack was not worth
pursuing.

Edgeworth's other contribution to the analysis of monopoly
equilibrium, a geometrical representation, was more conventional.
Whilst Cournot represented equilibrium geometrically in the zero cost
case, and Marshall, as we shall see, used average curves to depict
monopoly equilibrium, Edgeworth drew total curves i.e. he directly
represented equation (8.8), interpreted in the usual sense.[1] Assume
initially that marginal cost is constant, so that total cost is a
straight line (curve I of Figure 8.11). Then

"the position of maximum advantage to the monopolist is where
the difference between the gross receipts and the total cost is a
maximum: that is, at a point where the tangent to the cost curve is
parallel to the tangent at the corresponding point of the gross
receipts curve".[2]

In figure (8.11) such a point is at output rate Oa, whilst the second
order condition requires total revenue to be concave from below.
The possibilities of increasing and decreasing marginal costs are
then represented by curves II and III (respectively), drawn tangential
to curve I at point b, the equilibrium output being maintained at
output rate Oa.

---

1. 'Professor Seligman' (1897), Papers, vol. I, pp. 154-5. Edgeworth
also represented equilibrium as the maximum point of a net revenue
curve: see 'Professor Graziani on the Mathematical Theory of
Monopoly', Papers, vol. III, p. 92. Marshall also drew the net
revenue curve: see chapter 9 below.

2. ibid., p. 154.

Figure 8.11

revenue and cost
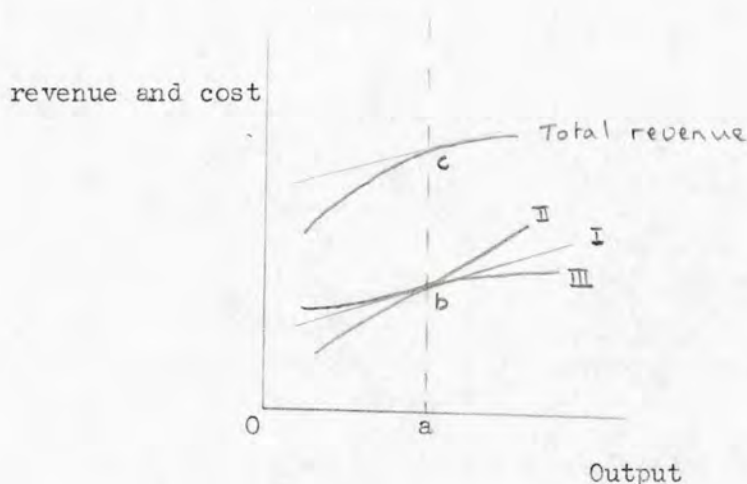
Clearly the geometry of figure (8.11) is a straight representation of equation (8.8). Whilst trivial to Edgeworth, who generally favoured algebra to geometry, it nevertheless marks an original contribution which may have contributed to the understanding of Cournot's analysis for non-mathematical economists.[1]

Edgeworth made use of this geometric representation to demonstrate to the non-mathematical Professor Seligman the comparative static effects of a specific tax on monopoly equilibrium.[2] Cournot, as we have seen, had already demonstrated that such a tax would raise price and lower output in the usual case.[3] Suppose we denote "an indefinitely small tax or addition to taxation" by $\Delta\tau$. Then Cournot's result may be represented as:-

$$\frac{\Delta p}{\Delta \tau} = \frac{e}{2e + c'e^2 + e'(p-c)} \qquad (8.9)$$

where p is price, c is marginal cost, and e, which Edgeworth terms

---

1. Edgeworth's purpose in using this diagram was indeed to get over to Professor Seligman his analysis of the effect of a tax on monopoly.

2. 'Professor Seligman' (1897), Papers, vol. I, pp. 143-171. The book referred to in this article is Seligman's Shifting and Incidence: see Edgeworth's preface to the article, ibid., p. 143.

3. Recherches, pp. 61-6; 71-3. See chapter 5 above.

"elasticity", is the slope of the demand curve (the negative of Cournot's F'(p)).[1] The denominator of this expression is positive by the second order conditions,[2] so the whole expression is positive and the tax causes price to rise. Edgeworth in response to Seligman's confusion over the effect of the law of costs on this result, extracted the additional conclusion that as the slope of marginal cost becomes more positive, the rise in price becomes less.[3] This result is clear from inspection of equation (8.9): as c' becomes more positive, the denominator increases, reducing the rise in price. Referring to Professor Seligman's analysis, Edgeworth goes on:

"A particular case of this proposition is that the rise of price is likely to be greater when c' is negative than when c' is positive: in other words, higher when the law of increasing, than when the law of diminishing, returns prevails."[4]

The law of cost thus affects the magnitude of the price response but not its direction. This result, implicit in Cournot's

---

1. Edgeworth, op. cit., p. 167. Cournot's expression appears in Recherches, p. 63.

2. Or rather the negative of the denominator is negative by the second order conditions.

3. Edgeworth notes that Professor Seligman probably had in mind average rather than marginal costs when he spoke of increasing and decreasing costs. Whilst his argument is carried on in terms of marginal costs, Edgeworth also demonstrates that Seligman is incorrect even on his own terms. See Edgeworth, op. cit., pp. 151-7.

4. Edgeworth, op. cit., p. 168.

mathematics, was brought out into the open by Edgeworth.[1]

Edgeworth's diagrammatic representation of the result is reproduced in Figure 8.12.

Figure 8.12
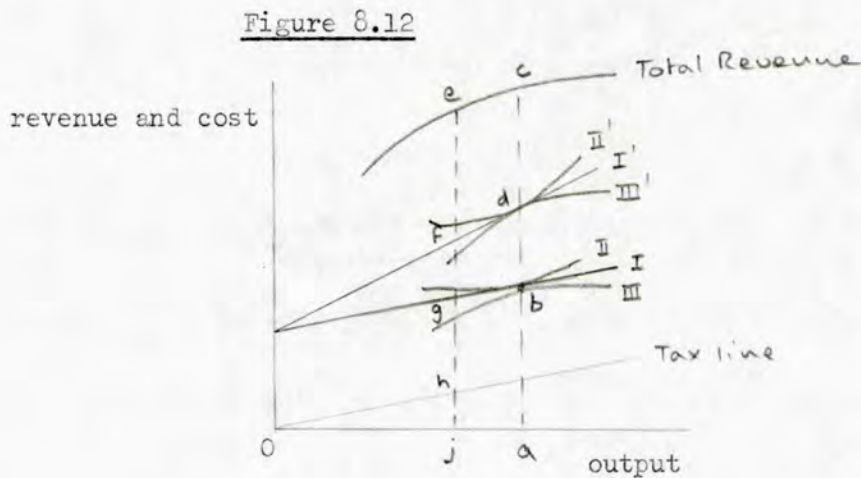
In this figure, the specific tax is represented by a straight line from the origin, such that at any output rate, Oj, the total tax paid is given by the perpendicular to the curve, hj. This perpendicular distance is added to each of the cost curves to give post-tax costs. These cost curves retain their respective shapes and remain tangential at output Oa. Now consider the constant marginal cost case (curve I'). The effect of the tax is to increase its slope at output Oa. It follows that, given the shape of the total revenue curve, curve I' is only parallel to a tangent to the total revenue

---

1. Edgeworth did admit that the tax might not raise price in two special cases: "(1) where it is not in the power of the monopolist to increase or limit his output at will; (2) where the monopolist is a sole buyer, and the supply of the article bought is perfectly inelastic". (ibid., pp. 161-5. See also 'Pure Theory' (1897), Papers vol. I, p. 113 and 'Taxation' (1897), Papers, vol. II, pp. 90-1). Edgeworth dismisses the case where price is unchanged because it is not a continuous variable, regarding this case as a friction not to be dealt with by pure theory. (ibid., pp. 162-5).

curve at a lower output level, Oj. The effect of the tax is thus
to reduce output and increase price with constant marginal costs.
With increasing marginal costs (curve II') output must be below Oa
also, since the slopes of curves I' and II' are the same at this
output rate. But since curve II' is convex from below, equilibrium
will be reached at a higher output than Oj. Conversely, for
decreasing marginal costs (curve III') output will fall below Oj,
and the rise in price will be correspondingly larger. Thus Edgeworth
was able to succinctly represent the effect of the law of costs on
monopoly equilibrium subject to a specific tax. This demonstration,
whilst lacking the generality of algebra, is important for the insight
it gives into the meaning of Cournot's algebraic result.

We shall not recount all of Edgeworth's theorems concerning the
effects of various taxes and restrictions on monopoly equilibrium.
Taken as a whole they represent a filling in of the minor gaps in
Cournot's analysis of taxation and monopoly.[1] One point does deserve
mention, however. This was Edgeworth's use of the concept of prob-
ability in his mathematical analysis.[2] When faced with a result which
could not be signed, he was always prepared to argue a presumption
for a particular result taken in an average of cases. This tendency
can be illustrated with reference to the effect of a specific tax
(equation 8.9 above) wherein e', the curvature of the demand curve,
is not usually given.[3] Consider first the magnitude of the price

---

1. These results will be found scattered about the articles singled
out above as Edgeworth's most important in this field.

2. For a discussion of Edgeworth's concept of probability in pure
mathematics, and its relation to the rest of his thought, see A.L. Bowley,
'Francis Ysidro Edgeworth' Econometrica, 1934, pp. 113-124.

3. Everything else in the denominator is signed: the slope of the
demand curve is negative so e is positive; price exceeds marginal
cost, so (p-c) is positive; and the slope of the marginal cost
curve c', is given by the law of costs.

rise[1]. Edgeworth argued that there was a probability that price would rise less than the tax rate i.e.

$$e < 2e + c'e^2 + e'(p-c)$$

even though the last term is not signed. This is because whilst e' may be positive or negative, large or small, on an average of cases we may ignore it. Hence the result required is that

$$e < 2e + c'e^2$$

which result always holds if marginal cost is constant or increasing, and still holds when marginal cost is decreasing, as long as

$$c' < \frac{e}{e^2}$$

The possibility that the curvature of demand, e', is positive increases the probability that the price rise will be less than the tax rate; and, conversely, if e' is negative. Nevertheless, overall the probability is that the price rise is less than the tax rate, especially if marginal cost is increasing.

The second probability result that can be derived from equation (8.9) concerns the effect of the slope of the demand curve on the rise in price due to a specific tax. In the competitive case, a specific tax will raise price more, the steeper is the demand curve (or loosely, following Edgeworth, the more "inelastic" is demand). Under monopoly, however, it is necessary to consider the curvature of the demand curve as well as its slope, and

"in any given case it is impossible to say whether the increase of elasticity conduces to the increase or the decrease of the efficacy of a tax to raise price".[2]

However, suppose as before we ignore the term involving e', and divide equation (8.9) through by e, giving

$$\frac{\Delta P}{\Delta \tau} = \frac{1}{2 + c'e}$$

---

1. 'Taxation' (1897), Papers, vol. II, p. 90.
2. 'Professor Seligman' (1897), Papers, vol. I, pp. 168-9.

Then it becomes clear that an increase in e (i.e. a more "elastic" demand) increases the denominator, and reduces the price rise, when marginal costs c' are increasing; whilst it increases the price rise when marginal costs are decreasing. Hence, ignoring the curvature of the demand curve, we get the opposite to the competitive result if marginal costs are decreasing i.e. the more "inelastic" the demand, the less is the price rise due to a tax. Again, Edgeworth is able to extract positive results from his analysis in the form of a probability statement, even though in any particular case the result is unsigned. The usefulness of this method of approach is obvious, and it is to be regretted that it is not employed more by modern theorists in the discussion of complex results.

Having looked at Edgeworth's discussion of the comparative statics of a cost shift under monopoly, we may turn as a last point to his discussion of a shift in demand. This case was not treated by Cournot, and only received brief mention in Marshall's Principles, where the reader is referred to Edgeworth's 'Pure Theory of Monopoly' article in the Giornale degli Economisti for October 1897.[1] However, the case of a shift in demand does not in fact appear to be covered in this article, and indeed I have not been able to find an explicit algebraic treatment of it in Edgeworth's Papers.[2]

Edgeworth does, however, present some conclusions with respect to a shift in demand in his Papers. Firstly, he argues that the effect on price of an increase in demand is not certain:-

"If the demand for an article is raised in the sense that more of it is demanded at each price than before; then, whereas in a regime of competition, ceteris paribus, theoretically in general the price will rise, this rule is not equally universal in a regime of monopoly

---

1. Alfred Marshall, Principles, Guilleband edition, p. 485 n. 2. This note was added in the 4th edition (1898).

2. It is probable that Marshall was at fault in suggesting that Edgeworth had covered the analysis in his 'Pure Theory' article, which was after all, a highly complex article available only in Italian, and, moreover, Marshall probably had little interest in the technicalities of a shift in demand under monopoly.

where the price may fall while the demand rises".[1]

Invoking his probability argument, however, Edgeworth concluded that a rise in demand for a monopolised commodity is "probably attended by a rise in its price".[2] The reason for the uncertainty of this result, Edgeworth explained as follows:

"In competition we are concerned only with the rise in the amount demanded at each price, the variation of Cournot's function F(p) say $\delta F(p)$. If this is positive, the price must rise, the law of decreasing returns prevailing. In monopoly we have also to look to the sign of $\frac{d}{dp} \delta F(p)$, which is not usually given."[3]

In other words, Edgeworth states correctly that the sign of the price change depends on the change in slope of the demand curve, following from the shift in demand.[4] He does not, however, offer any

---

1. 'Professor Seligman' (1897), Papers, vol. I, p. 144. See also 'Railway Rates' (1912), Papers, vol. I, p. 182.

2. 'Taxation' (1897), Papers, vol. II, p. 96.

3. ibid.,pp. 96-7 n. 6.

4. If we let p be price, $x = D(p,\alpha)$ be demand, where α is a shift parameter, and $c(x)$ be cost, where x is output, then

$$\frac{dp}{d\alpha} = - \frac{D_\alpha + D_{p\alpha} \cdot (p-c'(x)) - c''(x) \cdot D_\alpha \cdot D_p}{2D_p - c''(x) \cdot D_p^2 + D_{pp}(p-c'(x))}$$

where $D\alpha = \frac{\delta D}{\delta\alpha}$ and so on. Since the denominator is negative by the second order conditions, and D_α is positive, the effect on price depends on the sign of $D_{p\alpha}$ if we neglect costs (i.e. assume costs constant). More, generally, the change in price depends on the way the demand curve shifts and the slope of marginal cost. An iso-elastic demand rise will only cause price to fall if marginal costs are decreasing. A parallel demand rise will only cause price to fall if marginal costs are falling at a faster rate than demand. Thus price is likely to rise as long as the demand curve shifts less than iso-elastically and as long as marginal costs do not fall too quickly. See Robinson, Economics of Imperfect Competition, chapter 4.

further discussion of this result. We are thus left with an incomplete treatment of this case. It is perhaps surprising that it appears that the effect of a shift in demand on monopoly price did not receive proper treatment in the 19th century economic literature.[1]

But even bearing in mind this limitation, it is clear that Edgeworth made a number of important extensions to Cournot's analysis of pure monopoly. Whilst we may regard his reinterpretations of monopoly equilibrium as unacceptable in this ordinalist age; his diagrammatic contributions, his treatment of a specific tax, and his use of the idea of probability in mathematical analysis, all represent important extensions of Cournot's model.[2] These contributions, together with his work on competition and imperfect competition in his earlier Mathematical Psychics, make his work one of the most important original contributions to the development of competition and monopoly analysis in our period.

But whilst his work is important in an objective sense, it was to have little or no influence on the general economics profession in England.[3] We have already come across some of the reasons for this with reference to Edgeworth's monopoly analysis: the scattered nature of his contribution; the peculiarities of his exposition; his uncompromising use of mathematics. Added to this we must note his strong belief in utilitarianism, which may have discouraged reading of his work as this philosophy lost favour. Or again, we may note that, in Schumpeter's words, he was "the worst speaker and lecturer imaginable",[4] so that he must have had tremendous difficulty in

---

1. For a 20th century treatment of the case, see Joan Robinson, The Economics of Imperfect Competition (1933), 2nd edition, (London: Macmillan, 1969) Chapter 5. Mrs. Robinson's geometrical approach provides some insight into the case, although her results lack the generality that would be provided by an algebraic treatment.
2. It should be stressed again that these are only some of the important contributions that Edgeworth made to monopoly analysis.
3. The thoughts in this paragraph rely heavily on Schumpeter's assessment of Edgeworth: History of Economic Analysis, pp. 830-1.
4. ibid., p. 831.

getting his message across. All these factors conspired to mean that his work was completely overshadowed by the much more popularly accessible work of Alfred Marshall in the period 1890-1930, and it is to his treatment of competition and monopoly that we now turn.

Chapter 9

Marshall's 'Principles of Economics'[1]

In 1890 Marshall published the first edition of his Principles of Economics at the age of 48. This work, which was to run to eight editions, became the cornerstone of economic teaching in England, well into the 20th century. In it he attempted to deal in a comprehensive and realistic way with the workings of capitalist economies. The superficial realism of the book, however, masks an analytical skeleton worked out with the aid of mathematics in the early 1870s.[2] It will be our task in this chapter to expose the main elements of this skeleton with regard to Marshall's analyses of competition and monopoly.

The difficulties of dealing satisfactorily with Marshall's work are well known.[3] His desire to make his analysis accessible to businessmen and intelligent laymen led him to banish the technical parts of the argument to footnotes and appendices. In the text, he provides a seemingly commonplace literary discussion in which, in the interests of realism, assumptions and concepts are often left vague. Further, in an effort to present a comprehensive analysis, problems (such as the consistency of increasing returns and competitive analysis) are covered up rather than brought into the open.

---

1. I have used the 9th (Variorum) edition: Alfred Marshall, Principles of Economics, 2 vols., edited by C.W. Guilleband (London; Macmillan, 1961). References to vol. II are referred to as Notes, whilst other references are to the text (vol. I).

2. For a background to Marshall's work see C.W. Guilleband's editorial introduction in ibid., Notes, pp. 3-30.

3. See, for example, M. Blaug, Economic Theory in Retrospect, pp. 426-7 or Joseph A. Schumpeter, History of Economic Analysis, pp. 833-840.

As a consequence of this it is necessary to dig deep beneath the surface of Marshall's _Principles_ in order to discover his meaning. More than most authors, there is scope for interpretation in Marshall. In what follows I have endeavoured to give a faithful representation of Marshall's contribution to competition and monopoly analysis, whilst recognising that, inevitably, interpretation plays a part in this representation. Nevertheless, I hope not to have erred too much in my discussion, either in the direction of reading things into Marshall's analysis, nor in the direction of not fully appreciating the depth of his analysis.

Marshall's discussion of competition and monopoly occurs in Book V of the _Principles_, entitled the 'General Relations of Demand, Supply, and Value'. In this Book, he set forth the partial equilibrium analysis of price which forms the basis of the modern analysis of competition and monopoly. Beneath the surface realism of the text it is possible, as we shall see, to discern all the essential elements of the modern theory, although it was left to subsequent writers to dig some of these elements out, and to clarify, refine and develop them. Such developments will be discussed later. For the present, our interest is to place Marshall's classic analysis in its historical context. To this end some general themes of this chapter will be outlined in the remainder of this section, prior to going into details on competitive theory in section I and monopoly theory in section II below.

The first point to note is that Marshall's analysis, despite his attempts to stretch it to cover all types of economic phenomena, was essentially static in form.[1] That is, stripped of his often penetrating observations regarding the real world, and his reiterated belief that the Mecca of the economist lies in 'economic biology', his analysis was based on the application of the method of mechanics (essentially the calculus) to economics. In this, his work was similar to that of Walras. But, whereas Walras' work was concerned with general equilibrium, Marshall, in Schumpeter's words, provided "the classic

---

1.   See Schumpeter, op. cit., pp. 836-7.

masterpiece of the partial analysis".[1] In this analysis, he considered
the working of individual competitive and monopolistic industries
against a background of other factors held in a pound of _caeteris paribus_.
In this way he was able to avoid the abstract heights of Walrasian
theory, and instead penetrate much more deeply than Walras was able
to do into the more practical problems of competition and monopoly.[2]
It is for this reason that we find in Marshall a much more complete
discussion of these models than in Walras.

Secondly, Marshall was a competitive economist in the broad
sense in that he adopted a general competitive view of the economy.
Thus, except for one isolated chpater on monopoly, his analysis was
centred around the notion of supply and demand.

"the general theory of the equilibrium of demand and supply is
a Fundamental Idea running through the frames of all the various
parts of the central problem of Distribution and Exchange".[3]

---

1. ibid., p. 836. It should not be forgotten that Cournot's approach
was partial too, as indeed was Walras' treatment of monopoly.
Schumpeter's assertion (ibid., p. 836) that Marshall might also be listed
amongst "the builders of the general equilibrium system" seems to
overstate the case: Marshall certainly conceived of and sketched
out the notion of general equilibrium, but he made no explicit analytical
contribution to that line of enquiry.

2. This is not to say that Marshall solved all these problems.
Indeed, we shall argue below that, like Smith, part of Marshall's
achievement was to expose problems to be solved rather than to solve
them himself.

3. _Principles_, Preface to the First Edition, p. viii. See also ibid.,
Book III, chapter i, p. 83.

But whilst his analysis is competitive, Marshall does not do more than sketch out the assumptions of that analysis. At one point he says:-

"Thus we assume that the forces of demand and supply have free play; that there is no close combination among dealers on either side, but each acts for himself, and there is much free competition; that is, buyers generally compete freely with buyers, and sellers compete freely with sellers. But though everyone acts for himself, his knowledge of what others are doing is supposed to be generally sufficient to prevent him from taking a lower or paying a higher price than others are doing.. .... we assume that there is only one price in the market at one and the same time."[1]

Or again he notes that his competitive analysis "assumes the existence of a great many competitors".[2] Against this, however, we must set his frequent references to marketing and advertising expenses, and his belief that producers try not to "spoil the market" for the future or antagonise their rivals.[3] Such considerations are of course beyond the scope of the competitive model interpreted strictly. That Marshall referred to them provides again an illustration of his tendency to stretch his analysis to incorporate as much realism as possible.

---

1.   ibid., Book V, chapter iii, pp. 341-2. Note that Marshall uses the phrase free competition not in the Classical sense, but in the sense of unhampered rivalry. This usage is indicative of the greater emphasis put on market behaviour by economists in the second half of the 19th century.

2.   ibid., Book V, chapter xii, p. 397. Again this emphasis on large numbers is a sign of the times. That there were only several producers in a certain market would not have worried Adam Smith at all.

3.   See, in particular, ibid., Book V, chapter v and section I below.

Marshall's analysis, as is well known, centres around the division
of competitive analysis into several parts according to the time
period under view.[1] Whilst in temporary equilibrium supply means only
what is currently available for sale; in normal equilibrium supply
can be adjusted: partially in the short run, when only some inputs
are variable; or completely in the long run, when all inputs are vari-
able:-

"For the nature of the equilibrium itself, and that of the causes
by which it is determined, depend on the length of the period over
which the market is taken to extend. We shall find that if the
period is short, the supply is limited to the stores which happen to
be at hand: if the period is longer, the supply will be influenced,
more or less, by the cost of producing the commodity in question; and
if the period is very long, this cost will in its turn be influenced,
more or less, by the cost of producing the labour and the material
things required for producing the commodity."[2]

Against this analysis, Marshall offered only a single chapter on
monopoly; a chapter which nevertheless, as we shall see, played an
important historical role. For the moment, however, it is Marshall's
normal equilibrium analysis which is of most importance.

Consider, first, normal equilibrium with reference to long
periods. In this part of his analysis, Marshall examined the question
of industry equilibrium when all factors of production can be varied
so as to yield their normal incomes. In other words, he was concerned
with essentially the Classical idea, deriving from Adam Smith, of
natural value:-

"This is the real drift of that much quoted, and much-misunderstood
doctrine of Adam Smith and other economists that the normal, or
"natural", value of a commodity is that which economic forces tend to
bring about in the long run. It is the average value which economic

---

1.   For an excellent discussion of these "various orders of change"
see R. Frisch, 'Alfred Marshall's Theory of Value' Quarterly Journal
of Economics, vol. LXIV, November 1950, pp. 495-524.

2.   Principles, Book V, Chapter i, p. 330.

forces would bring about if the general conditions of life were stationary for a run of time long enough to enable them all to work out their full effect."[1]

Given that long run normal analysis was for Marshall his primary model of price determination, it follows that his performance must be classified as basically in the Classical line of development. As far as his long run analysis is concerned, therefore, his contribution was the important one of clarifying and developing Classical cost price analysis.[2] Such work had already been begun by Fleeming Jenkin, but as we shall see Marshall's technical contributions were to go far beyond those of Jenkin. These contributions, dotted about as they are in footnotes and appendices, together form the classic treatment of the Classical "free competition" model.

In contrast, Marshall's analysis of normal equilibrium in the short run marks an important departure from Classical competitive analysis. Whereas the Classical economists focussed their attention on industry equilibrium (as did Marshall in his long run analysis); in his short run analysis, Marshall's attention switches to the producer. In the few pages of Book V, chapter v devoted to short run analysis,[3] Marshall provides what at first sight appears little more than a realistic and descriptive picture of the behaviour of producers. It will be demonstrated in more detail below, however, that beneath the surface realism, and stripped of its refinements, these few pages contain the basic ingredients of the modern analysis of the competitive producer; namely, that producers being price-takers, set output such that price equals marginal cost. It follows from this that, subject to refinements introduced by Marshall, the industry supply curve in the short run is the horizontal sum of the producers' marginal cost curves.

---

1. ibid., Book V, chapter iii, p. 347. See also Appendix I, pp. 813-21.

2. Details of Marshall's technical developments of the Classical analysis are given in section I below.

3. op. cit., pp. 369-80.

Given this analysis of short run competitive equilibrium in the
Principles, the question then arises as to the historical interpretation
to be put on it. We have seen in chapter 5 above, that Cournot in
1838 had derived the essential result that the competitive producer
would set price equal to marginal cost. Such a result follows
automatically from the assumption that the producer is a price-taker,
and it is possible that Marshall derived this essentially simple
result from his own mathematics, independently of Cournot's work.
Or again, given that Cournot's work was well-known amongst the limited
number of mathematical economists in Europe in the second half of
the 19th century, it may be that Marshall became aware of the theory
indirectly through his acquaintance with their work. A third possib-
ility for which a case can be made, however, is that Marshall got the
analysis direct from the Recherches. The case for this is not cast-
iron, since Marshall makes no mention of Cournot with respect to his
short run analysis, nor does his exposition of it (in contrast to his
monopoly analysis) bear a close relation to Cournot's.[1] On the other
hand, we know that Cournot's work had a major influence on Marshall's
work generally, and that given he read the Recherches in 1868, it
is possible to conceive of the final form of his short run analysis,
framed over twenty years, as being the result of typically Marshallian
refinements to what were originally but a few terse paragraphs in
Cournot's work. Furthermore, in a letter to A.W. Flux, which will
be quoted more fully below, Marshall can only be referring to these
paragraphs when he says

"My confidence in Cournot as an economist was shaken when I found
that his mathematics re I.R. (increasing returns) led inevitably to
things which do not exist and have no near relation to reality."[2]

Indeed Marshall goes on to suggest that much of his work in the period
1870-90 was devoted to solving the problem of the apparent inconsist-
ency of increasing returns and competitive equilibrium brought to
light by Cournot in his discussion of unlimited competition. Thus
Cournot's work was an important driving force behind Marshall's

1. The fact that Cournot is not mentioned in the relevant passages
does not weigh heavily because Marshall was generally less than
generous in his acknowledgements: see Schumpeter, op. cit., pp.
839-40.
2. Reprinted in Principles, Notes, p. 521.

competitive analysis, particularly with respect to increasing returns, and this provides strong circumstantial evidence that Marshall's analysis of short run normal price grew from the seeds planted in Cournot's discussion of unlimited competition.

The question of the source of Marshall's short run analysis must remain conjectural given the available evidence. Regardless of its origin, however, its inclusion in the Principles marks an important development over the usual Classical treatment of competition. It has been a central theme of this thesis that modern competitive analysis developed along two distinct historical lines. On the one hand, the Classical economists were concerned with free competition and the equilibrium of competitive industries; whilst on the other, Cournot was concerned with the equilibrium of the competitive producer in the market. Whereas, the Classical economists had little to say on market structure or the theory of the firm, Cournot emphasised the importance of there being large numbers of producers so that each might be treated as a price-taker. However, the central Classical assumption of free mobility of resources equalising rates of return in all directions found no place in the Recherches. In the second half of the 19th century we have seen that there was a growing aware-ness of the need for many producers in a market for the competitive analysis to apply, but there was no explicit discussion of producer equilibrium. It was in Marshall's work, through his division of normal equilibrium into short period and long period analysis, that the synth-esis of the free competition and price-taker strands of analysis took place. It is in this sense that we may say that Marshall's Principles contained the first exposition of perfect competition analysis.

Marshall's exposition of the perfect competition model was, of course, not complete. In the interests of realism his discussion of the assumptions of the model was loose and vague. Further, his discussion of the short run, as already noted, was obscure to say the least, necessitating a great deal of work by his successors to disinter his analysis. Likewise, there was a need for further work on the relationship between the short and long run, and on the perplexing concept of "the representative firm". And, most important of all, there was the problem of increasing returns to be sorted out.

Nevertheless, the fact that these problems now came to light, indicates that in Marshall's book a major development had been made with regard to competitive theory. This development was essentially the synthesis of the analysis of the competitive producer with the analysis of the competitive industry. It was only in 1890 in the Principles that such a synthesis was attempted, and it is from this book therefore that modern competitive theory can be dated.

I. Marshall's Competitive Analysis

In this section we shall examine Marshall's competitive analysis advanced in Book V of the Principles. Marshall, like Adam Smith, whilst working with largely extant ideas, was able to fashion them into an analysis peculiarly his own. With Adam Smith the outcome of this process was the market price/natural price dichotomy which was, as we have seen, a central feature of subsequent Classical economics. With Marshall, the outcome was the distinction of the various periods of competitive analysis

1. temporary equilibrium
2. normal equilibrium with reference to short periods, and
3. normal equilibrium with reference to long periods.

This division of competitive analysis was to replace Smith's dichotomy in English speaking economics after 1890, and it remains the basic framework of partial equilibrium treatments of competition in modern textbooks.[1] These categories of analysis will be considered in turn in the first three sub-sections below. Sub-section four examines Marshall's attempts to deal with the problem of increasing returns in the Principles.[2]

(1) Temporary Equilibrium

'The temporary model' is discussed in Book V, Chapter ii, entitled 'Temporary Equilibrium of Demand and Supply'.[3] In this model, cost and production are not explicitly brought into account

---

1. See, for example, C.A. Tisdell, Microeconomics: the theory of economic allocation (John Wiley and Sons: Sydney, 1972) Chapter 8.

2. Sub-sections are used in order to break up what would be otherwise an overly long section. Monopoly analysis is, however, dealt with in section II below.

3. ibid., pp. 331-336. This chapter dates substantially from the 1st edition (1890).

and

" 'supply' means in effect merely the stock available at the
time for sale in the market"[1].

Rather than present his theory in the abstract, Marshall proceeds
by means of an example of "a corn market in a country town".[2] Such
a policy of course stems from his desire to make his analysis
realistic. But it also means that he does not make the market
structure that he is assuming very explicit. We learn that he is
not considering "a casual barter" in which "there is seldom anything
that can properly be called an equilibrium of supply and demand".[3]
Nor is he considering "a market for unique and rare things" such as
"pictures of old masters, rare coins and other things, which cannot
be 'graded' at all".[4] But his assertion that he is concerned with
"the ordinary dealings of modern life", describes a competitive
market structure in only the vaguest of ways, and is quite character-
istic of Marshall's loose treatment of the assumptions of his analysis
throughout the Principles.

Turning to the analysis itself, Marshall proceeds by means of a
numerical example. On the one hand, holders of corn will be willing
to sell more the higher the price, whilst, on the other hand, buyers
will be willing to buy more the lower the price. Marshall illustrates
this situation as follows:-[5]

At the price	Holders will be willing to sell	Buyers will be willing to buy
37s	1,000 quarters	600 quarters
36s	700 "	700 "
35s	600 "	900 "

It is clear that

"the price of 36s has .... some claim to be called the true
equilibrium price: because if it were fixed on at the beginning,
and adhered to throughout, it would exactly equate demand and supply...;

---

1. ibid., Book V, chapter i, p. 330.
2. ibid., Book V, chapter ii, p. 332.
3. ibid., p. 331.   4. ibid., p. 332.
5. ibid., p. 333.

and because every dealer who has a perfect knowledge of the circum-
stances of the market expects that price to be established."[1]

Thus, we have equilibrium in a simple and familiar supply and demand
model of market price.

But, whereas Fleeming Jenkin had represented this analysis by
means of supply and demand curves, such curves do not appear in
Marshall's discussion of temporary equilibrium.[2] This is no accident.
Rather, Marshall chose to reserve graphic representation to his more
important analysis of normal equilibrium wherein supply took on a
more fundamental meaning than simply the stock available for sale.[3]
In Marshall's view the analysis of market price as presented in
Book V, chapter ii of the Principles was a minor consideration next
to his normal analysis so that to use supply and demand curves in both
cases would be to tax the reader for little gain. As he put it to
J.N. Keynes, in a letter dated 26 October 1888,

"I intended to tell you that I acted deliberately in applying
the curves only to problems of Normal Values and not to Market Values.
Market curves can be drawn: but I should agree with Wicksteed that they
could never have a shape that would correspond to the Law of Increasing
return. And I don't think they would be of much practical use.
I considered whether I would introduce "market" curves and explain the
difference between them and Normal curves: but thought I should only
bother the reader."[4]

----

1.   ibid., p. 333.

2.   Marshall had read Jenkin's 1870 paper prior to the publication
of the Principles in 1890 (see ibid., Notes, pp. 533-4). It seems
likely that the letter to Keynes quoted below represents a justifica-
tion for his position in not drawing market curves in contrast to Jenkin.

3.   We shall see below, however, that in the normal model "supply"
takes on separate meanings, depending on whether the short or long run
is under consideration.

4.   Quoted in Principles, Notes, p. 364.

This omission of a graphic representation of temporary equilibrium is indicative of the small importance Marshall attached to this case, which is a theme we shall refer to again below.

In contrast to Walras, Marshall does not assume away the relationship of equilibrium price and actual price in his temporary model. In the Elements an auctioneer calls out prices and no contract is made till the equilibrium price is established.[1] Marshall's desire for realism could not let him indulge in such a heroic abstraction, however. He assumes instead that the facts in the table above represent the underlying situation, whereas

"the (actual) price may be tossed hither and thither like a shuttlecock, as one side or the other gets the better in the 'higgling and bargaining' of the market".[2]

However, he argues that

"unless the sides are unequally matched.... the price is likely to be never far from 36s; and it is nearly sure to be pretty close to 36s at the end of the market".

At a higher price, buyers hold back and pull price down; while at a lower price, sellers hold back and push price up. Hence Marshall claimed that the actual price would approximate the equilibrium price, particularly at the end of the day. This will be so even if dealers make errors due to their imperfect knowledge of the market.[3] Such an argument is clearly no more than a vague article of faith, rather than a demonstrated proposition. Marshall is saying that he thinks in real life markets actual price is typically close to equilibrium price.

---

1. See chapter 6 above.

2. Principles, p. 333.

3. ibid., p. 334.

However, a major argument in favour of Marshall's approach of realism, against Walras' abstraction, is that the former brings to light important problems while the latter tends to hide them. A case in point is the problem that an equilibrium position may be altered by the path taken towards it. Walras did not deal with this problem, since in his model contracts are only made at equilibrium prices. Marshall, however, saw the problem. To deal with it he explicitly assumes that each individual's marginal utility of money is inappreciably affected by any deals he concludes at disequilibrium prices, which he justifies by saying:-

"When a person buys anything for his own consumption, he generally spends on it a small part of his total resources; while when he buys it for the purposes of trade, he looks to reselling it, and therefore his potential resources are not diminished."[1]

If this is the case then the path to equilibrium does not alter that equilibrium. However, in the labour market, for example, it is not the case, and this is but one of the imperfections which, whilst not denying the basic supply and demand model, does make it necessary to look at this market in more detail.[2]

---

1.   ibid., p. 333.

2.   Marshall's argument is that the workman sells his labour in order to get his means of subsistence, so that his need for money is great. Since the advantage of bargaining is more on the employer's side in the labour market, wages are likely to be low, and the labourer, driven by his need for money, continues to work at the low rate, rather than withdraw his labour. Thus contract at the low wage continues despite the apparently higher equilibrium wage at the outset.

(2) Normal Equilibrium with Reference to Short Periods

Marshall's treatment of the short run occurs primarily in Book V, chapter v of the Principles.[1] In the short run, producers are only able to vary their use of certain factors of production, whilst others remain fixed. This contrasts with the long run situation in which all factors are variable. These two divisions of the normal model are placed within the context of fourfold division of time in the Principles:-

"Four classes stand out. In each, price is governed by the relations between demand and supply. As regards market prices, supply is taken to mean the stock of the commodity in question which is on hand, or at all events " in sight". As regards normal prices, when the term Normal is taken to relate to short periods of a few months or a year, supply means broadly what can be produced for the price in question with the existing stock of plant, personal and impersonal, in the given time. As regards normal prices, when the term Normal is to refer to long periods of several years, supply means what can be produced by plant, which itself can be remuneratively produced and applied within the given time; while lastly, there are very gradual or Secular movements of normal price, caused by the gradual growth of knowledge, of population and of capital, and the changing conditions of demand and supply from one generation to another."[2]

Marshall, as usual, chooses a real world illustration of his analysis. In the case of the short run, this example is of "a great increase in the general demand for fish" occasioned by a cattle plague which makes meat "a dear and dangerous food for several years together."[3]

---

1. Principles, pp. 363-380.

2. ibid., pp. 378-9. We have already pointed out the particular meaning of Supply in the temporary model. At the other extreme, Marshall conceived of his analysis of normal value as tapering into an analysis of secular movements of variables. Such considerations, however, are beyond the scope of our present inquiry into his competitive analysis.

3. ibid., pp. 369-370.

In these circumstances

"The normal price for any given daily supply of fish, which we
are now seeking, is the price which will <u>quickly</u> call into the fishing
trade capital and labour enough to obtain that supply in a day's
fishing of average good fortune."[1]

In the short run, the numbers of seafaring men are fixed, and the
additional supply of fish is provided by encouraging men to fish rather
than work ship, and by bringing already built boats into the fishing
industry. The additional production will thus clearly be brought
about at increased cost:-

"Here we see an illustration of the almost universal law that the
term Normal being taken to refer to a short period of time <u>an increase</u>
<u>in the amount demanded raises the normal supply</u> price. This law is
almost universal even as regards industries which in long periods
follow the tendency to increasing return."[2]

Marshall's discussion of the short run in the remainder of Book V,
chapter v is notable because unlike his discussion of the long run,
where he introduces the concept of the representative firm, he actually
considers individual producers in the market. This discussion, whilst
at times being elusive, nevertheless clearly marks out the modern
treatment of short run competitive equilibrium. Consider a market in
the short run, and allow price to be gradually raised from a low level:-

"As the expectations of price improve, an increased part of the
production will yield a considerable surplus above prime costs, and the
margin of production will be pushed outwards. Every increase in the
price expected will, as a rule, induce some people who would not other-
wise have produced anything, to produce a little; and those, who have
produced something for the lower price, will produce more for the higher
price."[3]

---

1.   ibid., p. 370. Day to day oscillations of price caused by un-
certainties of the weather etc. are for our present purposes held in the
pound of <u>caeteris paribus</u>.
2.   ibid., p. 370.   3.   ibid., p. 373.

As price rises, each producer expands his production to the point where price equals marginal cost. As Marshall put it explicitly in his second and third editions of the Principles:-

"With regard to the latter (diminishing returns), the producer whose normal marginal expenses of production are just equal to the normal demand price in the market, would generally have no inducement to raise additional produce, even though he could market it on the same terms as the rest."[1]

Clearly then, although Marshall tended to conceal this fact in his exposition, the supply curve of the individual producer is his marginal cost curve.[2] In the now familiar diagram, which was not drawn by Marshall, we have producer equilibrium where price equals marginal cost and industry equilibrium where supply (the horizontal sum of the marginal cost curves) equals industry demand (Figure 9.1). Thus the equilibrium price is p_e and the ith firm is in equilibrium at an output rate q^e_i. Industry output is then the sum of the individual output rates. This analysis was of course implicitly in Cournot's work as it was in Marshall's.

Figure 9.1
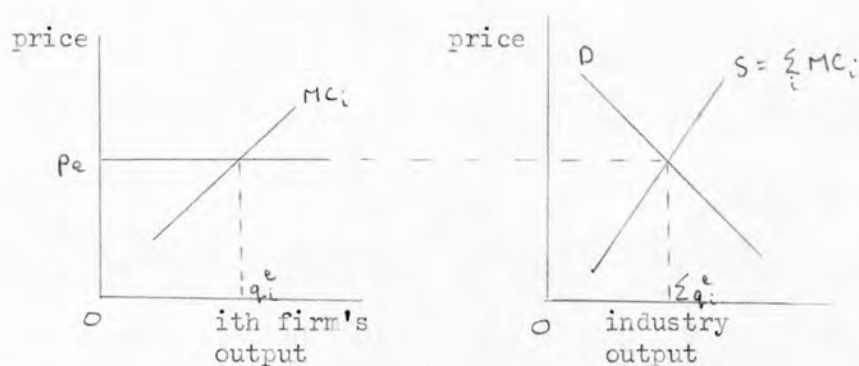
1. ibid., Notes, p. 524. This passage appeared in Book V, chapter **xi** of the second edition (1891) and third edition (1895) of the Principles, but was deleted from the fourth edition (1898). See also Mathematical Note XIV, pp. 849-50.

2. The analysis which follows, relies heavily on R. Frisch, op. cit. See also Blaug, Economic Theory in Retrospect, ch. 10.

We are now in a position to interpret Marshall's suggestion that
if demand is low then the supply price is likely to be "nearly always
above, and generally very much above the special or prime cost for
raw materials, labour and wear - and - tear of plant."[1] Consider
Figure 9.2.

<u>Figure 9.2</u>
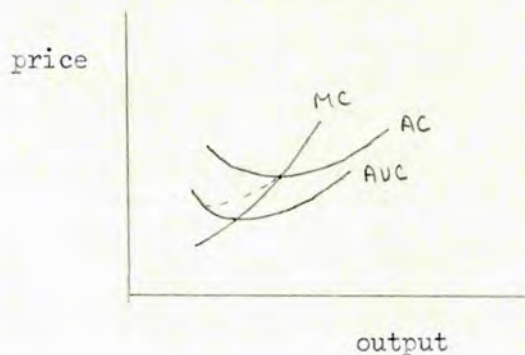
In the short run, it would pay the firm to produce along its marginal
cost curve at any price above average variable cost (AVC). But
Marshall argues

"they (producers) generally hold out for a higher price; each man
fears to spoil his chance of getting a better price later on from his
customers; or, if he produces for a large and open market, he is more
or less in fear of incurring the resentment of other producers, should
he sell needlessly at a price that spoils the common market for all."[2]

Hence, when price is below average cost (AC), producers will curtail
their production more sharply than indicated by the marginal cost
curve (MC), so that the true supply curve is indicated by the dotted
line in Figure 9.2. Such behaviour, therefore, in part restricts the
variation of supply price in the short run.[3]

---

1. ibid., pp. 374-5.

2. ibid., p. 374. If producers glut the market, they prevent prices
from reviving and so cause bankruptcies. If then demand picks up, the
result is a large price rise, and such oscillations of price are bene-
ficial neither to producers nor consumers.

3. In the short run, the difference between receipts and prime costs is
a surplus which has the nature of a rent to the fixed factors of product-
ion. Whilst this surplus (and price) may be subject to wide variation in
the short run, this variation is restricted by fears of spoiling the
market, and more generally by notions of normal returns to all factors.

Whilst Marshall did not draw the positions of producer and industry equilibrium depicted above, his discussion of the short run clearly points to such representations. As such it is a major original contribution, providing all the material for such a depiction by his successors if they were prepared to dig for it. Why then did Marshall not represent the position graphically himself nor treat the case very clearly? One answer seems to be his desire to make his analysis seem realistic. Producers who are marginal cost pricing do not consider the reactions of other producers, nor the possibility of spoiling the market for the future, in their pursuit of instantaneous gain. Yet these considerations are important in reality, and Marshall strove to include them by expressing his theoretical analysis loosely.[1]

A second consideration is, however, more fundamental. Marshall was very much aware that an individual competitive producer experiencing decreasing marginal costs would have no incentive to limit production.[2] The problem of increasing returns, which in Marshall's analysis was a long run problem, was met partly, as we shall see, by the introduction of the concept of the representative producer in place of the individual

---

1. Marshall was also prepared to allow his producers to collude, tacitly or overtly, in these pages (op. cit., p. 375 n. 1) which, like considering the future or other producers, is not usual behaviour under perfect competition.

2. This result, which was first derived by Cournot (Recherches, p. 91), will be discussed in detail in sub-section 4 below.

producers of his short run analysis.[1] Nevertheless, the analysis of
competitive producers in the short run, whilst logically secure in
itself, posed a threat to Marshall's long run analysis by providing the
tools to criticise his treatment of increasing returns. It is for
this reason that Marshall had an interest in treating the short run
elusively, and it seems likely that it was partly in order to cover
up this line of attack on his competitive analysis that his treatment
of the short run is so vague in the Principles.[2] This trait in
Marshall of covering up the problems of his analysis is to be
regretted since it worked against the development of economic analysis
in that subsequent writers were not presented with a clear statement
of the problem which necessitated solution.[3]

---

1.   It is not too far fetched to suggest that Marshall's division of
normal equilibrium into the short and long run was prompted by the need
to accommodate analysis of the competitive producer with that of the
competitive industry. The restriction of the short run to increasing
costs enabled him to discuss the competitive producer, whilst attention
switches to the industry in the long run. This solution as we shall
see has its problems, yet it is nevertheless a neat method of synthes-
ising the two lines of development of competitive theory deriving from
Cournot and the Classical economists.

2.   There is evidence that Marshall's analysis became less clear if
anything from the Fourth Edition (1898) on. Compare, in particular,
the 'Editorial Appendix to Book V, chapter xii': op. cit., Notes,
pp 523-9 with the later text.

3.   We see here the importance of Marshall's position in the develop-
ment of English economics, and the way it could work both ways. Whilst
he made a large body of hitherto mathematical analysis available to
non-mathematicians, he also, in his desire to develop a unified approach
to all problems, covered up the weaknesses of that analysis. The
problem of increasing marginal costs was there for all to see in
Cournot, but those who had to rely on Marshall's work got a much less
clear view of the problem. Further discussion of the problem is given
below.

(3) Normal Equilibrium with Reference to Long Periods.

Marshall's analysis of the long run is first outlined in Book V, chapter iii of the Principles.[1] As was noted above, Marshall considers this case in terms of "the representative firm" rather than individual producers, so that it is appropriate to start with this concept.[2]

"We shall have to analyse carefully the normal cost of producing a commodity, relatively to a given aggregate volume of production; and for this purpose we shall have to study the expenses of a representative producer for that aggregate volume. On the one hand we shall not want to select some new producer just struggling into business, who works under many disadvantages...; nor on the other hand shall we want to take a firm which by exceptionally long-sustained ability and good fortune has got together a vast business, and huge well-ordered workshops that give it a superiority over almost all its rivals. But our representative firm must be one which has had a fairly long life, and fair success, which is managed with normal ability, and which has normal access to the economies, external and internal, which belong to that aggregate volume of production; account being taken of the class of goods produced, the conditions of marketing them and the economic environment generally."[3]

The representative firm is therefore "in a sense an average firm"; a kind of miniaturised version of the general conditions of supply in an industry in the long run.[4]

---

1. Principles, pp. 337-350. This chapter in fact purports to give an overview of equilibrium of normal demand and supply, prior to the division into short and long periods in Book V, chapter v. However, it is clear that Marshall was really thinking of the long run in this chapter.

2. The reference here is to ibid., Book IV, chapter xiii.

3. ibid., p. 317.

4. ibid., p. 318. The actual phrase "representative firm" was first used in the second edition of the Principles (1891). The relationship between the representative firm and the actual producers will be discussed later in this section.

In the long run all factors of production are variable:-

"In long periods... all investments of capital and effort in providing the material plant and the organization of a business, and in acquiring trade knowledge and specialized ability, have time to be adjusted to the incomes which are expected to be earned by them: and the estimates of those incomes therefore directly govern supply, and are the true long-period normal supply price of the commodities produced."[1]

Thus in considering the long run we must consider the costs of production when all adjustments have occurred. Under these circumstances, the representative firm may experience increasing or decreasing returns. Moreover, when account is taken of external as well as internal economies, and when our attention is focussed on manufacturing, "where the cost of raw material counts for little"[2], we find that increasing returns tend to predominate:-

"The general argument of the present Book (Book IV) shows that an increase in the aggregate volume of production of anything will generally increase the size, and therefore the internal economies possessed by such a representative firm; that it will always increase the external economies to which the firm has access; and thus will enable it to manufacture at a less proportionate cost of labour and sacrifice than before."[3]

It was the reconciliation of this widespread tendency to increasing returns with his competitive analysis, which was to cause Marshall so much trouble, as we shall see below. Before we tackle this problem, however, we shall consider Marshallian normal equilibrium in the long run.

As usual Marshall proceeds to demonstrate his analysis by means of an example: in this case from the woollen trade.

---

1. ibid., Book V, chapter v, p. 377.

2. ibid., Book IV, chapter xiii, p. 319.

3. ibid., p. 318.

"Let us suppose that a person well acquainted with the woollen trade sets himself to inquire what would be the normal supply price of a certain number of millions of yards annually of a particular kind of cloth. He would have to reckon (i) the price of the wool, coal, and other materials which would be used up in making it, (ii) wear-and-tear and depreciation of the buildings, machinery and other fixed capital, (iii) interest and insurance on all the capital, (iv) the wages of those who work in the factories, and (v) the gross earnings of management (including insurance against loss), of those who undertake the risks, who engineer and superintend the working."[1]

Given this information, the supply curve of the representative firm is the vertical sum of these normal costs of production. In Figure 9.3, Ox measures quantity and Oy price. At an arbitrary quantity OM, P_1M is the supply price of wool and other circulating capital; P_1P_2 is wear-and-tear and depreciation; and so on. The length PM is then the supply price of quantity OM in the long run, and "the locus of P may be called the supply curve."[2]

Figure 9.3[3]
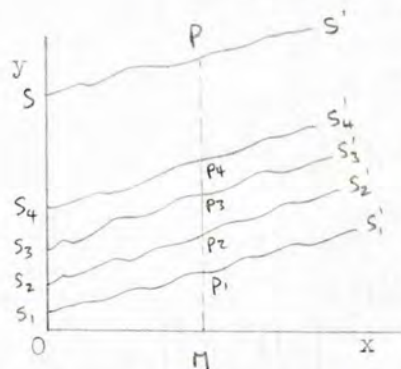
It traces the normal unit costs of the representative firm in the long run:-

"the normal supply price of any amount of that commodity may be taken to be its normal expenses of production (including gross earnings of management) by that firm. That is, let us assume that this is the price the expectation of which will just suffice to maintain

1. ibid., Book V, chapter iii, p. 343.

2. ibid., p. 344 n. 1.   3.   ibid., p.344 n. 1.

the existing aggregate amount of production; some firms meanwhile rising
and increasing their output, and others falling and diminishing
theirs; but the aggregate production remaining unchanged. A price
higher than this would increase the growth of rising firms, and
slacken, though it might not arrest, the decay of the falling firms;
with the net result of an increase in the aggregate production. On
the other hand, a price lower than this would hasten the decay of the
falling firms, and slacken the growth of the rising firms; and on the
whole diminish production."[1]

Equilibrium in the long run is at the point of intersection of
the demand curve and the industry supply curve, the latter being the
supply curve of the representative firm with a proper scale coefficient
applied to it.[2] In Figure 9.4, Ox is aggregate production and Oy is
price. The point of intersection of the demand curve, DD', and the
supply curve, SS', defines "the equilibrium-amount", Oq, and

Figure 9.4[3]
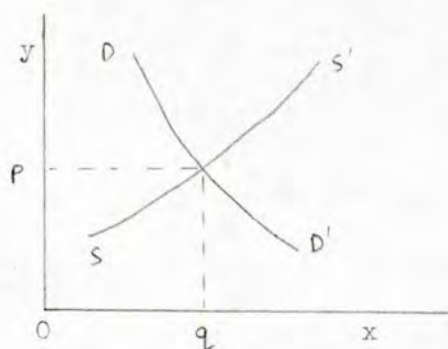
"the equilibrium-price", Op.[4] At this price and production level,

---

1. ibid., pp. 342-3.

2. Marshall does not explicitly consider this scaling up. See,
however, R. Frisch, 'Alfred Marshall's Theory of Value', p. 516.

3. Principles, p. 346 n. 1.

4. ibid., p. 345.

there is no tendency for production of the representative firm or the industry to change. Such a position of equilibrium Marshall saw as the central aspect of his analysis:-

"The remainder of the present volume will be chiefly occupied with interpreting and limiting this doctrine that the value of a thing tends in the long run to correspond to its cost of production."[1]

Clearly it would be beyond the bounds of this thesis to follow all the ramifications of Marshall's theory of normal equilibrium in the long run in the remainder of the Principles. We shall, therefore select a number of his important developments of the analysis which are of particular interest to us. The first such development is Marshall's discussion of the stability of long run normal equilibrium. In Figure 9.4, where decreasing returns are prevalent, the inter-section of the demand and supply curves define a position of stable equilibrium:-

"Such an equilibrium is stable; that is, the price, if displaced a little from it, will tend to return, as a pendulum oscillates about its lowest point; and it will be found to be a characteristic of stable equilibria that in them the demand price is greater than the supply price for amounts just less than the equilibrium amount, and vice versa. For when the demand price is greater than the supply price, the amount produced tends to increase. Therefore, if the demand price is greater than the supply price for amounts just less than an equilibrium amount; then if the scale of production is temporarily diminished somewhat below that equilibrium amount, it will tend to return; thus the equilibrium is stable for displacements in that direction. If the demand price is greater than the supply price for amounts just less than the equilibrium amount, it is sure to be less than the supply price for amounts just greater; and therefore, if the scale of production is somewhat increased beyond the equilibrium will be stable for displacements in that direction

---

1. ibid., p. 348. See also Book V, chapter v, p. 380. Marshall's graphic representation of normal equilibrium in the long run closely resembles Fleeming Jenkin's representation of his third law of supply and demand; see section I of chapter 8 above. Marshall claimed to have drawn his curves before seeing Jenkin's work however. See ibid., Book V, chapter xiii, p. 476, and Notes, pp. 533-4.

also."[1]

Clearly, equilibria will always be stable in the case of increasing
or constant costs.[2]

It is the case of decreasing costs which gives rise to the
possibility of unstable equilibrium. Such a possibility arises in
the context of multiple positions of equilibrium. Consider Figure 9.5.

<center>Figure 9.5[3]</center>
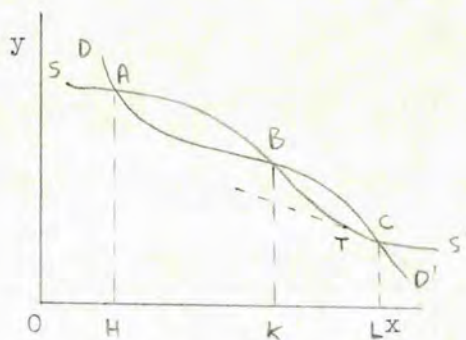
With Oy price and Ox aggregate production, three positions of equilibrium
are depicted at points A, B and C. Points A and C are positions of
stable equilibrium on the criteria given above, but point B is a
position of unstable equilibrium. Thus, if output chanced to be OK
initially, and there was a slight disturbance in the market, production
would move away to OH in one direction or to OL in the other. Given
that the supply and demand curves are continuous, positions of stable
and unstable equilibrium will alternate, with the last position to
the right being a stable one, since costs cannot fall to zero.[4]
Marshall's mathematical background allowed him to make short shrift of

---

1. ibid., Book V, chapter iii, pp. 345-6.

2. In addition, equilibrium is stable under increasing returns as
long as supply is less steeply sloped than demand.

3. Principles, Appendix H, p. 806 n. 1.

4. Moving from zero production it is possible that the first equi-
librium encountered would be an unstable one. In such circumstances,
production will be zero unless chance factors or foresight on the part
of producers starts production at a larger scale. See ibid., pp. 806-7 n. 1.

these possibilities, and his work remains a standard reference on this subject. Marshall himself, however, put little store by the usefulness of this analysis, (not least because he regarded the long run supply curve as not fully reversible),[1] and this is evidenced by his relegation of it to a footnote in an appendix in later editions of the Principles.[2]

The second development of long run normal analysis we shall consider is Marshall's treatment of comparative statics.[3]

---

1. Marshall believed that economies of scale once attained are not easily given up. Thus in Figure 9.5 whilst production might expand along SS', at a position T production would only be contracted along the dotted line rather than along SS'. In such circumstances, the possibility of multiple equilibria is much reduced: (ibid., pp. 807-9). See M. Blaug, Economic Theory in Retrospect, p. 418. Note also that positions of unstable equilibrium per se are of no practical importance since, by definition, the model always moves away from them. The problem is rather one that with several stable equilibria it is possible that relatively small changes cause large oscillations in price from one equilibrium position to the other.

2. Stability was discussed in the text in Book V, chapter v of the 1st edition (1890), and in Book V, chapter xi of the 2nd (1891) and 3rd (1895) editions. In the 4th edition (1898) it was relegated to a Note to Book V, chapter xi, whilst in the 5th edition (1907) it took its place as Appendix H. The actual technical analysis dates from the 1st edition when it was even then in a footnote. (See ibid., Notes, pp. 800, 802). For a discussion of the relation of Marshallian and Walrasian stability, where it is shown that the former involves quantity movements whilst the latter involves price movements, see M. Blaug, Economic Theory in Retrospect, pp. 411-414.

3. Principles, Book V, chapter xiii.

Firstly, he examines the effects of an increase in normal demand. This will increase, decrease or leave price unchanged depending on whether costs are increasing, decreasing or constant (Figure 9.6).

Figure 9.6[1]
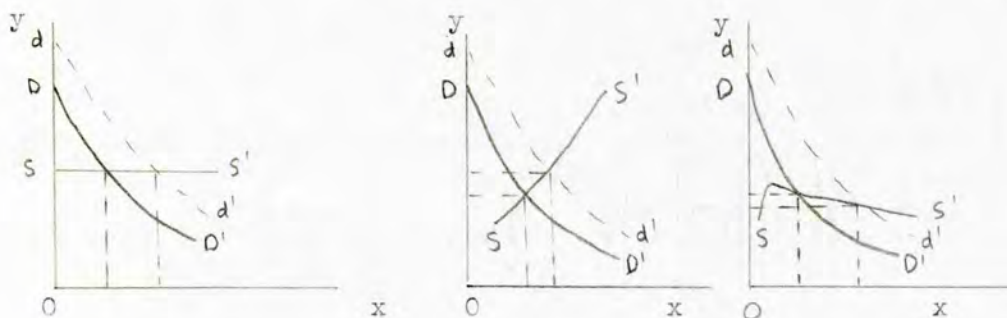
The first case of constant costs shows the Classical theorem that it is cost of production which determines value. In this case, price is completely independent of the level of demand for the commodity.[2] The third case in Figure 9.6 indicates that in the long run when increasing returns are present an increase in demand will lower price. Such a possibility does not arise in the short run, when costs generally increase, but Marshall felt that it was a very real possibility in the long run as economies of scale are taken up. Turning to an increase in supply, price will be lowered, the magnitude of the effect increasing as we move from decreasing to increasing returns (Figure 9.7)

Figure 9.7[3]
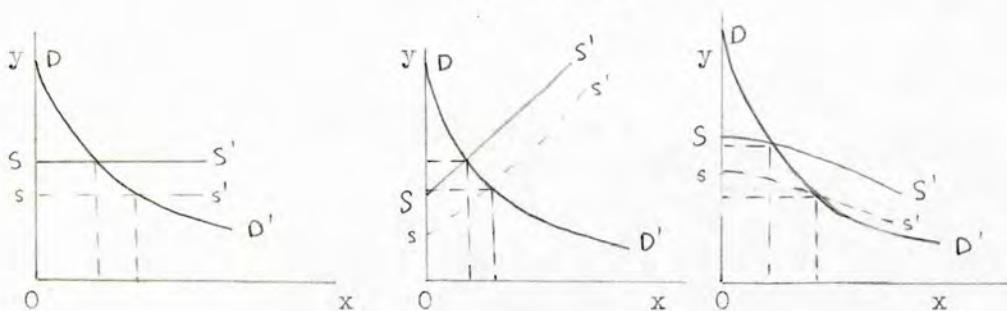
1.   ibid., p. 464 n. 1.

2.   Compare Jenkin's analysis in chapter 8, section I above.

3.   Principles, p. 466. n. 1.

The fall in price and increase in production resulting from the increase in supply will be greater the more elastic the demand. Again Marshall provides the standard reference with respect to the comparative statics of competitive equilibrium in the long run, demonstrating once again the importance of a mathematical background to the economic theorist.

Enough has been said of the content of Marshall's analysis of long run normal price to indicate his theoretical achievement. We shall therefore turn to several points of more broad interest. The first point concerns Marshall's use of the term "supply" in his three categories of competitive analysis. Whilst in each case, "supply" refers to the quantity offered for sale at each price, given the period under consideration, it is clear that the term denotes a separate concept for each such period. We have already seen that in temporary equilibrium "supply" means little more than the stock available for sale, and that indeed Marshall himself stressed the peculiar nature of "supply" in this case.[1] However, he failed to bring out clearly the fact that "supply" differed between the short and long periods as well. In the short run it is the sum of the marginal cost curves of the producers (except when demand is low). In the long run, however, it is the unit cost curve of the representative producer i.e. it shows the supply at each price when complete adjustment of resources and firms has occurred. For a given level of demand, therefore, it is the sum of the optimum outputs of the producers, and whilst each producer produces on its marginal cost curve as before, the supply curve is the sum of the marginal cost curves in the long run only in the sense that only the point where marginal cost equals average cost is considered.[2] As Marshall noted, only in a stationary state when costs are constant are the curves the same, so that the distinction of the short and long run disappears.[3] In non-stationary situations, however, Marshall tended to fudge over the distinction of supply in the short and long run in his attempt to maintain the unity of his analysis.[4] When a

---

1. The supply is not completely fixed in the temporary model, but it is presumably fairly inelastic.
2. See any standard text, such as Tisdell, Microeconomics, chapter 8.
3. Principles, Book V, chapter v, pp. 366-8.
4. For an attempt at sorting out Marshall's loose treatment of "supply" in this context see Frisch, op. cit., passim.

better service may have been done by laying it bare.[1]

The second point we shall make is the broader one concerning "the controversy whether 'cost of production' or 'utility' governs value".[2] Whilst Schumpeter has taken the view that we can discount the importance of Ricardianism in the _Principles_,[3] it seems clear that Marshall's treatment of competition owes more to Ricardo than to Jevons. The theory of normal equilibrium with reference to long periods was, as we have seen, essentially a development from the Classical analysis of the competitive industry, and as such took the central position in Marshall's competitive analysis. Compared to this Jevons' work only found representation in Marshall's much less prominent discussion of temporary equilibrium, and then the presentation bore more resemblance to Classical market price analysis that to Jevons' exposition. In Marshall's view, Jevons claim that "value depends entirely upon utility" was

"no less one-sided and fragmentary, and much more misleading, than that into which Ricardo often glided with careless brevity, as to the dependence of value on cost of production".[4]

---

1. We shall in section II below that Marshall also presented his monopoly analysis in terms of demand and supply. In this analysis, however, supply did not even have the meaning of being the quantity offered for sale at each price.

2. ibid., Book V, chapter iii, pp. 348-50. See also ibid., Appendix I.

3. Schumpeter, op. cit., p. 837.

4. op. cit., Appendix I, p. 817. Marshall betrays a much more charitable outlook on Ricardo's work than on Jevons' in this Appendix. Whilst many of his criticisms of Jevons are justified, in particular Jevons' failure to realise that equilibrium is simultaneously determined rather than determined in a causal chain (ibid., p. 818), Marshall's criticism of his work is perhaps too harsh. There is a case to be made for the radical approach to economics even if in the event much of the fuss turns out to be over nothing.

Reconciliation of the two lines of thought Marshall saw in his treatment of time. Jevons' case that value is determined solely with reference to the demand side of the market, implies a given stock of the commodity for sale, which may be considered to be the case if the market period is under discussion. However, such a perspective is essentially temporary, and is not a firm basis for disproving doctrines as to ultimate tendencies.[1] On the other hand, the belief that cost of production alone determines value is only strictly true when costs are constant, which Marshall takes as an implicit assumption of Ricardo's analysis.[2] When costs are not constant, the level of demand does have some effect on value, and it was one of Marshall's chief aims to trace this effect in his long run normal analysis. As a general rule, therefore the position may be summarised as follows:-

"the shorter the period which we are considering the greater must be the share of our attention which is given to the influence of demand on value; and the longer the period, the more important will be the influence of cost of production on value."[3]

But in the event it was the long run which was central to Marshall's analysis, and so in this context we must place him in the Classical line of development.

(4) The Problem of Increasing Returns and Competitive Equilibrium

In this section we shall investigate the problem which arises with respect to increasing returns and competitive equilibrium. Marshall put it this way in the 2nd edition of the Principles:-

"the producer whose normal marginal expenses of production are just equal to the normal demand price in the market would generally have no inducement to raise additional produce, even though he could market it on the same terms as the rest. But in the case of a commodity that obeys the law of increasing return, the point at which

---

1.   ibid., p. 821.   2.   ibid., p. 814.

3.   ibid., Book V, chapter iii, p. 349. See also Marshall's famous references to the blades of a pair of scissors: ibid., p. 348, p. 820.

the producer should stop is not so clearly marked out. It may seem
at first sight that by doubling his production, he will increase
very much his internal economies, and, marketing his output on
nearly the same terms as before, he will more than double his profits.
It may be argued that so long as this course is open to him, his
production can never be in equilibrium."[1]

If, then, producers operate with increasing returns, they will indefin-
itely expand production, so that the assumptions of the competitive
model no longer hold:-

"when the production of a commodity conforms to the law of
increasing return in such a way as to give a very great advantage to
large producers, it is apt to fall almost entirely into the hands of
a few large firms; and then the normal marginal supply price cannot
be isolated on the plan just referred to, because that plan assumes
the existence of a great many competitors with businesses of all
sizes, some of them being young and some old, some in the ascending
and some in the descending phase. The production of such a commodity
really partakes in a great measure of the nature of a monopoly; and
its price is likely to be so much influenced by the incidents of the
campaign between rival producers, each struggling for an extension of
territory, as scarcely to have a true normal level."[2]

Thus it would appear in cases of increasing return it would be nec-
essary to turn towards monopoly theory. This was, of course, the
solution suggested by Sraffa in 1926 and put into effect by Robinson
in 1933.[3]

Marshall, however, saw the matter differently. Whilst accepting
increasing returns as an important real world phenomenon, he strove
to maintain the Classical analysis of long run normal price by a
number of devices, the most important of which was his concept of
"the representative firm". In a letter to A.W. Flux dated 7 March 1898
he says

"My confidence in Cournot as an _economist_ was shaken when I

---

1.   ibid., _Notes_, p. 524.

2.   ibid., Book V, chapter vii, p. 397.   3.   See the next chapter.

found that his mathematics re I.R. (increasing returns) led inevitably to things which do not exist and have no near relation to reality. One of the chief purposes of my Wanderjahre among factories was to discover how Cournot's premises were wrong. The chief outcome of my work in this direction, which occupied me a good deal between 1870 and 1890, is in the "Representative Firm" theory, Principles, pp. 348-90, the supplementary cost analysis, pp. 435-8 and 464-70; as well as the parts that directly relate to supply price for I.R."[1]

Rather than admit that increasing returns seriously restricted the applicability of his analysis, Marshall presented several lines of defence for its inclusion which we must now examine.

For this purpose the most useful reference is § 2 of Book V, chapter xi of the 2nd edition of the Principles, a shortened version of which became § 2 of Book V, chapter xii from edition 4 on.[2] Marshall's first argument centres on the importance of distinguishing industry supply from the supply of an individual firm. An individual businessman subject to significant increasing returns might in time build up a monopoly of his trade

---

1. Principles, Notes, p. 521. References to the 8th edition are to pp. 267-313, 359-62 and 395-400 respectively.

2. ibid., Notes, pp. 523-529. From the 4th edition certain portions of this passage were transferred to Book IV, chapter xi, § 5 whilst only a resumé remained in Book V, chapter xii, §2. Rather than cross-reference, all references are to the passage in the second edition reproduced in the Notes, pp. 523-9. There is no evidence that Marshall's views on increasing returns changed significantly through the editions of the Principles, although his shortened summary of the argument from edition 4 might be interpreted as meaning that he was aware that problems still remained in his treatment of increasing returns which in typical fashion he tended to cover up.

"if, as his business increased, his faculties adapted themselves
to his larger sphere, as they had done to his smaller; if he retained
his originality, and versatility and power of initiation, his per-
severance, his tact and his good luck for a hundred years together."[1]

But in actual practice firms typically have a life cycle of growth and
decay, which Marshall summed up in his famous analogy of the trees of
the forest:-

"But here we may read a lesson from the young trees of the forest
as they struggle upwards through the benumbing shade of their older
rivals. Many succumb on the way, and a few only survive; those few
become stronger with every year, they get a larger share of light
and air with every increase of their height, and at last in their
turn they tower above their neighbours, and seem as they would grow
on for ever, and for ever become stronger as they grow. But they
do not. One tree will last longer in full vigour and attain a greater
size than another; but sooner or later age tells on them all. Though
the taller ones have a better access to light and air than their
rivals, they gradually lose vitality; and one after another they give
place to others, which though of less material strength, have on
their side the vigour of youth."[2]

Hence to consider a single firm taking control of a trade through its
economies of scale is to abstract from an important real world
phenomena which prevents such monopolisation taking place.

The answer to this dilemma Marshall saw in his concept of "the
representative firm". Whilst real world businesses were typically
part of a disequilibrium process of growth and decay, it was possible
to abstract from this process for purposes of considering long period
movements of price, by representing the general conditions of supply
in an industry in terms of a representative firm:-

"we must be careful not to regard the conditions of supply by

---

1. ibid., p. 524.

2. ibid., Book IV, chapter xiii, pp. 315-6. Marshall admitted
from the 6th edition (1910) that joint-stock companies "which often
stagnate, but do not readily die" may upset this process, but he felt
that "it still holds in many industries and trades" (ibid., p. 316).

individual producer as typical of those which govern the general
supply in a market, without taking account of the fact that very few
firms have a long-continued life of active progress; and that while
some are growing, others are sure to be decaying, like the older trees
of the forest; so that their normal productive power remains nearly
constant, though the yield of each one of them is generally either on
the rise or the decline".[1]

The representative firm enabled Marshall to take account of the general
availability of internal and external economies in an industry, whilst
not considering the actual growth and decay of firms in the industry.

The problem with this line of analysis is not that it is invalid
to draw a "supply schedule which represents prices diminishing as the
amount produced increases".[2] Such a supply curve can be drawn even
though no firm in the market is experiencing increasing returns.
Consider Figure 9.8.

Figure 9.8
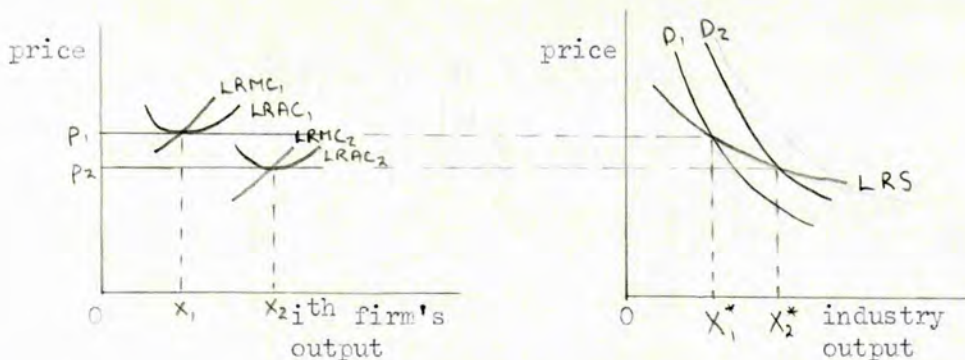
The firm in the left hand diagram has increasing marginal costs and
in equilibrium will produce where price equals marginal cost equals
average cost (since only normal profits are earned). With initial
demand D_1, it produces output x_1, and industry output is x_1^*. If we
now increase industry demand to D_2 and assume that the resultant
increase in industry production gives rise to external economies of
scale, the firm's cost curves will shift downwards to $LRAC_2$ and $LRMC_2$.
In these circumstances, the new equilibrium price, p_2 will be lower
and industry production, x_2^*, higher than previously, so that the supply
curve, LRS, in the right hand diagram slopes downward. Thus external
economies provide the basis for a negatively sloped supply curve which
is consistent with competitive analysis.

---

1. ibid., Notes, p. 525.   2. ibid., Notes, p. 524. n. 1.

The problem with Marshall's analysis is rather over whether his device of the representative firm allows him to deal adequately with internal economies. And the answer is clearly that it does not. The suggestion that firms grow and decay sidesteps the issue of the tendency to monopoly under increasing returns. Marshall himself seems to have realised this for he says:-

"the objection is that the decay of human energies is after all a slow process, and that, if a large output would cost much less in proportion than a small one, an able and energetic man could often find the means of increasing his output tenfold or more within a period very short in comparison with the length of his own life".

Thus the growth and decay of firms is a long-term process, so that it does not prevent a firm taking advantage of scale economies and obtaining a large market share. Under such conditions the representative firm becomes a redundant concept, as normal analysis itself does when competitive conditions break down.

Marshall meets this objection by raising a second line of defence. This is that for the tendency to monopoly to be operative two conditions must be fulfilled: there must be significant internal economies in an industry, and producers must be able to market their extra output easily. Such conditions, Marshall argues, are rarely fulfilled together, so that the long run normal model can be applied to the usual case

"It must be admitted... that there are a few industries, in which these two conditions do coexist; and that such industries are, for that very reason, in so transitional a state that for the time there is nothing to be gained by trying to apply the statical theory of equilibrium of normal demand and supply to them. They must be thought of as in motion, rather than at rest. But, on the other hand, these industries are very few in number. For, though there are many industries in which an individual producer could secure much increased internal economies by a great increase of his output; and there are many in which he could market that output easily; yet there are few in which he could do both. And this is not an accidental but almost a necessary result."[1]

---

1.   ibid., Notes p. 526.

It is a necessary result because commodities can be broadly classified into two categories under which different conditions prevail.

On the one hand in large markets, such as for raw materials or simple commodities like calico or steel rails, there is ease of marketing but the possibility of large cost advantages of increased size are small. Producers usually produce such simple commodities using the newest equipment embodying the latest technology. Under these circumstances,"there remains no very great difference between the economies available by a large and by a very large firm".[1] Thus, whilst a producer would find it easy to market any increased output, the incentive to increase output is small due to the lack of untapped scale economies. Hence, in large markets, the tendency to monopoly is not a significant factor:-

"In these industries, in short, the tendency of large firms to drive out small ones has already gone so far as to exhaust most of the strength of those forces by which it was originally promoted."[2]

On the other hand, commodities in which increasing returns are strong, usually come under the head of "specialities":-

"Many of them are adapted to special tastes; some can never have a very large market; and some have merits that are not easily tested, and must win their way to general favour slowly. In all such cases the sales of each business are limited, more or less according to circumstances, to the particular market which it has slowly acquired."[3]

In such particular markets, additional output can only be marketed at a lower price, i.e. the producer is no longer a price-taker in his particular market.

"When a business is thus confined   more or less to its own particular market, a hasty increase in its production is likely to lower the demand price in that market out of all proportion to the increased internal economies that it will gain, even though its production is but small relatively to the broad market for which in

---

1. ibid., Notes, p. 526.   2. ibid., Notes, pp. 526-7.

3. ibid., Notes, p. 527.

a more general sense it may be said to produce.

.... This may be expressed by saying that when we are considering
an individual producer, we must couple his supply curve - not with
the general demand curve for his commodity in a wide market - but
with the particular demand curve of his own special market. And
this particular demand curve will generally be very steep, steeper
than his own supply curve is likely to be even when an increased
output will give him an important increase in internal economies."[1]

Marshall's second line of defence is thus that, on the one hand,
in wide markets potential internal economies are not important,
whilst where they are important in more narrow markets, the tendency
to increased firm size is halted by downward sloping demand curves,
so that relative to the broad market of which they are a part,
producers are not large enough to violate the competitive assumptions.
This ingeneous argument contains important insights into the operation
of real world industries. At the same time, however, it is open to
objection. Is it true for instance that potentialities for increasing
returns in large markets are exhausted before competitive assumptions
are violated? Or again, in what sense is it possible to treat pro-
ducers as monopolists in their particular markets, whilst treating them
as competitors in a broad market? In the event, Marshall's argument
reduces only to an article of faith that internal economies are not
important enough to upset his general usage of the normal model.

This article of faith is evidenced by Marshall's repeated
emphasis on not pushing the reasonings of static theory too far, and
his belief that the Mecca of the economist lay in economic biology
rather than economic mechanics:-

"The theory of stable equilibrium of normal demand and supply
helps to give definiteness to our ideas; and in its elementary
stages it does not diverge from the actual facts of life, so far as
to prevent its giving a fairly trustworthy picture of the chief
methods of action of the strongest and most persistent group of
economic forces. But when pushed to its more remote and intricate
logical consequences, it slips away from the conditions of real life.

----

1.   ibid., Notes, p. 527. The second paragraph of this quotation
comprises a footnote of the first.

In fact we are here verging on the high theme of economic progress; and here therefore it is especially needful to remember that economic problems are imperfectly presented when they are treated as problems of statical equilibrium, and not of organic growth. For though the statical treatment alone can give us definiteness and precision of thought, and is therefore a necessary introduction to a more philosophic treatment of society as an organism; it is yet only an introduction."[1]

Nevertheless, despite all these arguments, the problem of the inconsistency of increasing returns and competitive equilibrium remains. Marshall did his best to minimise the importance of this inconsistency but he could not remove it completely. It was this problem which was to give rise to the move towards monopoly suggested by Sraffa in 1926. Marshall despite his various arguments to the contrary was not able to counter the essential logic of the competitive analysis. His attempt at doing so may have thrown up a few red herrings to delay the reaction of later economists; but in the end the problem of increasing returns would have to be dealt with.

1.   ibid., Book V, chapter xii, p. 461.

II. Marshall's Monopoly Analysis

Marshall's analysis of monopoly appears in an isolated chapter (chapter xiv) towards the end of Book V of the Principles.[1] In this chapter, he provides what Schumpeter has referred to as "his masterly version of Cournot's theory"[2] and we shall concentrate in this section on the refinements and extensions to Cournot's analysis which Marshall introduced. In this exposition we shall neglect, in line with our general policy in this thesis, the welfare aspects of Marshall's analysis. It must be remembered, however, that such considerations were a leading part of Marshall's contribution, so that we do not of necessity capture the whole of his performance in this discussion.[3]

We have already noted that Marshall probably read the Recherches in 1868, the year in which he turned to economics.[4] In addition, we have it on his own authority that

"My main position as to the theory of value and distribution was practically completed in the years 1867 to 1870.... In the next four years I worked a good deal at the mathematical theory of monopolies, and at the diagrammatic treatment of Mill's problem of international values."[5]

---

1. This analysis dates substantially from the First Edition, where it appeared as Book V, chapter viii.

2. Schumpeter, History of Economic Analysis, p. 960.

3. Marshall's positive analysis of monopoly in Book V, chapter xiv was but a preliminary step to his "study of the relations in which the interests of the monopolist stand to those of the rest of society" (Principles, Book V, chapter xiv, p. 477). For the full sweep of this analysis of optimal public pricing, the reader should consult: ibid., Book V, chapter xiv, pp. 487-493 and Mathematical Note XXIII bis; pp. 856-8.

4. In a letter to J.B. Clark dated 2 July 1900 he says "I fancy I read Cournot in 1868" (reprinted in ibid., Notes, p. 9.)

5. From a letter to J.B. Clark dated 24 March 1908 and reprinted in ibid., Notes, p. 10.

375.

The dating of his monopoly analysis to the early 1870s is confirmed
in an article he wrote in 1898,[1] and is supported by the abstract of
a paper he read to the Cambridge Philosophical Society in 1873.[2]
In this section we shall see that Marshall refined and developed the
bare theoretical bones of Cournot's analysis making his version of
it characteristically his won. This will be clear from, in
particular, his exposition of the analysis in terms of "demand and
supply", a consideration we shall turn to first.

In Book V, chapter xiv of the Principles, Marshall defines a
monopolist as a single seller of a commodity:-

"At present we consider only those general causes determining
monopoly values, that can be traced with more or less distinctness
in every case in which a single person or association of persons
has the power of fixing either the amount of a commodity that is
offered for sale or the price at which it is offered."[3]

Such a seller, following Cournot, is initially assumed to maximise
his net revenue, the difference between revenue and costs:-

"The prima facie interest of the owner of a monopoly is clearly
to adjust the supply to the demand, not in such a way that the price
at which he can sell his commodity shall just cover its expenses of
production, but in such a way as to afford him the greatest possible
total net revenue."[4]

---

1.   "Distribution and Exchange", Economic Journal, vol. viii, 1898.
A portion of this articles is reprinted in ibid., Notes, pp. 62-75,
and the reference is to p. 69, n. 1, of this reprint.

2.   The paper was entitled 'Graphic Representation by aid of a series
of Hyperbolas of some economic problems having reference to Monopolies'.
A short abstract of the paper, which unfortunately gives no specific
details of its contents, appears in 'Proceedings of the Cambridge
Philosophical Society' for October 1873.

3.   Principles, p. 477. Marshall's later volume Industry and Trade
(Macmillan: London, 1919) considers monopoly in the wider sense of cartels
and trusts.
4.   ibid., pp. 477-8.

Marshall chooses to represent the equilibrium solution to the model in terms of supply and demand curves. By demand he refers to the monopolist's average revenue curve, and by supply he refers to his average cost curve.[1] Thus, taking the example of "a gas company that has the monopoly of the supply of gas to a town", he says:-

"The demand schedule for gas remains the same as it would be if gas were a freely-produced commodity; it specifies the price per thousand feet at which consumers in the town will among them use any given number of feet. But the supply schedule must represent the normal expenses of production of each several amount supplied."[2]

Given these two schedules, it is then possible to derive "a monopoly revenue schedule" by subtraction:-

"Having set against each several amount of the commodity its demand price, and its supply price estimated on the plan just described, subtract each supply price from the corresponding demand price and set the residue in the monopoly revenue column against the corresponding amount of the commodity."[3]

This procedure is followed in Figure 9.9, where

Figure 9.9[4]

---
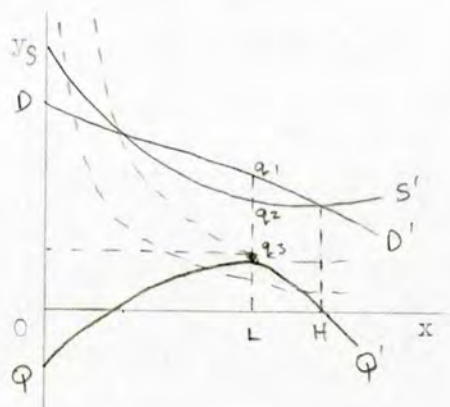
1. Marshall's motivation in adopting this approach is discussed below.

2. op. cit., pp. 478-9.   3. ibid., p. 479.

4. ibid., pp. 479-80, n. 1, Figure 34.

Oy measures price and Ox output whilst DD' is the demand curve and SS' the supply curve. For any point L on Ox, if we draw a perpendicular line Lq_2q_1, cutting SS' in q_2 and DD' in q_1, and along it mark off q_3 such that $Lq_3 = q_1q_2$, then the locus of q_3 defines the monopoly revenue curve, QQ'.

We are now in a position to determine monopoly equilibrium. This will be an output rate OL such that $OL \times Lq_3$ is a maximum. Imagine a series of rectangular hyperbolas drawn in Figure 9.9, of which two (represented by dotted lines) have been drawn. Such curves have the property that at each point on them Ox times Oy equals a constant. Thus, since price and quantity form our axes, they are "constant revenue curves."[1] The further from the origin is one of these curves, the higher is the (constant) revenue it relates to. The equilibrium output is thus determined such that the monopoly revenue curve is just tangential to the highest attainable constant revenue curve. In Figure 9.9 tangentcy occurs at q_3, equilibrium output is OL, and the price charged, as indicated by the demand curve, is Lq_1. In algebraic terms, if $y = f_1(x)$ is demand and $y = f_2(x)$ is supply, then equilibrium output is such that

$$\frac{d}{dx}\{x \cdot f_1(x) - x \cdot f_2(x)\} = 0$$

$$\therefore \ x \cdot f_1'(x) + f_1(x) - x \cdot f_2'(x) - f_2(x) = 0 \quad (9.1)^2$$

---

1.   ibid., pp. 479-80, n. 1.

2.   ibid., Mathematical Note XXIII _bis_, p. 857.   Re-arranging equation 9.1 we have

$$f_1(x) - f_2(x) = x\{f_2'(x) - f_1'(x)\}$$

The left hand side of this equation is positive if a profit is made, so that in the equilibrium position the supply curve, if negatively inclined, must have a less steep slope than the demand curve. This is evidently the case on inspection of Figure 9.9.

Marshall's method of exposition of monopoly equilibrium, as exemplified in Figure 9.9, was original to himself, and as Schumpeter has noted "not everyone will consider (it) superior to Cournot's."[1] It seems clear that Marshall chose the rather cumbersome procedure of using demand and supply curves, in order to maintain a superficial unity with his competitive analysis.[2] But this unity is only superficial, as Marshall was aware, since the monopoly supply curve, as he had defined it, was not a true supply curve at all.[3] In competitive analysis the supply curve indicates the output forthcoming at each price. In monopoly analysis, however, "the supply curve" does not perform this role, but rather traces the unit costs of the monopolist. Thus it is analogous to the competitive supply curve only in so far as the latter also represents the average costs (of the representative producer). But under monopoly, equilibrium does not involve the equality of demand and supply. Clearly, if the monopolist makes a profit he will always produce where demand exceeds supply on Marshall's definitions of these terms. In monopoly analysis moreover it is not possible to construct a supply curve in the sense that one can in competitive analysis. Marshall's use of supply and deamnd in his monopoly analysis thus had the twin defects of being misleading and also of making his analysis cumbersome. This latter problem was only overcome in the late 1920s, when the (re)-discovery of marginal curves, implicit in Cournot's mathematics, allowed a much more direct representation of monopoly equilibrium.[4]

---

1. Schumpeter, op. cit., p. 977.

2. The Classical economists, of course, applied supply and demand analysis to both competition and monopoly. Marshall, who was always keen to emphasise the continuity of his thought with the Classical economists, may have followed them in this, even though his monopoly model was derived from Cournot.

3. Marshall made reference to the supply curve being drawn to "a special plan" (see op. cit., p. 479).

4. For a discussion of this rediscovery see G.L.S. Shackle, The Years of High Theory: Invention and Tradition in Economic Thought, 1926-1939 (Cambridge University Press, 1967)

379.

Whilst, Marshall's method of exposition may be questioned, his
analytical developments more than make up for this. In the remainder
of this section we shall consider these under three main heads:
his analysis of the comparative statics of monopoly, his comparison of
competitive and monopoly pricing, and his discussion of alternative
goals the monopolist may pursue.

Turning to the comparative statics of monopoly, Marshall examines
the effects of various taxes on equilibrium. This analysis has as
its motivation the publicising of Cournot's results, with a few
embellishments, so that Marshall's exposition in the text uses a
numerical example, whilst geometry is relegated to footnotes, and
algebra to the Mathematical Appendix.[1] Since we have already met
this analysis in Cournot, we may be permitted to summarise it using
Marshall's algebra. Let the aggregate amount of the tax be $F(x)$,
whilst $f_1(x)$ is demand and $f_2(x)$ is "supply", as before. Then the
monopolist maximises profits by setting

$$\frac{d}{dx}\{x.\ f_1(x) - x.f_2(x) - F(x)\} = 0 \qquad (9.2)[2]$$

Marshall then takes three cases of the function, $F(x)$. Firstly,
if it is a constant, so that the tax is a fixed sum, then it has no
effect on monopoly equilibrium.[3] Similarly, a tax proportional to
monopoly revenue drops out on differentiation, so that there is no
effect on equilibrium.[4] Finally, however, a specific tax proportional

---

1. The references are op. cit., pp. 480-483 and Mathematical Note
XXIII, p. 856.

2. ibid., p. 856.

3. In terms of Figure 9.9 the lump sum tax causes QQ' to shift
down, such that equilibrium is at the same output as before, but
net revenue is reduced by the fixed amount.

4. If a is the tax rate it is necessary to maximise

$$\{x.f_1(x) - x.f_2(x)\}\{1 - a\}$$

which implies an unaltered equilibrium condition
$$x.f_1'(x) + f_1(x) - x.f_2'(x) - f_2(x) = 0$$
For further details see chapter 5 above.

to output will generally reduce output and raise price.[1] Each of these results is in the Recherches so that Marshall's contribution was largely that of making them known to a larger audience.

Marshall does, however, add several observations of his own. The first is simply that a tax on sales need not be strictly proportional for price to be raised; all that is necessary is that the aggregate amount of the tax, $F(x)$, increases monotonically with sales. This result is clear from equation (9.2)[2] A less obvious point deals with the magnitude of the price change resulting from a sales tax. Consider Figure 9.10.

Figure 9.10[3]
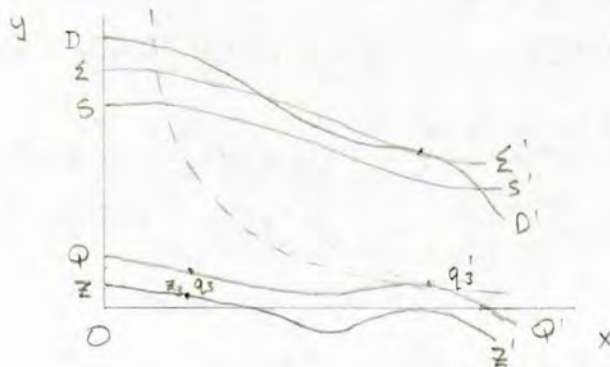
In this diagram the original demand, supply and monopoly revenue curves are DD', SS' and QQ', respectively. As drawn there are two positions of maximum profit, q_3 and q'_3, and the monopolist chooses position q'_3 on the highest attainable constant revenue curve (the dotted line). The effect of a tax is to raise the supply curve to $\Sigma\Sigma'$, and lower the monopoly revenue curve to ZZ', and

---

1. In this case the equilibrium condition is
$$x.f_1'(x) + f_1(x) - x.f_2'(x) - f_2(x) - a = 0$$
where a is the tax rate $(a > 0)$. This implies output is reduced and price higher after the tax.
2. Principles, p. 483, n. 1. With reference to equation (9.2) $F'(x)$ should be positive, and the analysis for a proportional tax applies.
3. This diagram reproduces the essentials of Marshall's Figure 35 (ibid., p. 483, n. 1). In Marshall's diagram, the demand and supply curves are drawn to cut each other more than once. Since, as he himself stresses, his argument does not depend on this possibility, we have avoided it in our Figure 9.10 in the interests of clarity.

"the chief point of maximum revenue will move from q'_3 to z_3, representing a great diminution of production, a great rise of price and a great injury to the consumers".[1]

Such a result arises because of the shape of the monopoly revenue curve. As a general rule, a given tax will have a greater effect on production "the more nearly the monopoly revenue curve approximates to the shape of a constant revenue curve'. In other words, the greater the range of output or series of outputs for which monopoly revenue is close to a maximum the bigger the likely effect of a tax on monopoly price. This result is not immediately obvious and Marshall argues that such results demonstrate the value of employing diagrams in economics:-

"Much instruction is to be got by drawing diagrams to represent various conditions of demand and of (monopoly) supply, with the resultant shapes of the monopoly revenue curve. A careful study of the shapes thus obtained will give more assistance than any elaborate course of reasoning in the endeavour to realise the multiform action of economic forces in relation to monopolies."[2]

As we have already noted in our discussion of Edgeworth above, Marshall does not explicitly analyse the effect of a rise in demand on monopoly price:-

"The full theoretical treatment of questions relating to the influence exerted on monopoly price by an increase of demand requires the use of mathematics for which the reader is referred to an article on monopolies by Professor Edgeworth in the Giornale degli Economisti for October 1897."[3]

However, Marshall thought that there was a presumption that a rise in demand would lower price

"It must be admitted that, other things being equal, the "mon-opoly revenue price" fixed by a railway will be lowered by every increase in the demand for its services, and vice versa.[4]

---

1. ibid., pp. 483-4, n. 1. 2. ibid., p. 483, n. 1.

3. ibid., p. 485, n. 2.

4. ibid., p. 485. Marshall is implicitly referring to a monopolist with decreasing costs at this juncture.

Referring to Figure 9.9, a uniform raising of DD' pushes L much to the right, and "the resulting position of q_1 will be probably lower than before".[1] However, if the new demand curve is more inelastic than before (the left side of DD' is raised more in proportion than its right) it may be that price will be raised. Marshall does not go on to make the conditions under which his results hold explicit. Nevertheless, despite his looseness, it is clear that he appreciated the essentials of the problem. These essentials, relating to iso-elastic demand shifts and the law of costs, were brought fully into the open only in 1933 with the publication of Joan Robinson's Economics of Imperfect Competition.[2]

Marshall next turns his attention to a comparison of monopoly price and competitive price. A superficial examination of Figure 9.9 above, indicates that monopoly output, OL, is always less than the output at which supply equals demand, OH.

"It may therefore appear as though the amount produced under a monopoly is always less and its price to the consumer always higher than if there were no monopoly. But this is not the case."[3]

---

1. ibid., p. 485, n. 2.

2. Robinson, op. cit., chapter 4. As Robinson observes:-
   "If the demand curve is reaised in such a way that the second demand curve is iso-elastic with the first, the price will be increased, reduced or remain the same according as marginal costs are rising, falling, or constant.
   If marginal costs are constant, and the new demand is less elastic than the old (at the old price), the price will rise; if it is more elastic, the price will fall." (ibid., p. 61).
   Marshall was considering the case of an iso-elastic and decreasing elastic shift with decreasing costs.

3. op. cit., p. 484.

The fallacy of such an argument lies in treating the competitive supply curve as identical with the monopoly supply curve. Marshall believed, generally, that if a multitude of small producers took over from the monopolist, the supply curve (of the representative producer) would indicate greater costs than the monopoly supply curve. Small firms in competition would have to spend more on advertising than a single firm, and they would be less able to avail themselves of economies of scale.[1] Further, Marshall believed, small firms have less incentive to invent than a single firm certain of reaping the whole benefit from an invention itself.[2] Referring again to Figure 9.9, the competitive supply curve would lie above SS', so that it would cut DD' at a lower output which "might not improbably lie to the left of L".[3] If this were the case, as it would be more likely to be the greater the monopolist's cost advantage, monopoly price would be lower than competitive price.

The possibility that price might be lower under monopoly than competition was first put forward by Marshall. As such it was against the conventional wisdom which, moreover, was supported by Cournot's demonstration that price was lowered in his oligopoly model by the addition of sellers to the market. As put forward by Marshall, however, the result is open to the criticism already discussed concerning increasing returns. Since the monopolist has decreasing costs, so one would expect the competitive firms also to experience internal economies.

---

1. The reference to competitive advertising indicates again Marshall's loose treatment of the competitive analysis.

2. Compare, however, the work of K.J.Arrow,'Economic Welfare and the Allocation of Resources for Invention' in National Bureau of Economic Research, The Rate and Direction of Inventive Activity (Princeton University Press, 1962) pp. 609-26.

3. op. cit., p. 485, n. 1.

If this is the case there will be a tendency to monopoly, so that the competitive analysis is no longer applicable.[1] Nevertheless, the essence of Marshall's demonstration that monopoly cost savings may put monopoly price below competitive price are valid and indeed form the basis of the modern analysis of anti-trust. In Figure 9.11, the monopolist has constant marginal costs, MC_m, and produces at price, P_m.

Figure 9.11

price

P_c
P_m ———— AC_c

———— MC_m

MR   D

O $q_c q_m$ output
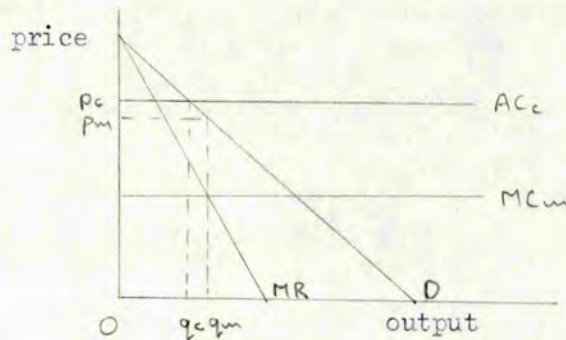
The competitive industry produces at higher average costs, AC_c, and competitive price, P_c, is above P_m. Clearly, if the situation is as depicted in Figure 9.11, there is a social gain to the formation of a monopoly. Whilst Marshall thought a lower monopoly price was a very rare occurrence,[2] the cost saving argument is nevertheless an important consideration for a rational anti-trust authority, and it is in Marshall's analysis that this consideration first received explicit treatment.[3]

---

1.   It is possible that the monopolist is operating a number of plants with increasing costs, and yet he experiences decreasing costs because he is able to internalise economies external to the plants. Marshall, however, did not draw a sharp line between internal and external economies in this context.

2.   op. cit., p. 60, n. 1.

3.   For a further treatment of this subject see C.K. Rowley, Anti-trust and Economic Efficiency, Macmillan Studies in Economics (London: Macmillan, 1973).
Clearly if social welfare is defined as the sum of net revenue and consumer's surplus, a monopoly may be preferable to competition even if monopoly price is higher.

Up to now we have supposed "the owner of a monopoly to fix the price of his commodity with exclusive reference to the immediate net revenue which he can derive from it."[1] However, Cournot had realised, and Marshall went on to emphasise that a single firm need not pursue such a policy. Whilst a competitive firm in long run equilibrium must profit maximise in order to survive, the monopolist has the power to choose its price over a certain range and still continue in business. Marshall felt that in practice there might be forces leading monopolists to charge lower than profit maximising prices, and he put forward three reasons for this.

The first reason is that "the monopolist may lower his price with a view to the future development of his business."[2] If demand in the future can be influenced by current pricing policy, it may pay the monopolist to charge a low price currently in order to build up a commitment to his product. Thus, for example, a railway company may offer low rates to a district or port which is just being developed, in order to encourage its development, and so secure a stronger demand for its services in the future. Or again, consider the case of a gas company:-

"The lower the price of gas, the more likely people are to have it laid on to their houses; and when once it is there, they are likely to go on making some use of it, even though a rival, such as electricity or mineral oil, may be competing closely with it."[3]

Marshall was well aware of the practical importance of such strategies, so that he stressed that the loss to consumers' surplus in such cases was not as great as might first appear.

A second consideration which Marshall noted in Book IV, chapter xi of the Principles relates to the possibility of entry preventing pricing. A monopoly which is not secure in its trade, Marshall calls " a limited monopoly", defined as

"a monopoly limited by the consideration that a very high price would bring rival producers into the field".[4]

---

1.   op. cit., p. 486.   2.   ibid., p. 486.

3.   ibid., p. 486.

4.   ibid., Book IV, chapter xi, p. 286.

Whilst Marshall does not analyse this case, he presumably felt that entry-preventing policies might lead to a lower than profit maximising price in the short run. Such issues he discussed at greater length in his practical study Industry and Trade, and we shall not pursue them further here.[1]

The final possibility that might induce a monopolist to lower price arises if the monopolist has an interest in the welfare of consumers.[2] If this is the case, then the monopolist will not maximise simply net revenue, but, either total benefit (the sum of monopoly revenue and consumers' surplus), or a compromise benefit (consisting of monopoly revenue and some fraction of consumers' surplus).[3] The first such policy involves maximising

$$\int_0^x f_1(\alpha).d\alpha - f_2(x).x \qquad (9.3)$$

where f_1 is demand and f_2 is supply as before. Such a policy leads to the marginal cost pricing solution

$$f_1(x) - f_2(x) - x.f_2'(x) = 0 \qquad (9.4)[4]$$

---

1. See, in particular, Industry and Trade, Book III.

2. Marshall is presumably thinking of public utilities here rather than philanthropic private businessmen.

3. These policies are discussed in detail in op. cit., Book V, chapter xiv, pp. 487-493 and Mathematical Note XXIII bis.

4. ibid., Mathematical Note XXIII bis, p. 857. The maximising of compromise benefit, where n is the fraction of consumer's surplus taken into account, involves the solution
$$(1 - n).x.f_1'(x) + f_1(x) - f_2(x) - x.f_2'(x) = 0$$
The additional term, $(1 - n).x.f_1'(x)$ is negative, so that price exceeds marginal cost in the compromise case.

Generally it will be true that

"Firstly, the amount which the monopolist will offer for sale will be greater (and the price at which he will sell it will be less) if he is to any extent desirous to promote the interests of consumers than if his sole aim is to obtain the greatest possible monopoly revenue; and secondly, the amount produced will be greater (and the selling price will be less) the greater be the desire of the monopolist to promote the interests of consumers."[1]

Marshall's analysis of these possibilities represent a classic investigation into social pricing.

In conclusion we can see that Marshall made important advances in his treatment of monopoly over Cournot's analysis. Whilst his exposition in terms of supply and demand curves can be criticised, his contributions to comparative static analysis were noteworthy, as was his pioneering comparison of price under competition and monopoly. Throughout his discussion of monopoly, Marshall was concerned to make his analysis realistic, and this was the motivation behind his consideration of alternative goals of the monopolist. This latter analysis, together with his comparison of competition and monopoly, and his consideration of social pricing, indicates the importance of Marshall's achievement in laying the foundations of a vast literature by subsequent economists on each of these topics.

Despite his notable achievements in developing Cournot's theory of monopoly, Marshall remained sceptical of its practical importance. In a letter to Edgeworth, dated 28 August 1902, he says, with reference to monopoly:-

"I am confirmed in my opinion that Cournot's method of treatment is wholly inapplicable to the real conditions of life. His discoveries were, I think - in so far as they claimed to have a bearing on real problems - rediscoveries of things that had been known in the XVII and better in the XVIII century as the result of the working of the chartered companies. In all the vast talk which I have put into

---

1.   ibid., p. 489.

388.

writing on them I have seldom been tempted to refer to the abstract theory of monopolies, except of course in the general introduction.

No instance could, I think, be better of the _mischievousness_ of an academic education in abstract _economics_ not continued into _real_ economics.... than the inferences which Cournot's method suggests as to the relative efficiencies and inefficiencies, public usefulnesses and mischiefs of different forms of combination and monopoly."[1]

Marshall therefore believed that Cournot's monopoly analysis ought to be diluted with a large measure of common-sense in real world application. Paradoxically, however, Marshall's isolated chapter on monopoly had the effect of bringing Cournot's analysis to a wider audience; and, moreover, it was instrumental in the general adoption of the analysis by the economics profession, in place of the Classical notion of limited supply. In doing this, Marshall, ironically, set the stage for the takeover of price theory by monopoly in the 1920s and 1930s. When it was found that Marshall's competitive analysis involved problems which necessitated a move towards monopoly, the basis of such a move was present in none other than Marshall's version of Cournot's theory. It is perhaps a measure of the importance of Marshall's work that not only does it contain the theory which was to fall from favour, but also the makings of the theory which was to rise (albeit temporarily) to replace it.[2]

---

1. ibid., _Notes_, p. 536. Marshall's harsh criticisms of Cournot, even taking into account his wish to have a dig at Edgeworth's abstract approach to economics, are hardly warranted, given that Marshall owed so much of his own analysis to Cournot's work. We have seen in this thesis, in addition, that Cournot's work on monopoly was in no way anticipated by writers of the XVII and XVIII centuries.

2. Marshall, of course, would have abhorred the imperfect competition revolution, his work on value being largely an attempt to advance a broad-brush competitive approach.

III. Marshall's Contribution

It should be clear from what has been said in this chapter as
to the central position of Marshall's Principles in the development of
competition and monopoly analysis. Whilst individual writers, of whom
the most important was Cournot, worked at developing individual aspects
of competition and monopoly theory, Marshall's greatness in the last
analysis lay in his ability to present these individual contributions
in a whole system of analysis. In this system, Marshall was able to
incorporate both the analysis of the competitive producer and the
competitive industry by the device of dividing normal equilibrium
into the short and long run. He was thus able to present the classic
analysis of perfect competition, in so far as his system of analysis
mapped out the modern partial equilibrium approach to the model.

Whilst Marshall's technical contributions were important, his
scheme of analysis still left scope for many of the details to be
filled in by subsequent economists in the 1920s and 1930s. But also
there was more than detail to be dealt with; there was also the problem
of increasing returns. Despite his attempts to deal with this problem,
Marshall had not been able to do the impossible and reconcile competi-
tive equilibrium with increasing returns. Whilst his work did not
expose the problem as directly as had Cournot, nevertheless he brought
the problem to a wider, non-mathematical audience. Subsequent
economists, whilst often misled by Marshall's tergiversations, were
bound to eventually seize on this central problem in the Principles.
Certainly in England Marshall's Principles was central to the imperfect
competition revolution of the inter-war years, in that it was through
this book that general economists became aware of the increasing returns
problem.

In line with the Classical economists Marshall only gave slight
emphasis to monopoly relative to competition. In his view the
competitive model was generally applicable to capitalist economies,
and monopoly analysis if applicable at all was only so in a restricted
number of situations. At the same time, however, Marshall was very
much aware of the importance of increasing returns, particularly in
manufacturing industry. Given that he had not succeeded in reconciling
increasing returns with competition, the presence of increasing returns

must lead to the erosion of competition in real world industry.
When subsequent economists came to realise this, it was perhaps natural
they would turn towards monopoly; the theory of monopoly presented in
Marshall's Principles. We have seen that Marshall was skeptical over
the relevance of Cournot's monopoly theory, yet, nevertheless, he
was instrumental in making it known to general economists in England.
Thus, paradoxically, when the attack upon Marshall's competitive theory
came in the 1920s, it turns out that the construction raised to replace
it was largely culled from the pages of Marshall again.

Chapter 10

From Competition to Monopoly

The period 1700-1926, despite many changes of detail, can generally be characterised as a competitive era. Practically all the economists we have met, from Smith to Marshall, were competitive economists in the sense that they felt capitalist economies were generally subject to the laws of competition. Further, they felt, often implicitly, that competition was also an optimal situation in the welfare sense. Within this framework, as we have seen, concepts and analyses were sharpened with the rise in the level of scientific rigour, in particular with the application of the powerful tools of mathematics, mainly in the second half of the 19th century. Further, the period saw changes of emphasis and content of competitive and monopoly theory often associated with these technical developments. Nevertheless, despite these many changes the framework remained competitive, the analysis of monopoly being reserved to take care of exceptions to the competitive rule.

The post-Marshallian era, however, saw a radical departure from this traditional view of the relation of competition and monopoly in economic theory. Received theory as developed and expounded in Marshall's Principles was suddenly revealed to be inconsistent with an important aspect of reality: increasing returns. It was, therefore, necessary to develop a theory to overcome this problem, and this theory was essentially at hand in the theory of monopoly. Thus the 1920s and 1930s saw a move from competition to monopoly in economic theory; a move to make the analysis of monopoly the general theory of capitalist economies. In this final chapter, we shall examine this move from competition to monopoly in the light of Piero Sraffa's classic article of 1926 which may properly be said to mark the turning point with respect to competition and monopoly analysis.

As is well known, dissatisfaction with received theory was expressed in the 1920s by a number of writers in the pages of the Economic Journal.[1] Whilst some of these contributions were wide of the mark, they nevertheless were indicative of a general feeling of disquiet over Marshall's competitive analysis. In order to meet objections raised, Pigou, who was Marshall's successor in the Cambridge chair, clarified and extended Marshall's analysis in reply.[2] But despite Pigou's undoubted theoretical superiority over most of the protagonists,[3] his defence of Marshall's analysis was essentially a rearguard action. Whilst he fought a brilliant campaign, Pigou had the misfortune, as he was also to have over Keynes' General Theory, of being on the wrong side. No matter what defence he took, he could not, like Marshall get round the inconsistency of increasing returns and competitive theory. The only answer to this problem was to abandon competitive theory.

---

1. The first paper of note was J.H. Clapham,' Of Empty Economic Boxes', Economic Journal, vol. XXXII, 1922, pp. 305-14. This and a number of other important contributions are reprinted in George J. Stigler and Kenneth E. Boulding, eds, Readings in Price Theory (George Allen and Unwin: London, 1956), Part II. For a more complete list of all the important 1920s articles, see 'Editor's Note: Increasing Returns and the Representative Firm: A symposium' Economic Journal, vol. XL, 1930, p. 79.

2. See A.C. Pigou, The Economics of Welfare (Macmillan: London, 1920). Subsequent editions appeared in 1924, 1929 and 1932. Of his various papers on value theory in the 1920s, see, in particular, A.C. Pigou, 'An Analysis of Supply' Economic Journal, vol. XXXVIII, 1928.

3. See, in particular, the early debate between Pigou, Clapham and Robertson on Empty Economic Boxes in the Economic Journal, vols. XXXII-XXXIV, 1922-4, reprinted in Stigler and Boulding, op. cit., pp. 119-159. This stricture about the poor quality of some of Pigou's opponents as economic theorists does not of course extend to Sraffa.

In 1933, Joan Robinson and Edward Chamberlin both published books
designed to re-orient the theory of value away from the traditional
competitive viewpoint.[1] These books, their similarities and
differences are not the explicit concern of this thesis.[2] However,
one point concerning both of them is of interest. This is their
attempt to introduce monopoly analysis generally into value theory by
assuming that producers face negatively sloped demand curves, whilst
ignoring the problem of inter-dependence of those demand curves.
The main thrust of both the imperfect competition and monopolistic
competition theories was to allow market power into the analysis
on the one hand, and yet to largely neutralise this advance on the
other by ignoring the oligopoly problem: the interaction of such
power between producers. This solution to the problems of competitive
theory, it will be argued below, itself involved problems which were
to prevent the effective abandonment of competitive theory.

The framework of this final chapter will be centred on Piero
Sraffa's classic 1926 article, 'The Laws of Returns under Competitive
Conditions'.[3] This brilliant essay clearly marks a turning point in

---

1.   Joan Robinson, The Economics of Imperfect Competition (1933)
(Macmillan: London, 1969); Edward H. Chamberlin, The Theory of Monopo-
listic Competition, A reorientation of the theory of value (1933)
(Oxford University Press, 1962).

2.   For a comparison of these theories, and also a general rehearsal
of the evidence, starting with Sraffa's 1926 article (see below), see
G.L.S. Shackle, The Years of High Theory: Invention and Tradition in
Economic Thought, 1926-1939 (Cambridge University Press, 1967).
Shackle takes the view that Robinson and Chamberlin put forward
essentially identical theories to replace competitive theory. For a
contrary view, see Blaug, Economic Theory in Retrospect, pp. 398-403.
See also Schumpeter, History of Economic Analysis, pp. 1150-1152.

3.   P. Sraffa, 'The Laws of Returns under Competitive Conditions,
Economic Journal, vol. XXXVI, 1926, pp. 535-50 reprinted in Stigler and
Boulding, Readings in Price Theory, pp. 180-197. All references are
to the latter source.

the development of competitive and monopoly analysis. It is divided
into two sections: the first critical, the second suggestive. In
the first part, Sraffa proposes and largely accomplishes the
demolition of Marshall's competitive analysis based on the laws of
increasing and decreasing returns. By applying the rules of logical
consistency, Sraffa powerfully demonstrates that Marshall's partial
competitive analysis is unable to occupy the central position in
value theory as the general model of price determination in capitalist
economies. Having accomplished this demolition job, Sraffa goes on,
in the second part of his paper, to sketch out an alternative solution
which, by employing elements of monopoly analysis, enables the problems
of competitive theory to be overcome. He thus proposes, although
this part of his paper does not fully work out his ideas, that the
answer to the problems of Marshall's theory lies in a move from
competition to monopoly. Both Sraffa's destructive and constructive
ideas are examined in section I below. Section II then assesses
the implications of Sraffa's ideas for the further development of
competition and monopoly analysis.

I.   The Contribution of Sraffa

Sraffa's paper is divided into critical and constructive parts, and we shall take these in turn. The first section, whilst not referring explicitly to Marshall, is nevertheless a sustained attack on his competitive value theory. This theory as Sraffa notes had found almost universal acceptance among economists at the start of the 20th century:-

"A striking feature of the present position of economic science is the almost unanimous agreement at which economists have arrived regarding the theory of competitive value, which is inspired by the fundamental symmetry existing between the forces of demand and those of supply, and is based upon the assumption that the essential causes determining the price of particular commodities may be simplified and grouped together so as to be represented by a pair of intersecting curves of collective demand and supply ."[1]

This solution, however, contains a fundamental fault with respect to the laws of returns, which Sraffa set himself to expose:-

"In the tranquil view which the modern theory of value presents us there is one dark spot which disturbs the harmony of the whole. This is represented by the supply curve, based upon the laws of increasing and diminishing returns. That its foundations are less solid than those of the other portions of the structure is generally recognised. That they are actually so weak as to be unable to support the weight imposed upon them is a doubt which slumbers beneath the

---

1.   'Laws of Returns', p. 180. Sraffa contrasts this situation with the controversies over the theory of value which characterised the 19th century. He suggests that the present concensus, whilst it may be due to the theory now being correct, may also be due to loss of interest occasioned by its degeneration from being a practical tool of analysis to "a pedagogic instrument" (ibid., pp. 180-1).

consciousness of many, but which most succeed in silently suppressing. From time to time someone is unable any longer to resist the pressure of his doubts and expresses them openly; then, in order to prevent the scandal spreading, he is promptly silenced, frequently with some concessions and partial admissions of his objections, which, naturally the theory had implicitly taken into account. And so, with the lapse of time, the qualifications, the restrictions and the exceptions have piled up, and have eaten up, if not all, certainly the greater part of the theory. If their aggregate effect is not at once apparent, this is because they are scattered about in footnotes and articles and carefully segregated from one another.

It is not the purpose of this article to add anything to the pile, but simply to attempt to coordinate certain materials, separating what is still alive from what is dead in the concept of the supply curve and of its effects on competitive price determination."[1]

The central thrust of Sraffa's critique is that given the assumptions of Marshall's competitive theory, and in particular the assumption of partial equilibrium it is difficult to envisage many industries subject to either decreasing or increasing returns. The notion of particular equilibrium is crucial in this. In order to focus attention on a particular competitive industry it is necessary to assume that "the conditions of production and the demand for a commodity can be considered, in respect to small variations, as being practically independent, both in regard to each other and in relation to the supply and demand of all commodities."[2] Whilst "a slight degree of interdependence" is inevitable, it may be overlooked "if it applies to quantities of the second order of smalls".[3] Thus an increase in cost in the industry under consideration which affects its price and output, will in turn affect demand and price in related industries, and produce a feedback effect on demand and price in the first industry. But such a feedback effect is of only secondary importance, and may safely be ignored in studying the industry in question.

---

1. ibid., p. 181.   2.   ibid., p. 184.

3.   ibid., p. 184.

On the other hand, however, if a change in production in the first
industry, changes costs in related industries as well as itself, such
an effect is not of the second order of smalls, and cannot be ignored
in the analysis of the first industry. To apply the competitive
theory to particular industries it is thus necessary to ensure that
the laws of returns do not upset the partial equilibrium assumption.

Consider, first, diminishing returns.[1] In this case, three
possibilities present themselves. Firstly, the industry may experience
rising costs from employing a substantial portion of a "fixed" factor.[2]
This case is, however, ruled out since, as the first industry expands
production, this causes the costs of other industries using the fixed
factor to rise, and since these other industries are likely to produce
partial substitutes for the first industry's product (for example,
agricultural produce where land is the "fixed" factor) there will be
a feedback effect on the first industry's demand which cannot be
ignored.[3] This argument is lessened if the first industry employs
a small part of the fixed factor only (the second possibility), but
in this case it can increase its production "by drawing 'marginal
doses' of the constant factor from other industries" rather than

---

1. ibid., pp. 184-5.

2. The factor does not have to be absolutely fixed in supply, but
merely such that it can be increased "only at a more than proportional
cost" (ibid., p. 184).

3. This argument is perhaps the weakest point in Sraffa's case for
it involves the assumption that industries which use large quantities
of common fixed factors commonly produce commodities which are related
(substitutes) in consumption. A counter-example, however, might be
users of coal, the electricity industry and the railways, (we are
assuming for the moment that all industries are competitively organised,
and that railways are run on coal). Whilst coal-fire power stations
might only increase production at increased cost, and this might push
up railway costs, this is not likely to affect the demand for energy.
Other suppliers of energy (the oil and gas industries) are not affected
by the coal price rise, and so Marshall's analysis appears to hold.

398.

by intensifying its use of its existing supply.[1] If it does this,
the increasing costs it experiences are likely to be negligible,
and if they are not then the first argument comes into effect. The
third possibility is that the industry under consideration employs the
whole of the fixed factor. But this possibility whilst logically
secure, can in reality only represent a minute class of real world
commodities. It thus appears that the Marshallian analysis of
increasing costs, setting aside the unrealistic third possibility,
cannot be applied to the problem of competitive price determination.

Turning to increasing returns, again we find three possibilities
present themselves.[2] Firstly, Marshall's "external economies which
result from the general progress of industrial environment" must be
excluded from view since such economies will affect all industries and
so violate our particular equilibrium assumptions.[3] On the other hand,

"reductions in cost connected with an increase in a firm's scale
of production, arising from internal economies or from the possibility
of distributing the overhead charges over a larger number of product
units, must be put aside as being incompatible with competitive
conditions".[4]

This leaves but one possibility, that decreasing costs are associated
with economies which arise between these two extremes. Such intermed-
iate economies are, however, rare:-

"But it is just in the middle that nothing, or almost nothing,
is to be found. Those economies which are external from the point
of view of the individual firm, but internal as regards the industry
in its aggregate, constitute precisely the class which is most seldom
to be met with. As Marshall has said in the work in which he has
intended to approach most closely the actual conditions of industry,

---

1.   op. cit., p. 185.

2.   ibid., pp. 185-6.

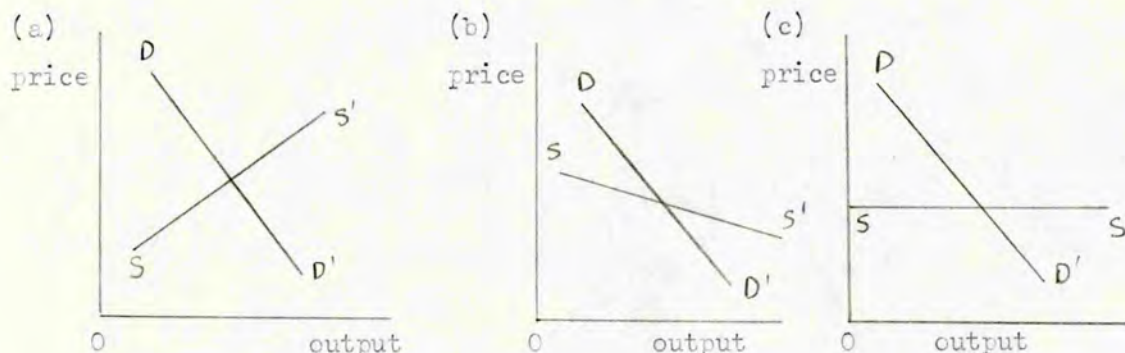3.   The quotation is from Marshall, Principles, Book V, chapter xi,
p. 441.

4.   'Laws of Returns', pp. 185-6.

'the economies of production on a large scale can seldom be allocated exactly to any one industry: they are in great measure attached to groups, often large groups, of correlated industries'."[1]

Thus, the one case where increasing returns are logically feasible, where external economies are available to the industry under consideration but not related industries, turns out to be empirically unimportant. As with increasing costs, Sraffa argues that apart from unimportant cases Marshall's partial competitive analysis is not consistent with increasing returns.

Before we turn to Sraffa's constructive suggestions, it is worthwhile to pause and consider the fundamental nature of his critique of Marshall. Marshall took the Classical analysis of (long run) competitive equilibrium, and integrating it with the age old notions of increasing and decreasing returns, he put forward a comprehensive analysis of price behaviour in the long run, suggesting that a rise in demand may increase price (decreasing returns); leave price unchanged (constant returns); or lower price (increasing returns). The central feature of Marshall's analysis was its partial equilibrium nature and his focus of attention on the individual industry, as exemplified by his representation of each law of return in a diagram (see Figure 10.1). Sraffa's critique was then that the logic of Marshall's analysis restricted his use of decreasing or increasing returns (parts (a) and (b) of Figure 10.1) to cases which were empirically insignificant. Thus, setting aside the empirically

Figure 10.1

(a)
price

(b)
price

(c)
price

output

output

output

---

1. ibid., p. 186. The quotation is from Marshall, Industry and Trade, p. 188.

unimportant case where the whole of a fixed factor is used in the industry, part (a) of Figure 10.1 is not consistent, since if the industry uses enough of the fixed factor to bring forth significant increasing costs, costs in related industries will be raised lowering their output, and shifting DD' in the industry under consideration.[1] Thus, in part (a) of Figure 10.1 the demand and supply curves would not be independent, so that it would be inconsistent to use this diagram. Similarly, part (b) of Figure 10.1 is also only applicable to the empirically unimportant case of externalities restricted to this single industry. If externalities affect related industries as well, the demand and supply curves of part (b) of Figure 10.1 are not independent. On the other hand, internal economies give rise to a tendency to monopoly, so that Marshall's competitive assumptions are violated. Thus it appears that in the general case it is not possible to represent competitive equilibrium in an individual industry under increasing or decreasing costs. Marshall's novel generalisation of Classical competitive analysis to increasing and decreasing costs is found to be inconsistent with his assumptions, except in empirically trivial cases, so that parts (a) and (b) of Figure 10.1 must be thrown out. Clearly this represents a major attack on Marshallian competitive analysis, and we shall argue in section II below that, at least in effect, Marshall's analysis is unable to stand up to it.

Its immediate implication is that Marshallian competitive analysis must be restricted to the case of constant returns as a general rule (case (c) of Figure 10.1). That is we must jettison the Marshallian contribution with regard to the laws of returns and return to the Classical case where cost of production alone determines price:-

"In normal cases the cost of production of commodities produced competitively - as we are not entitled to take into consideration the causes which may make it rise or fall - must be regarded as constant in respect of small variations in the quantity produced. And so, as a simple way of approaching the problem of competitive value, the old and now obsolete theory which makes it dependent on the cost of production along appears to hold its ground as the best available."[2]

---

1. Note, however, the objection raised above.

2. 'Laws of Returns', pp. 186-7.

Thus if we wish to take a broad view of competitive price determination in a particular industry, as a "first approximation" we should assume constant costs. Such a policy has two advantages. Firstly, it emphasises "the fundamental factor", that the predominant influence in the determination of competitive price is cost of production. And secondly, when we get down to the detail of cases, it does not lead us to suppose that we can take care of factors such as increasing and decreasing returns within our framework of analysis, as Marshall attempted to do.

Next, when we consider a further approximation to allow us to consider increasing and decreasing returns, consistency implies that we must consider industries simultaneously. Thus, whilst Marshallian partial analysis cannot deal with these cases, they can be dealt with in a general equilibrium system.[1] However, Sraffa argues that, given the present state of our knowledge, systems of even much less complexity offer no hope of fruitful application to real world conditions. Furthermore, even if operational such a general equilibrium system would not be able to deal with externalities arising from dynamic considerations. And, moreover, internal economies are, as always, ruled out by our competitive assumptions. It is at this point in his argument that Sraffa makes his radical suggestion that when we wish to consider industries other than at a first approximation it is necessary to abandon competitive theory completely:-

"It is necessary, therefore, to abandon the path of free competition and turn in the opposite direction, namely, towards monopoly."[2]

When in 1933 Joan Robinson attempted to put this course of action into practice, she explicitly noted her debt to Sraffa in her conception of the task:-

"Mr. Sraffa's article must be regarded as the fount from which my work flows, for the chief aim of this book is to attempt to carry out his pregnant suggestion that the whole theory of value should be treated in terms of monopoly analysis."[3]

---

1. ibid., p. 187.   2. ibid., p. 187.
3. Economics of Imperfect Competition, p. xiii. See also ibid., Introduction, pp. 3-8.

402.

However, it is important to note that the solution suggested by
Robinson, and for that matter Chamberlin (in the large group),[1]
differed from the solution sketched out by Sraffa in 1926. The
difference amounts to the fact that Sraffa, unlike Chamberlin and
Robinson was particularly aware of the problem of producer inter-
dependence in the general case of "monopolistic competition", and
that much of his attention was directed towards this problem.
This is, of course, as might be expected, given that, in the first
part of his article, Sraffa had largely demolished Marshallian value
theory on similar grounds of logical inconsistency due to interdepend-
ence of forces. What it means for our purposes, however, is that
Sraffa's proposed move towards monopoly represented more than a
simple replacement of received competitive theory with received
monopoly theory. Our purpose in the remainder of this section is to
examine the sense in which Sraffa proposed that economic theory
should turn "towards monopoly".[2]

One of the ideas deriving from the 'traditional' view of competition
and monopoly was that these theories represent polar cases between
which real world markets in practice lie:-

"Of course, when we are supplied with theories in respect of the
two extreme cases of monopoly and competition as part of the equipment
required in order to undertake the study of the actual conditions in
the different industries, we are warned that these generally do not
fit exactly one or other of the categories, but will be found
scattered along the intermediate zone, and that the nature of an
industry will approximate more closely to the monopolist or the

---

1.   Chamberlin did in fact consider the oligopoly problem as well
as the large group (Theory of Monopolistic Competition, chapter iii,
and chapter v, § 4). However, the main thrust of his theoretical
contribution was focussed on the large group case.

2.   This aspect of Sraffa's contribution appears to have been neglected
in the literature. Unfortunately, it is not possible to examine all
its ramifications here. It is suggested in the next section, however,
that it presents an area where research effort may offer high returns.

competitive system according to its particular circumstances, such
as whether the number of autonomous undertakings in it is larger or
smaller or whether or not they are bound together by partial
agreements, etc."[1]

The implication of this view is then

"that when production is in the hands of a large number of
concerns entirely independent of one another as regards control, the
conclusions proper to competition may be applied even if the market in
which the goods are exchanged is not absolutely perfect, for its
imperfections are in general constituted by frictions which may
simply retard or slightly modify the effects of the active forces
of competition, but which the latter ultimately succeed in substantially
overcoming."[2]

In Sraffa's view such a position is, however, "fundamentally
inadmissible". It would only be acceptable if the forces designated
"frictions" are transitory and unstable so that they offer no firm
basis for theoretical development. Such, Sraffa contends, is not the
case with the so-called "frictions" at work in competitive theory.[3]

He proposes, therefore, to reconstruct price theory, and he
selects for this purpose two "effects" which have the feature of being
found frequently in industries which appear to be competitive:-

---

1.   'Laws of Returns', pp. 187-8.

2.   ibid., p. 188.

3.   Sraffa's conclusion here has practical bearing on the more
recent debates over methodology and economic theory, centreing on
Friedman's work: see, in particular, M. Friedman, 'The Methodology
of Positive Economics', paper 1 in Essays in Positive Economics
(University Press: Chicago, 1966). Sraffa's basic position that the
existence of permanent and stable forces, inconsistent with the
assumptions of a theory (viz. internal economies and price-makers, in
the case of competition) necessitate its reconstruction, appears
fundamentally unassailable. This issue is returned to in greater
detail below.

404.

"These two points in which the theory of competition differs
radically from the actual state of things which is most general are:
first, the idea that the competing producer cannot deliberately affect
the market price, and that he may therefore regard it as constant
whatever the quantity of goods which he individually may throw on the
market; second, the idea that each competing producer necessarily
produces normally in circumstances of individual increasing costs."[1]

Both of these ideas commonly do not hold in apparently competitive
industries, and yet they are basic assumptions of the competitive
model. Sraffa, therefore, proposes to reconstruct value theory on
the basis of the assumptions that firms can sell extra output only
at lower prices (i.e. negatively sloped individual demand curves) and
that costs may be decreasing.[2] The results of applying such assumptions,
as we shall see, "render the manner in which equilibrium is attained
extremely similar to that peculiar to monopoly".[3]

Consider a group of firms producing a differentiated product
i.e. a product for which buyers are not indifferent between the differ-
ent producers:-

"The causes of the preference shown by any group of buyers for a
particular firm are of the most diverse nature, and may range from
long custom, personal acquaintance, confidence in the quality of the
product, proximity, knowledge of particular requirements and the
possibility of obtaining credit, to the reputation of a trade-mark,
or a sign, or a name with high traditions, or to such special
features of modelling or design in the product as - without constituting
it a distinct commodity intended for the satisfaction of particular
needs - have for their principal purpose that of distinguishing it
from the products of other firms."[4]

---

1. 'Laws of Returns', pp. 188-9.

2. ibid., pp. 189-90.

3. ibid., p. 188.

4. ibid., pp. 190-1.

405.

Whatever the basis for preference, the implication of it is that some
buyers are willing to pay "something extra in order to obtain the
goods from a particular firm rather than from any other."[1] Each firm
might then be envisaged as possessing its own distinct market within
the general market. Any firm wishing to extend its own market by
invading that of its competitors must incur heavy marketing expenses
to break the barriers of preference. However, within his own market,
each firm has a privileged position "whereby it obtains advantages
which - if not in extent, at least in nature - are equal to those
enjoyed by the ordinary monopolist".[2]

Clearly in this conception firms are similar to a monopolist.
Like the monopolist, the degree of independence a firm has in fixing
price is indicated by the elasticity of the demand curve: "the less
elastic the demand for his product, the greater is his hold on his
market".[3] At one extreme, we might distinguish the case of "absolute
monopoly" where the elasticity of demand is unity, so that as he
raises his price the monopolist diverts no expenditure away from his
product.[4] The presence of rival firms producing near substitutes

---

1. ibid., p. 191.

2. ibid., p. 191. Sraffa's representation of general markets being
divided into a series of distinct markets for each firm should be
interpreted as merely a pedagogical device. Compare Marshall's
particular and broad markets in the Principles, Book V, chapter xii,
pp. 547-9.

3. ibid., p. 191.

4. That this is the extreme case is easily seen when it is remembered
that monopoly equilibrium can only occur at a point where the elasticity
of demand exceeds unity (ibid., p. 191, n. 1). If the monopolist's
demand curve has (just more than) unit elasticity throughout its length
he can raise his price without diverting any sums of money to rival
producers, and so his monopoly power is at a maximum.

for his product, increases the absolute value of the elasticity of
our firm's demand curve. And, at the other extreme, when the demand
curve is infinitely elastic, we have perfect competition. Thus the
general case appears to be one of finite elasticity of demand, and
perfect competition is then a special case of a general monopoly
model.[1]

Consider now a firm raising price from a low level. As he does
so "he is forsaken by a portion of his purchasers".[2] This is "the
direct effect". If sums set free are expended on a large number of
different commodities, the indirect effect on the firm is of the
second order of smalls and can be neglected. If, however, the sums
set free are spent on one or a few rival commodities, the indirect
effects must be taken into account. It is this latter case, Sraffa
contends, to which Marshall's discussion of special markets can be
applied.[3] But whereas Marshall argued that price determination in
special markets was consistent in a broad way with competitive price
determination in general markets, Sraffa carries the logic of his

---

1.   Since "absolute monopoly" is an unlikely occurrence even in
industries traditionally regarded as monopolies, it appears that all
cases up to perfect competition are covered by Sraffa's intermediate
model. However, as we shall see in the next paragraph, there does
exist a distinction in Sraffa's approach which depends on whether
the inter-dependence of firms can be ignored or not. Given this
distinction monopoly analysis can be applied when inter-dependence
can be ignored; but when, in general, it cannot the analysis becomes
more complex.

2.   op. cit., p. 192.

3.   The reference to Marshall is Principles, Book V, chapter xii,
pp. 457-9.

discussion to its conclusion:-

"If we extend this method to those industries in which each firm
has more or less a particular market, we must not restrict its
employment to the occasions when we are considering the individual
producer, but we must adhere to it also when we examine the manner in
which equilibrium is attained in the trade as a whole; for it is
clear that such particular curves can by no means be compounded so as
to form a single pair of collective demand and supply curves. The
method mentioned above is the very same as that followed in cases of
ordinary monopoly, and in both cases, in fact, the individual
producer determines his selling price by the well-known method which
makes his monopoly revenue or his profits the maximum obtainable."[1]

It is clearly the case of mutual interdependence of producers which
is the general case, and unlike Robinson and Chamberlin it is to this
case which Sraffa directs his attention.

To grasp the solution Sraffa is driving at let us consider the
matter more formally.[2] Suppose that the group consisted of n producers
(i = 1...n), each producing a differentiated product. Then says
Sraffa

"The peculiarity of the case of the firm which does not
possess an actual monopoly but has merely a particular market is that,
in the demand schedule for the goods produced by it, the possible
buyers are entered in descending order according to the price which
each of them is prepared to pay, not rather than go entirely without,
but rather than not buy it from the particular producer instead of
elsewhere. That is to say, that two elements enter into the compos-
ition of such demand prices - the price at which the goods can be
purchased from those other producers who, in the order of a purchaser's
preference, immediately follow the producer under consideration, and

---

1.   'Laws of Returns', pp. 192-3.

2.   Of course, Sraffa's discussion is not explicit, and, moreover,
in places he appears a little confused. Nevertheless, it is contended
that the model outlined in the text captures the essence of his
thought. I have not attempted to provide more than a heuristic
outline of it; more formal investigation would require greater time
and mathematical resources than at present available to me.

the monetary measure of the value (a quantity which may be positive or negative) which the purchaser puts on his preference for the products of the firm in question."[1]

Whilst not following the letter of Sraffa's specification, it would seem that we would capture the spirit of his intention by writing the ith firm's demand function as

$$x_i = x_i(p_1 \ldots p_n, m_i) \qquad (10.1)$$

This equation makes the demand for the ith firm's product, x_i, depend on all prices, $p_1 \ldots p_n$, and his own advertising outlay, m_i.[2] We would then predict that whilst an increase in his own price reduces demand for his product, demand increases as the prices of his rival products rise and as his advertising outlay increases. That is:-

$$\frac{\delta x_i}{\delta p_i} < 0 \; ; \qquad \frac{\delta x_i}{\delta p_j} > 0 \; (j \neq i) \; ; \quad \text{and} \; \frac{\delta x_i}{\delta m_i} > 0 \; .$$

Under these circumstances, the problem for the ith firm is to select its price and advertising expenditure so as to maximise profits. Its profit function is given by

$$\pi_i = p_i \cdot x_i(p_1 \ldots p_n, m_i) - c_i(x_i, m_i)$$

and the solution involves setting

$$\frac{\delta \pi_i}{\delta p_i} = 0 \quad \text{and} \quad \frac{\delta \pi_i}{\delta m_i} = 0$$

The general solution to such a problem, as is well known, involves the estimation of conjectural variation terms of the form, dp_j/dp_i. However, if we make a Cournot type assumption that such reaction terms are zero (and it will be argued below that such an assumption not only conforms with Sraffa's intentions but also can be defended on rationality grounds) then the equilibrium conditions simplify to

$$p_i \cdot \frac{\delta x_i}{\delta p_i} + x_i - \frac{\delta c_i}{\delta x_i} \cdot \frac{\delta x_i}{\delta p_i} = 0 \qquad (10.2)$$

$$p_i \cdot \frac{\delta x_i}{\delta m_i} - \frac{\delta c_i}{\delta m_i} = 0 \qquad (10.3)$$

By conforming to equations (10.2) and (10.3) the ith firm will maximise profits taking rival producers' prices as given. Assuming the solution to the system exists, and the system is stable, then

---

1. op. cit., p. 193.

2. An even more general formulation would allow the advertising outlays of rival producers also to affect the ith firm's demand.

the simultaneous solution of equations (10.2) and (10.3) will determine
the n prices and n advertising outlays, whilst the n output rates are
then determined by equations (10.1).

The questions of existence and stability are, of course, more
complicated than counting equations and unknowns. Sraffa offers an
essentially heuristic discussion of existence, and we shall do no
more than follow him in this. In order to simplify the problem, we shall
abstract from the possibility of advertising, and, moreover, consider
the simple case of duopoly in order to facilitate diagrammatic
analysis. Under these circumstances, solving our simplified equations
(10.2), we derive two reaction functions for our two firms:-

$$p_1 = \psi_1(p_2)$$

$$p_2 = \psi_2(p_1)$$

The questions of existence and stability then amount to constricting
these functions so that they intersect at positive prices, in such a
way that the system moves towards this point of intersection.

Suppose that initially each producer sets a low price. Then
according to Sraffa,

"The individual interest of each producer will urge him to
increase his price quickly so as to obtain the maximum profit. But
in proportion as this practice spreads throughout the trade the various
demand schedules will be modified as a result: for, as each buyer finds
that the prices of the substitutes upon which he was able to reckon
are increased, he will be inclined to pay a higher price for the
products of the firm whose customer he is. So that, even before the
first increase in price has been completely carried into effect, the
conditions will be created which may permit every one of the concerns
to make a further increase - and so on in succession."[1]

As firm 1 raises his price, customers switch to firm 2, thus enabling
him to raise his price, and so on. However, Sraffa argues this process
will converge to a solution:-

---

1. op. cit., p. 193.

"Naturally this process speedily reaches its limit. The customers lost by a firm whenever it raises its price have recourse in part to other suppliers, and these will return to it when the others also have raised their prices; but in part they entirely give up buying the goods and definitely drop out of the market. Thus, every business has two classes of marginal customers – those who are at the margin only from its own individual standpoint and fix a limit for the excess of its prices over the prices generally ruling, and those who are at the margin from the standpoint of the general market and fix a limit for the general increase in price of the product."[1]

In terms of the reaction curves, Sraffa is assuming that they are positively sloped and converge to a solution; that is, that they usually have the general shape depicted in Figure 10.2. In this diagram Sraffa contends, that if firm 1 sets price a and firm 2 price b, then firm 1 will raise price to c (maximising profits, taking p_2 as given), causing firm 2 to raise price to d, and so on. The system will then converge to a solution at E.[2]

Figure 10.2
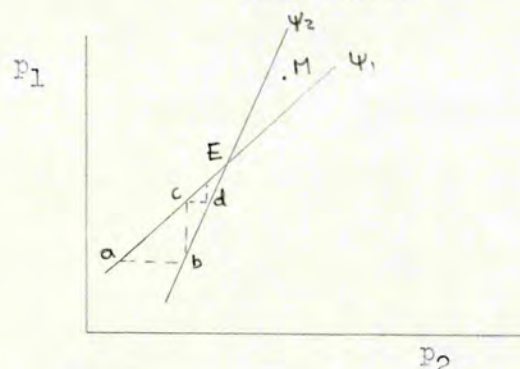
Sraffa's argument concerning existence and stability thus appears to rely on two assertions. Firstly, a firm faced with an increase in demand will generally respond by raising price. And secondly, that as prices rise the effect of customers leaving the market is to eventually bring convergence to an equilibrium. The first assertion, as we know, relies on marginal costs not falling too fast, and on shifts in demand being less than iso-elastic. Whilst not generally

---

1. ibid., pp. 193-4.
2. The argument is of course symmetrical if we start from high prices.

the case, Sraffa contends that it is normally so:-

"It is, of course, possible that a general rise in the prices of
a product may affect the conditions of demand and supply of certain
firms in such a way as to make it advantageous for them to lower their
prices rather than conform with the rise. But in an industry which
has attained a certain degree of stability in its general structure,
in regard to its methods of production, the number of undertakings
composing it, and its commercial customs - in respect to which,
therefore, statical assumptions are more nearly justified - this
alternative is much less likely to be adopted than its opposite."[1]

The second assertion regarding convergence appears to involve the
income effect of price rises swinging the demand curve round to become
less steep. Thus if costs are constant for simplicity, a rise in
demand at a low price will raise price if the shift is less than
isoelastic. As price continues to rise, however, successive shifts
become more nearly isoelastic as the income effect reduces the monopo-
list's power; until, in the limit, an iso-elastic shift occurs, and
equilibrium is reached. Clearly, both these assertions involve problems
of a theoretical nature which may not yield an easy solution.

---

1.   op. cit., p. 194. Sraffa's arguments for a price rise being the
normal case seem, however, to be misconceived. Firstly, he argues that
price will only fall if demand is highly elastic, whereas, in fact, it
is not the elasticity of the demand curve, but the change in elasticity
(at the old price) due to the shift which is important. (see Robinson
op. cit., chapter 4.) His second argument, that given the choice
between raising or lowering price to increase profits a firm, in the
interests of stability, will raise it, is, moreover, beside the point.
(See 'Laws of Returns', p. 194). These misconceptions largely vitiate
his discussion of indeterminacy in the next paragraph also (ibid.,
pp. 194-5).

Nevertheless, the intuitive plausibility of Sraffa's argument is encouraging so that there may be some prospect of deriving conditions for it to hold as a 'normal' case which are both consistent and not too restrictive.[1]

Clearly if reaction curves such as depicted in Figure 10.2 can be taken as normal, Sraffa's model offers important implications. In the first place, it offers relatively simple, comparative static predictions. A rise in marginal costs of firm 1 will cause its reaction curve to shift upwards to the left, raising both its, and its rivals', prices. Similarly a general cost rise raises all prices. On the other side, a rise in demand for firm 1's product raises all prices, as does a general rise in demand.[2] When the model is expanded to take account of advertising it seems that equally strong predictions may also be derived. In the second place, as was noted above, the model can be regarded as being more general than the perfect competition model, which represents the special case where producers are so many and the product so homogeneous that individual demand curves may be taken as infinitely elastic. And thirdly, the model suggests that in a world of differentiated products the idea of the industry loses meaning.[3] That is, whilst for empirical studies it may be desirable

---

1. One might hazard a guess that the usefulness of Sraffa's model hinges on the successful solution to this problem. The mathematics involved in such a solution appear, at first sight, rather complex, however.

2. That is, if the rise in demand is of the "normal" type.

3. This point was noted with respect to monopolistic competition by Robert Triffin, <u>Monopolistic Competition and General Equilibrium Theory</u> (Harvard University Press, 1940). Sraffa, whilst noting that generally each firm will charge a different price, seems in the event, to draw back from carrying the logic of the argument to its completion (see Sraffa, op. cit., pp. 195-6).

to restrict the number of firms, n, in the group; as far as general equilibrium is concerned the number, n, in equations (10.1) to (10.3) may be taken to represent all the firms in the economy.

Besides the problem concerning the shapes of the reaction curves, two other problems may be briefly mentioned. First, the reaction curves in Figure 10.2 were drawn on the assumption that each firm maximises profit taking other prices as given. Given the shapes of the reaction curves the system will then converge to the price vector denoted by position E. The question then arises: is such a solution rational? One way to look at this problem is to compare position E with another position, M, at which the sum of profits is maximised. Clearly, if the n producers had perfect knowledge of the conditions of the market, and were able to collude freely, they would establish the price vector, M, making side payments to redistribute profits as necessary. Now suppose collusion is excluded. If firms act independently, then position M will only be a possible equilibrium position if each producer at M receives greater profits than at E. If, however, one producer receives less profits at M, and so feels he can improve his position by moving elsewhere, then he will change his price so that position M cannot be the solution. Moreover, at any position other than E, one firm earning less profits than at E will cause a similar movement. Only at position E will each firm feel that it can't improve its position by changing price, so that E has some claim to be called the equilibrium solution. This is likely to be the case the more chance there is that one firm will be worse off at a position such as M, and the more imperfect is knowledge in the market, two factors which are likely to be more important the greater the number of firms in the group.[1]

---

1.   Whilst this argument is essentially heuristic, it does seem to yield the prediction that the effect of anti-cartelisation laws would be to move the solution from M to E, provoking firms to merge in order to avoid the losses associated with the break up of the cartel. Casual empiricism suggests that such an effect was observed in the U.K. in the merger boom which started in the late 1950s after the 1956 Restrictive Trade Practices Act came into operation.

The other problem is, perhaps, in the event more difficult. This concerns the question of entry into production. We have seen in this thesis that free competition was a widespread assumption in the literature at least since Adam Smith. In Sraffa's model, however, there are no longer industries producing homogeneous products for firms to enter into. Moreover, the existence of differentiated products give rise to entry barriers, and Sraffa argues that these are likely to restrict new entry:-

"It should be noted that in the foregoing the disturbing influence exercised by the competition of new firms attracted to an industry the conditions of which permit of high monopolist profits has been neglected. This appeared justified, in the first place because the entrance of new-comers is frequently hindered by the heavy expenses necessary for setting up a connection in a trade in which the existing firms have an established goodwill - expenses which may often exceed the capital value of the profits obtainable; in the second place, this element can acquire importance only when the monopoly profits in a trade are considerably above the normal level of profits in the trade in general, which, however, does not prevent the prices from being determined up to that point in the manner which has been indicated."[1]

However, given that entry and exit are an important empirical phenomena, it seems necessary to incorporate some assumption regarding new competition into Sraffa's model. Since the extremes of free competition and no entry appear to be unrealistic, some assumption relating to the height of entry barriers would seem appropriate. What this should be, and how it would affect the other parts of the model, cannot, however (like the other two problems referred to above) be discussed further here.

I have attempted to do no more than outline the model of differentiated oligopoly implicit in Sraffa's 1926 article, pointing out some of its problems and some of its possible virtues. Enough has been said, however, to indicate that when he proposed that economists should "abandon the path of free competition and turn... towards monopoly" he meant more than simply replacing Marshall's competitive

---

1. op. cit., p. 196.

theory with his monopoly theory. Rather, in Sraffa's view, a more
general theory would incorporate elements of monopoly analysis into
a competitive framework. Thus firms, like monopolists, were to have
negatively sloped demand curves and would be assumed to maximise
net revenue. But since they would generally be, more or less, in
competition with other producers, it was necessary to take explicit
account of this competition in determining equilibrium. This, as we
have seen, Sraffa did by allowing all prices to enter each firm's
demand function. He was then able to outline the solution to such a
model, although he in no way solved all of its problems. It is perhaps
a pity that the developments in the 1930s were, to some extent,
to turn away from the insights into the competitive process
contained in Sraffa's work. We may conjecture that the so-called
"imperfect competition revolution" might have had a greater chance of
success had it been more firmly rooted in a Sraffian framework.

II. From Competition to Monopoly

In this thesis, we have stressed the importance of Marshall's _Principles_ in the general development of perfect competition (and monopoly) theory. It was in Marshall's work that the Classical idea of free competition was integrated with that of pure competition, to form the model of perfect competition. In his classic analysis of normal equilibrium in the short period and the long period, despite its incomplete and at times obscure nature, Marshall put forward all the essentials of the perfect competition model. Whilst there was a great deal of scope for amplification and clarification of Marshall's analysis, nevertheless, this work was a tidying up operation, centred on ideas explicitly or implicitly in the _Principles_; ideas which even today form the basis of economic teaching with respect to perfect competition.[1]

The post-Marshallian debate on competitive theory was, therefore, a response to the comparatively new model of perfect competition as put forward in Marshall's _Principles_. As such, much of the debate over this model had the function of extension and clarification, in the same way that, for example, the Classical economists worked on Smith's notions of the market and natural price. But, in addition, Marshall's model was flawed in that it could not incorporate the possibility of decreasing (internal) costs within its framework. This flaw, which Cournot had been the first to point out, was brought to the general attention of economists through Marshall's work, despite the latter's attempt to cover it up. It was at this point that Sraffa was to suggest that economists drop their general reliance on competition, a tradition which dates at least to Adam Smith, and instead turn towards monopoly.

Sraffa's 'manifesto' raises a number of questions of a general nature, and we shall address ourselves to three of them. The first question we shall attempt to answer is: how far do his arguments against Marshallian competitive theory destroy the basis of the latter? Consider first his case against the falling long run supply curve (LRS).[2] Firstly, it is clear, as Cournot and Marshall had both

---

1.   Of course, what Marshall was to partial competitive analysis, Walras was to general competitive analysis. However, as was noted in chapter 6 above, Walras' argument was carried on at such a high level of abstraction that his contribution to the development of competitive analysis was limited in so far as details, such as the equilibrium of producers, were lost to sight on the ground far below.

2.   For a more detailed discussion of the points made in this paragraph see M. Blaug, _Economic Theory in Retrospect_, pp. 385-389. See also C.A. Tisdell, _Microeconomics_, pp. 182-190.

realised, that a falling LRS curve cannot be due to individual firms experiencing falling costs as their individual outputs increase. It follows that the justification for a falling supply curve must therefore lie with external economies. But as Sraffa pointed out, such economies must be both static in nature, and, if an individual industry is under consideration, they must be internal to that industry. Regardless of whether a partial or general analysis is proposed, external economies can only be strictly considered if they are reversible i.e. the fall in LRS due to a rise in demand is such that if demand falls again, the industry moves back along its LRS curve.[1] This consideration alone rules out most of the economies considered by Marshall which relate to historical non-reversible shifts, such as economies due to the localisation of industry or improvements in transport and communications. If it is then required to limit the static externalities considered to those which satisfy the partial equilibrium assumption, we may agree with Blaug that

"in partial equilibrium analysis, however, it is perfectly legitimate to regard downward-sloping long-run industry supply curves as very rare birds indeed".[2]

Certainly Blaug's suggested examples, such as cost savings associated with the setting up of a trade journal as a trade expands, as he points out, do not inspire confidence in the central importance of the case.[3]

Sraffa's case against rising LRS curves is, however, not so strong. Whilst one would certainly expect an industry which was a small user of a factor of production to have little effect on that factor's price, by the same token one must agree with Sraffa that such an industry conforms as close to the law of constant costs as makes no difference. However, when an industry, by expanding, raises factor prices against itself, it is not at once apparent that Marshallian

---

1. See Blaug, op. cit., pp. 387-8.   2. ibid., p. 389.

3. ibid., p. 388. Other possible external economies suggested by Blaug are cost savings in labour turnover and training, and economies associated with vertical disintegration. Whilst such savings may be empirically more significant than the trade journal effect, it does not seem a priori that they offer a secure enough basis for the use of falling LRS curves generally in partial equilibrium analysis.

analysis is innapplicable. As Sraffa points out, if the firms of the industry are the only users of the factor of production under consideration, then it is quite appropriate to examine a rising LRS curve in a partial context. If the factor of production is, however, a substantial input in a number of industries, then Marshallian analysis only breaks down if the industries produce related goods in consumption.[1] If, however, these industries do not produce substitutes in consumption, then indirect effects will be of the second order of smalls, and may be ignored. Thus it is not clear that rising LRS curves are generally untenable in Marshallian competitive theory.

As Sraffa pointed out much of his argument concerning Marshallian analysis focuses on Marshall's partial equilibrium approach. If, however, we move from partial to general analysis, it is clear that a number of Sraffa's arguments, as he realised, no longer hold. Thus, when all industries are considered simultaneously, it is possible to allow external economies which are external to the particular industry under consideration. Thus, whilst non-reversible economies are still precluded by our static assumptions, a wider range of external effects may then be incorporated into competitive analysis. Similarly, in a general competitive analysis even the limitation, that industries using a common fixed factor cannot produce substitutes in consumption is removed. Hence, when we consider general equilibrium competitive theory is logically tenable as long as individual producers have positively sloped marginal cost curves, and we confine ourselves to properly static effects. Sraffa's argument that general analysis is too complex to be applicable to real conditions is an argument of a separate order, moreover. As far as logical tenability is concerned, it is Marshall's partial method rather than competitive theory per se which bears the brunt of most of his criticisms.[2]

---

1.   The importance of this assumption was noted in section I above.

2.   Sraffa's case against the practicality of general equilibrium analysis is weakened if we support the view that it is possible to examine a group of related industries without going to the extreme of including all industries in the economy.

But if Sraffa was unable to show that competitive theory was untenable in general analysis, what he did highlight by implication was the fact that competitive theory was inapplicable to much of reality. That is, he highlighted what Shackle has termed "Sraffa's dilemma": that a competitive firm with decreasing costs would have no incentive to limit its production.[1] As far as reality is concerned, as opposed to logical tenability, Sraffa's discussion of the logic of external economies exposed, by implication, the misdirection of Marshall's analysis. Whilst within the competitive framework the relevant question appeared to be can external as opposed to internal economies give rise to a falling LRS curve; clearly, the more pertinent question was: how is economics to deal with the fact that manufacturing firms typically experience internal economies? Competitive theory was unable to address itself to this latter problem since it assumed that firms experience increasing costs. But this in itself is enough to require the abandonment of competitive theory as the general analysis of capitalist price formation.[2] It is thus on the grounds of applicability rather than logic that Sraffa's call to turn from competition theory in the event is justified.

---

1.   C.L.S. Shackle, The Years of High Theory, pp. 13-14. Shackle notes that the problem might as well be called "Marshall's dilemma" or, presumably, Cournot's dilemma. His assertion that Marshall, despite having all the tools at his disposal, failed to combine them to solve the problem seriously misrepresents Marshall. The latter in fact chose to defend the competitive approach rather than jettison it. (See ibid.,p. 15.)

2.   The so-called Chicago argument that competitive theory should not be judged on its assumptions will be discussed below under our second question relating to competitive theory.

This leads on to our second question: is the theory of perfect competition in some sense fundamental to economic theory, so that to abandon it would be to abandon economic theory also. This view, as we have seen, was held by a number of economists in the 19th century and was summed up by J.S. Mill in his famous assertion that

"only through the principle of competition has political economy any pretension to the character of a science".[1]

In the present century this view has been echoed by, amongst others, J.R. Hicks.[2] Faced with the dilemma of falling marginal costs, Hicks considers the possibility of turning to monopoly theory. Such a policy he, however, viewed as misguided:-

"yet it has to be recognized that a general abandonment of the assumption of perfect competition, a universal adoption of the assumption of monopoly, must have very destructive consequences for economic theory."[3]

In Hicks view, "the stability conditions" become indeterminate under monopoly, so that "the basis on which economic laws can be constructed is therefore shorn away".[4] In his view, which was also Marshall's

---

1. J.S. Mill, Principles, Book II, chapter iv, p. 239. We have already briefly considered this second question. See chapter 1.

2. J.R. Hicks, Value and Capital. An Inquiry into Some Fundamental Principles of Economic Theory, 2nd edition, (Clarendon Press: Oxford, 1968), pp. 82-85.

3. ibid., p. 83.

4. ibid., p. 84. Hicks appears to mean by this that it is no longer possible to predict that a rise in demand will raise price, or even, in certain cases, whether it will raise output. (In addition, he implies that the effect of a rise in marginal cost is determined only because of perfect competition in factor markets: a curious assertion). Hicks does not, however, think it worthwhile to explore the conditions that would make a demand shift determinate.

view, the answer was to stick with competitive theory:-

"It is, I believe, only possible to save anything from this
wreck - and it must be remembered that the threatened wreckage is that
of the greater part of general equilibrium theory - if we can assume
that markets confronting most of the firms with which we shall be
dealing do not differ very greatly from perfectly competitive
markets. If we can suppose that the percentages by which prices
exceed marginal costs are neither very large nor very variable, and
if we can suppose (what is largely a consequence of the first assumption)
that marginal costs do generally increase with output at the point of
equilibrium (diminishing marginal costs being rare), then the laws of
an economic system working under perfect competition will not be
appreciably varied in a system which contains widespread elements of
monopoly. At least, this get-away seems well worth trying. We must
be aware, however, that we are taking a dangerous step, and probably
limiting to a serious extent the problems with which our subsequent
analysis will be fitted to deal. Personally, however, I doubt if
most of the problems we shall have to exclude for this reason are
capable of much useful analysis by the methods of economic theory."[1]

But it seems that Hicks' position is untenable. In the first
place, as we have stressed before, perfect competition is an economic
theory and must not be confused with economic science itself.
To argue that to abandon perfect competition is to abandon much of
economic theory is not a logical but a historical argument. Clearly
if most economists since Adam Smith, and including Hicks, have
employed competitive assumptions then the greater part of economic
theory is at stake. In such circumstances, economists would
naturally and quite rightly only abandon it if it could be demonstrated
that a superior and more general theory was available to take its
place. And, in the absence of such a theory, to abandon perfect
competition would be to largely abandon economic theory. But this does
not admit the impossibility of replacing perfect competition at
some time as the general theory of price determination.

Besides its historical position, another main attribute of
perfect competition, as Hicks was of course aware, is its simplicitly.

---

1. ibid., pp. 84-85.

Schumpeter has noted this point admirably:-

"It has been stated above that the economists of the period under survey (1870-1914) substantially retained the habit of their 'classic' predecessors, which was to consider 'competition' as the normal case from which to build up their general analysis; and that like those predecessors they overrated the range of application of such an analysis. ..... Moreover, while not all of them were uncritical eulogists of competition, nearly all of them were apt to yield to the specific bias of the economic theorist that has nothing to do with political preference, the bias for easily manageable patterns. And it stands to reason that the theorist's generalized description of economic behaviour is greatly simplified by the assumption that the prices of all products and 'factors' cannot be perceptibly influenced by the individual household and the individual firm, and hence may be treated as given (as parameters) within the theory of their behaviour. These prices will then be determined, in general, by the mass effect of the actions of all households and all firms in 'markets', the mechanisms of which are relatively easy to describe so long as the households and firms have no choice but to adapt the quantities of commodities and services they wish to buy or to sell to the prices that rule. We may call this the Principle of Excluded Strategy and accordingly say that the bulk of the period's pure theory was a pure theory of a static equilibrium that excluded strategy."[1]

To abandon perfect competition would involve the abandonment of a theory which had the merit of dealing with complex reality in a simple manner. What is at stake is the belief, in a partial framework, that prices are determined by the opposition of two forces of supply and demand in general in the economy. Such a simplifying abstraction as "the Marshallian cross" inevitably must have a great hold over the minds of economists, and combined with the traditional use of competitive theory in the period from 1700 this fact represents a very powerful conservative force.

---

1. Schumpeter, op. cit., p. 972.

The argument that a theory has great power because it enables the reduction of complex reality to manageable proportions, and the argument that an hypothesis has historically been the basis upon which much of economic theory generally   has been constructed, are necessarily important considerations to be taken into account in evaluating perfect competition.[1] They are, however, subsiduary to the question as to whether perfect competition theory has been contradicted empirically. Hick's view that we can apply competitive theory if we assume that firms only set price above marginal cost by a small, constant amount, and if we assume (for the sake of argument) that marginal costs are rising in equilibrium, appears to be no more than, as he says, a get-out. If we assume that marginal costs are rising when for many producers they are not, we are, in the final event, contravening the rules of science. As Sraffa pointed out it is not possible to subsume under the head of "frictions" forces which are neither transitory nor unstable.[2] Such a policy is "fundamentally inadmissable", and it should be the economic theorist's aim to construct a new theory to take account of such forces.

At this point in our discussion it is necessary to consider

---

1. We have not brought in a third consideration with respect to perfect competition; namely, its supposed positive welfare features. This is in accordance with our policy of confining our attention to positive competitive theory. Whatever the normative properties of perfect competition, it seems reasonable to suppose that such considerations would be of restricted interest if perfect competition was replaced as the general positive theory of price.

2. See Sraffa, op. cit., pp. 187-8, and section I above.

briefly the views of Friedman (and Stigler) on this issue.[1] Since
I have no desire to move onto the shifting ground that Friedman
habitually moves on, I shall rather erect a straw man with neo-Friedmanite
views with which to conduct the discussion. Such a man might suggest
that positive theories or hypotheses consist of a complex mixture of
two elements: a system of tautologies or "language" by which concepts
and ideas are organised into a consistent filing system; and a set of
substantive hypotheses designed to abstract essentials from complex
reality.[2] These latter have the property that they give rise to
predictions or implications which are, moreover, capable (at least
in principle), of being refuted by empirical evidence. Then

"the only relevant test of the validity of a hypothesis is
comparison of its predictions with experience. The hypothesis is
rejected if its predictions are contradicted ("frequently" or more
often than predictions from an alternative hypothesis); it is accepted
if its predictions are not contradicted; great confidence is attached

---

1.   Reference will be made to Milton Friedman, 'The Methodology of
Positive Economics', in Essays in Positive Economics (University of
Chicago Press, 1966) pp. 3-43 . See also G.J. Stigler, 'Monopolistic
Competition in Retrospect', in Five Lectures on Economic Principles
(London School of Economics, 1949) reprinted in Charles K. Rowley
ed., Readings in Industrial Economics (Macmillan: London, 1972) pp.
131-144. Other pertinent contributions are: G.C. Archibald,
'Chamberlin versus Chicago', Review of Economic Studies vol. XXX,
February 1963, pp. 63-4, followed by a comment from Friedman (ibid.,
pp. 65-7) and a reply by Archibald (ibid., pp. 68-71). These last
four references are reprinted in Rowley, op. cit., pp. 145-196.

2.   Friedman, op. cit., pp. 7-9.

to it if it has survived many opportunities for contradiction."[1]

The testing of the conformity of "assumptions" with reality is then a procedure which is misguided. Assumptions of a theory are by definition unrealistic, since the aim of the theory is to abstract crucial relations from complex reality, so that to examine the realism of assumptions is to fundamentally misunderstand the nature of the scientific approach. It is only by testing predictions that an economic theory can be evaluated.[2]

Since we are not concerned so much with the methodological points raised as with their application to the case of the perfect competition model, let us now suppose that our straw man takes the position that to reject the model on the increasing returns issue is to evaluate its assumptions rather than its predictions, and hence is not justified.[3] When stated like this (and it must be noted that both Friedman and Stigler when considering the perfect competition case remain strangely silent on the increasing returns issue) it appears that Friedman's methodology breaks down.[4] As Friedman himself admits, when we strip a theory down to its logical bones, the distinction between its assumptions and the predictions become to an extent arbitrary:-

---

1. ibid., pp. 8-9.   2. ibid., passim.

3. Archibald (Chamberlin versus Chicago', p. 148 in Rowley, op, cit.) argues, however, that the perfect competition model predicts that costs will be increasing. It is argued in the text that the issue of whether increasing costs is an assumption or a prediction is irrelevant to the evaluation of the perfect competition model.

4. Whilst not wishing to enter the methodological arena fully, it appears that Friedman has a case when he argues that assumptions such as the number of firms or the homogeneity of the product in reality are not directly relevant to the evaluation of the model. (Compare Sraffa's comment that industries may appear competitive and yet not conform with the perfect competition model (Laws of Returns, p. 188)). On the other hand, it appears to me that the increasing costs "assumption" (if "assumption it be) is an entirely different kind of "assumption", and is of direct relevance to the validity of the theory. It may be this is what Friedman was driving at in his distinction of the abstract model and the set of rules which define its applicability (op. cit., p. 24). Be that as it may, the increasing returns problem is not raised by Friedman in his discussion of Marshall's value theory (ibid., pp. 34-39).

"The possibility of interchanging theorems and axioms in an abstract model implies the possibility of interchanging "implications" and "assumptions" in the substantive hypothesis corresponding to the abstract model, which is not to say that any implication can be interchanged with any assumption but only that there may be more than one set of statements that imply the rest."[1]

Friedman does not pursue the logic of this argument to its conclusion, however, but rather argues that the problem under study will define the division between "assumptions" and "predictions", and that once defined, the comparison between assumptions and the evidence will only give rise to the possibility of indirect refutation of the hypothesis.[2] But such an argument is essentially ad hoc. If the abstract model is a logical whole, then not only does the distinction between assumptions and predictions in that whole become arbitrary, but, also, so does the restriction of empirical testing to some parts of it and not others. If we argue that the perfect competition model assumes increasing costs, our straw man would say in that case it must not be judged refuted if the industries it is applied to experience decreasing costs. On the other hand, if we say the perfect competition model predicts that in equilibrium producers will have increasing costs, then evidence of increasing returns refutes the hypothesis. But the distinction between these approaches is only one of words, and Friedman offers no sound basis for preferring one to the other. Rather it would seem that each component of the abstract model may be tested against reality in order to evaluate its applicability. With respect to the present issue, it seems that increasing marginal costs are an integral part of the perfect competition theory, be they classified as an assumption or a prediction, and that the widespread evidence of decreasing costs represents refutation of the theory.

It seems to be equally true that if a theory is refuted at one point (say, with respect to an "assumption"), it will be refuted at others (with respect to "predictions"), and this appears to be the case. Thus, Archibald points out, for example, that perfect competition theory predicts that producers will have no incentive to advertise, since individually they will not be able to affect total demand for

---

1.   ibid., pp. 26-27.   2.   ibid., p. 28.

the product, and they can produce as much as they like at the current price. And yet producers do advertise.[1] Equally, it seems likely that over some issues perfect competition theory will not be refuted since after all it would say little for economics as a science if a theory central to it was refuted in every particular instance to which it was applied. Friedman's attempt to argue, given this last possibility, that the competitive model or the monopoly model should be applied to particular instances depending on which gives the correct prediction, is, however, essentially ad hoc, not to say promiscuous, and need not be commented on further here.[2]

Having completed this detour via Friedman, what conclusions do we emerge with concerning the possibility of turning from competition to monopoly? In the last analysis, Friedman and Hicks and a number of other writers, are responding to fact that regardless of the pros and cons of perfect competition theory, there does not exist a viable alternative to perfect competition as a general model of price determination. Such an alternative model must have the properties of being more general than perfect competition, presumably including the latter as a special case, and it must be able to solve problems which the perfect competition model cannot. Yet the theory of imperfect or monopolistic competition, as Friedman notes, has "none of the attributes that would make it a truly useful general theory".[3] Whilst it succeeds in introducing product differentiation, it does so at a great cost in terms of abstraction, and, moreover, it gives rise to more complex predictions than perfect competition. But, as has been noted before, its main fault is that it abstracts, in the event, from the most important feature of reality given that firms are recognised to possess market power; namely, oligopolistic interdependence, what Cournot called "the competition of producers". As soon as firms are allowed to be more than just quantity adjusters, it is necessary in general to

---

1.   Archibald, 'Chamberlin versus Chicago', in Rowley, op. cit., pp. 147-50.

2.   Friedman, op. cit., pp. 36-38. See also Stigler, 'Monopolistic Competition in Retrospect', in Rowley, op. cit., pp. 142-4. (Stigler appears to have changed his views, however, in 'Archibald versus Chicago', in Rowley, ibid., p. 185.)

3.   op. cit., p. 38.

428.

take account of the interdependence of their actions, as Sraffa
noted. To take the case where they have market power but where they
don't have enough to affect their rivals, is to take a case which if
not contradictory, is certainly only a very special case.

Thus, the projected move from competition to monopoly was in the
event not successful, not because the perfect competition model has
not been refuted, but because the absolutely necessary condition for
such a move, that a better theory exists to replace it, was not fulfilled.
Given this it is no wonder that Hicks wishes to stick with the
competitive model, or that Friedman suggests that we should employ
the theories we have as best we can.[1] But this situation is highly
unsatisfactory. On the one hand, we have competitive theory which,
whilst it may give correct predictions in some cases, more generally,
fails to say anything useful about important real world phenomena,
such as product differentiation, advertising, R and D expenditure,

---

1. Friedman, in fact, agrees that economics needs a more general
theory of price:-

"It would be highly desirable to have a more general theory than
Marshall's, one that would cover at the same time both those cases in
which differentiation of product or fewness of numbers makes an essential
difference and those in which it does not. Such a theory would enable
us to handle problems we now cannot and, in addition, facilitate
determination of the range of circumstances under which the simpler
theory can be regarded as a good enough approximation. To perform
this function, the more general theory must have content and substance;
it must have implications susceptible to empirical contradiction and
of substantive interest and importance." (ibid., p. 38).

ry, or have abandoned theory altogether. One only has to
examine the sorry state of Industrial Economics to realise the extent
of the damage caused by this failure to replace perfect competition
with a more general theory. Whilst ad hoc theories may be the best
that can be done in the absence of a more general theory, clearly
there is a need to concentrate research resources on the development
of such a theory.[2]

George Stigler ends his essay on the history of perfect competition
on an optimistic note, recording the resilience of the theory.[3] Perhaps
it may not be too amiss to end this thesis also on an optimistic note,
albeit a contrary one to Stigler's. This is to conjecture that further
analytical advance will be made towards filling the hiatus which even
today competition and monopoly analysis finds itself in. Whilst views
on future research can only be speculative, there does not seem to be
a fundamental reason why such research cannot be successful. It may
be indeed, as we have indicated in this chapter, that the ideas put
forward by Sraffa fifty years ago, will provide a pointer towards
where such a solution may lie. Such a suggestion may not be fashionable,
but as we have seen in this thesis the development of economic analysis
is a slow process. It may be that Sraffa's call "to abandon the path
of free competition and turn in the opposite direction, namely, towards
monopoly" will, in the slow progress of economic science, be the course
that a more general theory of price will follow.

1. For an assessment of the predictions of monopolistic competition
theory, see Archibald, 'Chamberlin versus Chicago' in Rowley, op. cit.,
pp. 145-183.
2. It is here that Friedman and Stigler, I feel, are most open to
criticism. Whilst, given the present situation, they may be right to
criticise monopolistic competition, or suggest the ad hoc application
of existing theories to particular situations; on a broader view, such
arguments predicate the present situation, and by this token neglect
the possibility of developing a more general theory. However, much
Friedman says it would be desirable to have such a theory, his research
works against, rather than for, such an end, and in the last analysis
one feels that his position reflects his basically conservative views
of the world.
3. 'Perfect Competition, Historically Contemplated', p. 17.

A SELECTED BIBLIOGRAPHY

Allen, R.G.D., Mathematical Analysis for Economists (London: Macmillan, 1947)

Archibald, G.C., 'Chamberlin versus Chicago', Review of Economic Studies, vol. XXIX, October 1961, pp. 2-28.

Aristotle, Ethica Nicomachea, trans. by W.D. Ross, in Vol. IX of The Works of Aristotle ed. J.A. Smith and W.D. Ross, (Oxford: Clarendon Press, 1925).

Aristotle, Politica, trans. by Benjamin Jowett, in Vol. X of The Works of Aristotle, ed. J.A. Smith and W.D. Ross (Oxford: Clarendon Press, 1921).

Arrow, K.J. and Hahn, F.H., General Competitive Analysis (Edinburgh: Oliver and Boyd, 1971).

Bagehot, W., Economic Studies, ed. R.H. Hutton, Second edition, (London: Longmans, Green and Co., 1888).

Bailey, S., A critical dissertation on the nature, measures and causes of value; chiefly in reference to the writings of Mr. Ricardo and his followers (New York: Augustus M. Kelley, 1967).

Barbon, N., A Discourse concerning coining the new money lighter: In answer to Mr. Lock's considerations about raising the value of money. (Farnborough: Gregg International, 1971).

Barbon, N., A Discourse of Trade (1690)(Baltimore: John Hopkins Press, 2nd impression 1934).

Bastiat, F., Harmonies of Political Economy (1850) trans. by Patrick James Stirling (John Murray, 1860).

Bland, A.E, Tawney, R.H. and Brown, P.A. eds., English Economic History: Select Documents. (London: Bell, 1914).

Blaug, M., Economic Theory in Retrospect, 2nd ed., (London: Heinemann, 1968).

Böhm-Bawerk, Eugen von, Capital and Interest (3 vols.) (1884,1889) trans. by G.D. Huncke and H.F. Sennholz (South Holland, Illinois: Libertarian Press, 1959).

Bowley, M., Nassau Senior and Classical Economics (London: George, Allen and Unwin, 1937).

Bowley, M., 'Some C17th contributions to the theory of value', Economica, vol. 30,May 1963, pp. 122-39.

Bowley, M., Studies in the History of Economic Theory before 1870. (London: Macmillan, 1973).

Cairnes, J., Some Leading Principles of Political Economy newly expounded, (London: Macmillan, 1888).

Calsoyas, C.D., 'The Mathematical Theory of Monopoly in 1839: Charles Ellet Jr.' Journal of Political Economy, 58, April 1950, pp. 162-70.

Cantillon, R., Essai sur la nature du commerce en general ed. with an English trans. and other material by Henry Higgs. (London: Macmillan, 1931).

Chamberlin, E.H., The Theory of Monopolistic Competition, A Re-orientation of the Theory of Value, 8th edition. (London: Oxford University Press, 1962).

Clapham, J.H., 'Of Empty Economic Boxes', Economic Journal, vol. XXXII, 1922, pp. 305-14.

Clapham, J.H., 'The Economic Boxes: A Rejoinder', Economic Journal, vol. XXXII, 1922, pp. 560-3.

Clark, J.B., The Distribution of Wealth. A Theory of wages, interest and profits, (New York: Macmillan, 1899).

Cournot, A., Researches into the Mathematical Principles of the Theory of Wealth (1838) trans. by Nathaniel T. Bacon. (Hafner, 1960).

Cunningham, W., The Growth of English Industry and Commerce: The Mercantile System, Vol. II, Pt. 1. (Cambridge University Press, 1921).

Dobb, M., Theories of Value and Distribution since Adam Smith: Ideology and Economic Theory (Cambridge University Pres , 1973).

Dupuit, J., 'On the Measurement of the Utility of public works' - Annales des Ponts et Chausees, 2nd series, vol. 8, 1844, trans. by R.H. Barback in International Economic Papers, no. 2., 1952, pp. 83-110.

Edgeworth, F.Y., Mathematical Psychics; An Essay on the Application of Mathematics to the Moral Sciences, (London: C. Kegan Paul and Co., 1881).

Edgeworth, F.Y., Papers Relating to Political Economy, 3 vols. (London: Macmillan, 1925).

Ellet, C., An Essay on the Laws of Trade, in reference to the works of internal improvements in the United States (Richmond: P.D. Bernard, 1839)

Engels, F., The condition of the Working Class in England in 1844. (London: Panther Books, 1972).

Fawcett, H., Manual of Political Economy, Seventh edition, (London: Macmillan, 1888).

Fisher, I., 'Cournot and Mathematical Economics', Quarterly Journal of Economics, XII, January 1898, pp. 119-138.

Fisher, I., Mathematical Investigations in the Theory of Value and
Prices (1892) (New York: Augustus M. Kelley, 1961).

Friedman, M., 'The Methodology of Positive Economics' in Essays in
Positive Economics (University of Chicago Press, 1966).

Frisch, R., 'Alfred Marshall's Theory of Value', Quarterly Journal
of Economics, Vol. LXIV, Nov. 1950, pp. 495-524.

Galiani, F., Della Moneta (1751) trans. and reprinted in Arthur Eli
Monroe ed. Early Economic Thought; Selections from Economic
Literature Prior to Adam Smith. (Cambridge: Harvard University Press,
1951), pp. 279-99.

Graaf, J.de V., Theoretical Welfare Economics (Cambridge University Press,
1957).

Groenewegen, P.D., 'The Origin of the Phrase, "Supply and Demand"',
Economic Journal, no. 330, vol. 83, June 1973, pp. 505-9.

Grotius, H., De jure belli ac pacis, trans. Francis W. Kelsey, et al
in the series The Classics of International Law, ed. by James Brown
Scott (New York: Oceana Publications Inc., 1964).

Harrod, R.F., 'The Law of Decreasing Costs', Economic Journal, vol. XLI,
Dec. 1931, pp. 566-576.

Harrod, R.F., 'Notes on Supply', Economic Journal, vol. XL, June 1930,
pp. 232-41.

Hayek, F.A.von, 'Carl Menger', Economica, n.s., Vol. 1, Nov. 1934,
pp. 393-420.

Heckscher, E.F., Mercantilism (2 vols.) trans. by Mendel Shapiro, (London:
George, Allen and Unwin, 1935).

Henderson, M. and Quandt, R.E., Microeconomic Theory: A Mathematical
Approach (New York: McGraw-Hill, 1958).

Hicks, J.R., 'Annual Survey of Economic Theory: the Theory of Monopoly'
Econometrica, vol. 3, 1935, pp. 1-20.

Hicks, J.R., 'Leon Walras' Econometrica, vol. 2., 1934, pp. 338-348.

Hicks, J.R., Value and Capital: an Inquiry into some fundamental
principles of economic theory, 2nd ed. (Oxford: Clarendon Press, 1965).

Hollander, S., The Economics of Adam Smith, Studies in Classical
Political Economy 1, (London: Heinemann, 1973)

Hume, D., Writings on Economics, ed. by Eugene Rotwein (Edinburgh:
Nelson, 1955).

Hutcheson, F., A system of Moral Philosophy (1755), Vols. 5 and 6 of
Collected Works of Francis Hutcheson. Facsimile Editions prepared
by Bernhard Fabian. (Hildesheim: George Olms, 1969).

Jenkin, F., The Graphic representation of the Laws of Supply and
Demand, and other Essays on Political Economy: no. 9. in series of
reprints of scarce tracts in economic and political science,(London
School of Economics and Political Science, 1931).

Jevons, W.S., _The Principles of Economics: A fragment of a Treatise on the Industial Mechanism of Society, and Other Papers_, with a Preface by Henry Higgs (London: Macmillan, 1905).

Jevons, W.S., _Theory of Political Economy_, (1871) 4th ed., ed. by H.S. Jevons (London: Macmillan, 1931).

Johnson, E.A.J., _Predecessors of Adam Smith: the growth of British Economic Thought_. (London: P.S. King, 1937).

Kaulla, R., _Theory of the Just Price_ (London: George Allen and Unwin, 1940).

Knight, F.H., _Risk, Uncertainty and Profit_ (Boston: Houghton Mifflin Co., 1921).

Keynes, J.M., 'Alfred Marshall, 1842-1924'. _Economic Journal_, vol. 34. September 1924, pp. 311-372.

Kuhn, T.S., _The Structure of Scientific Revolutions_, 2nd ed., International Encyclopedia of Unified Science Vol. 2. No. 2, (University of Chicago Press, 1970).

Lardner, D., _Railway Economy: a treatise on the new art of transport, its management, prospects, and relations_, (London: Taylor, Walton and Maberly, 1850).

Lauderdale, Earl of, _An Inquiry into the nature and origin of public wealth, and into the means and causes of its increase_. (Edinburgh: Constable, 1804).

Law, J., _Money and trade considered, with a proposal for supplying the nation with money_. (New York: Augustus M. Kelley, 1966).

Letwin, W., _The Origins of Scientific Economics: English Economic Thought, 1660-1776_. (London: Methuen, 1963).

List, F., _The National System of Political Economy_ (1841) trans. by S. Lloyd, (London: Longmans, 1916).

Locke, J., _Some considerations of the consequences of the lowering of interest and raising the value of money_ (1691). Vol. 4 of _The Works of John Locke_, in 9 vols. 12th ed. (London: n.p., 1824) pp. 1-130.

McCulloch, J.R., _The Principles of Political Economy_ (1825) 3rd ed. (Edinburgh: W. Tait, 1843).

McCulloch, J.R., _A Treatise on the circumstances which determine the rate of wages_ (1826) 2nd ed. (New York: Augustus M. Kelley, 1963).

McNulty, P.J., 'Economic Theory and the meaning of competition' _Quarterly Journal of Economics_, 1968, 82, pp. 639-656.

McNulty, P.J., 'A Note on the History of Perfect Competition' _Journal of Political Economy_, LXXV, August 1967, Pt. 1., pp. 395-9.

Machlup, F., 'Monopoly and Competition: a Classification of Market Positions' American Economic Review, vol. 27, September 1937, pp. 445-451.

Malthus, T.R., Principles of Political Economy (1820) 2nd ed., (Tokyo: Kyo Bun Kwan, 1936).

Malynes, Gerard de, The Maintenance of Free Trade (London, 1622).

Malynes, Gerard de, Consuetudo vel Lex Mercatoria, or, the Ancient Law Merchant, (London, 1622).

Marcet, J., Conversations on Political Economy, 2nd ed., (1816), (London: Longman, 1817).

Marshall, A., 'Graphic Representation by aid of a series of Hyperbolas of some economic problems having reference to Monopolies'. Proceedings of the Cambridge Philosophical Society, October 1873.

Marshall, A., Industry and Trade, 3rd ed. (London: Macmillan, 1921).

Marshall, A., Memorials of Alfred Marshall, ed. A.C. Pigou, (London: Macmillan, 1925).

Marshall, A., Principles of Economics, 2 vols., Ninth (Variorum) Edition, with annotations by C.W. Guilleband, (London: Macmillan, 1961).

Marshall, A., Pure Theory (Foreign Trade - Domestic Values), no. 1 in series of reprints of scarce tracts in economic and political science, (London: L.S.E., 1949).

Marx, K., Capital: A Critique of Political Economy, ed. by F. Engels, (London: Lawrence and Wishart, 1970), 3 vols.

Meek, R.L., Economics and Ideology and Other Essays: Studies in the Development of Economic Thought. (London: Chapman and Hall Ltd., 1967).

Meek, R.L., The Economics of Physiocracy: essays and translations. (London: Allen and Unwin, 1962).

Meek, R.L., ed., Precursors of Adam Smith, (London: Dent, 1973).

Menger, C., Principles of Economics.First, General Part. trans. and ed. by James Dingwall and Bert F. Hoselitz, (Glencoe, Illinois: Free Press, 1950).

Mill, J., Elements of Political Economy (1821) 2nd ed. (London: Baldwin, Cradock and Joy, 1824).

Mill, J.S., Principles of political economy, vols. 2-3 of the Collected Works of John Stuart Mill, 11 vols., ed. F.E.L. Priestley et al, (University of Toronto Press, Routledge and Kegan Paul, 1965)

Misselden, E., Free Trade; or, the Means to Make Trade Florish 2nd ed. (J. Legatt for S. Waterson: London, 1622)

435.

Montesquieu, Baron de., The Spirit of the Laws, trans. by Thomas Nugent,
(New York: Hafner, 1949)

Moore, H.L.,'Paradoxes of Competition! Quarterly Journal of Economics
vol. 20, February 1906, pp. 211-230.

Moore, H.L., Synthetic Economics, (New York: Macmillan, 1929)

More, Sir Thomas, Saint, Utopia ed. Edward Surtz S.J. and J.H. Hexter,
Vol. 4 of The Complete Works of St. Thomas More (Yale Edition) in
5 vols. (Yale University Press, 1965).

Mun, T., England's treasure by forraign trade. (1664). Reprints of
Economic History Classics, 1 (Oxford: Blackwell, 1933).

Nicholson, J., Principles of Political Economy, 3 vols. (London:
Adam and Charles Black, 1893, 1897, 1901).

North, Sir Dudley, Discourses upon trade (1691) (A Reprint of Economic
Tracts) (Baltimore: John Hopkins Press, 1907)

Opie, R.,'Marshall's Time Analysis', Economic Journal, vol. XLI,
June 1931, pp. 199-215.

Petty, Sir William, The Economic Writings: 2 vols. Ed. by Charles Henry
Hull (Reprints of Economic Classics) (New York: Augustus M. Kelley,
1963).

Pigou, A.C., 'An Analysis of Supply', Economic Journal, vol. 38, 1928,
pp. 238-257.

Pigou, A.C., The Economics of Welfare (London: Macmillan 1920).

Pigou, A.C., 'Empty Economic Boxes: A Reply' Economic Journal,
vol. XXXII, 1922, pp. 458-65.

Pigou, A.C., 'The Laws of Diminishing and Increasing Cost, Economic
Journal, vol. XXXVII June 1927, pp. 188-197.

Plato, Euthydemus, (New York: Arno Press, 1973)

Postlethwayt, M., The Universal dictionary of trade and commerce.
Translated from the French of the celebrated Monsieur Savary with
large additions, (London: J. and P. Knapton, 1751-5) 2 vols.

Pufendorf, Samuel von., De jure naturae et gentium vol. II. The Classics
of International Law. (Oxford: Clarendon Press, 1934).

Quesnay, F., Quesnay's Tableau Economique, edited, with new material,
translations and notes by Marguerite Kuczynski and Ronald L. Meek.
(London: Macmillan, 1972).

Ricardo, D., On the Principles of Political Economy and Taxation - Vol.I
of Sraffa, Piero ed. with the collaboration of Maurice Dobb 10 vols.
1951-   The Works and Correspondence of David Ricardo. (Cambridge
University Press, for the Royal Economic Society, 1970).

Robertson, Sir D. H., Economic Commentaries, (Staples Press, London, 1956).

Robertson, D.H., Shrove, C.F. and Sraffa, P.,'Increasing Returns and the Representative Firm: a Symposium'. Economic Journal, vol XL, March 1930, pp. 79-116.

Robertson, D.H.,'Those Empty Boxes', Economic Journal vol. XXXIV, 1924, pp. 16-30.

Robertson, H.M., and Taylor, W.L., 'Adam Smith's Approach to the Theory of Value', Economic Journal, vol. LXVII, June 1957. 181-198.

Robertson, R.M., 'Mathematical Economics before Cournot', Journal of Political Economy, 57, December 1949, pp. 523-36.

Robinson, J., The Economics of Imperfect Competition. 2nd ed. (London: Macmillan, 1969).

Robinson, J., 'What is Perfect Competition?', Quarterly Journal of Economics, 1935, pp. 104-120.

Roll, E., A History of Economic Thought 4th ed., (London: Faber and Faber, 1973).

de Roover, R., 'Joseph A. Schumpeter and Scholastic Economics', Kyklos, 10, 1957, pp. 115-46.

de Roover, R., 'Monopoly Theory Prior to Adam Smith: A Revision', Quarterly Journal of Economics, 65 (November 1951) 492-524.

Roscher, W., Principles of Political Economy, trans. from 13th (1877) German edition, by John J. Lalor, (New York: Henry Holt and Co., 1878) 2 vols.

Samuelson, P.A., Foundations of Economic Analysis, (Cambridge: Harvard University Press, 1948).

Say, J.B., A Treatise on Political Economy, or the production, distribution, and consumption of wealth. (New York: Kelley, 1964).

Schumpeter, J.A., History of Economic Analysis edited from manuscript by Elizabeth Boody Schumpeter. (New York: Oxford University Press, 1954).

Sen, S.R., The Economics of Sir James Steuart, (L.S.E. 1957).

Senior, N.W., An outline of the Science of Political Economy (1836) (London: Allen and Unwin, 1951).

Sewall, H.R., The Theory of Value before Adam Smith (Reprints of Economic Classics) (1901). (New York: Kelley, 1968).

Shackle, G.L.S., The Years of High Theory: Invention and Tradition in Economic Thought, 1926-1939. (Cambridge University Press, 1967).

Sidgwick, H., The Principles of Political Economy, (London: Macmillan, 1883

Sismondi, J.C.L. Simonde de., Political Economy (1815), (Reprints of Economic Classics) (New York: A.M. Kelley, 1966).

Smith, A., *An inquiry into the nature and causes of the wealth of nations*. Edited, with an introduction, notes, marginal summary and an enlarged index by Edwin Cannan, 2 vols. 5th ed. (London: Methuen, 1930).

Sraffa, P., 'The Laws of Returns under Competitive Conditions', *Economic Journal*, XXXVI, December 1926, pp. 535-550.

Steuart, Sir James, *An Inquiry into the Principles of Political Oeconomy*, (1767), edited and with an introduction by Andrew S. Skinner, 2 vols., (Edinburgh and London: Oliver and Boyd, 1966).

Steuart, Sir James, *Works* (6 vols.) (1805), (New York: Augustus M. Kelley, 1967).

Stigler, G.J., *Five Lectures on Economic Problems*, (London School of Economics 1949).

Stigler, G.J., 'Perfect Competition, Historically Contemplated' *Journal of Political Economy*, 1957, 65, pp. 1-17.

Stigler, G.J., *Production and Distribution Theories: The formative period.* (New York: Macmillan, 1946).

Tawney, R.H. and Power, E., *Tudor Economic Documents*, (University of London Historical Series, 4), (London: Longmans, 1924), 3 vols.

Taylor, O.H., 'Economics and the Idea of Natural Laws', *Quarterly Journal of Economics*, 44, November 1929, pp. 1-39.

Taylor, O.H., 'Economics and the Idea of "Jus Naturale"', *Quarterly Journal of Economics*, 44, February 1930, pp. 205-241.

Tisdell, C.A., *Microeconomics: the theory of economic allocation*, (Sydney: Wiley International, 1972).

Triffin, R., *Monopolistic Competition and General Equilibrium Theory*, (Harvard University Press, 1940).

Turgot, A.R.J., *Reflections on the formation and the distribution of Riches*, (1770), (Reprints of Economic Classics) (New York: Augustus M. Kelley, 1963).

Viner, J., 'The Intellectual History of Laissez Faire', *Journal of Law and Economics*, October 1960.

Walras, L., *Elements of Pure Economics of the Theory of Social Wealth*. trans. by William Jaffe. (London: Allen and Unwin, 1954).

West, Sir Edward., *Essay on the Application of Capital to Land* (1815) ed. J.H. Hollander, (Baltimore: John Hopkins Press, 1903).

Wheeler, J., *A Treatise of Commerce* (1601) (Facsimile Text Society. Ser. 5, no. 2) (New York, Columbia University Press, 1931).

Whewell, W., *On the Mathematical Exposition of some doctrines of Political Economy*, (Farnborough, Gregg International Ltd., 1968).

Whewell, W., Six Lectures on Political Economy (1862), Reprints of
    Economic Classics) (New York: Augustus M. Kelley, 1967).

Whittaker, E., 'A History of Economic Ideas', (London: Longmans, Green
    1950).

Wicksell, K., Lectures on Political Economy, (1901, 1911), 2 vols.,
    (London: George Routledge and Sons, 1946).

Wicksell, K., Selected Papers on Economic Theory ed. Erik Lindahl,
    (London: George Allen and Unwin, 1958).

Wicksell, K., Value, Capital and Rent, (1893) trans. S.H. Frowein,
    (London: George Allen and Unwin, 1954).

Wicksteed, P.H., The Alphabet of Economic Science: Part 1, Elements
    of the Theory of Value or Worth, (London: Macmillan, 1888).

Wicksteed, P.H., The Common Sense of Political Economy, (1910),
    reprinted with Selected Papers edited with an Introduction by
    Lionel Robbins, 2 vols. (London: George Routledge and Sons Ltd.,
    1933).

Wicksteed, P., An Essay on the Coordination of the Laws of Distribution,
    (1894) (L.S.E. 1932).

Wieser, F.   Natural Value, trans. Christian A. Malloch,
    ed. William Smart. (London: Macmillan, 1893).

Wieser, F. von., Social Economics (1914), (London: George Allen and
    Unwin, 1928).

Witt, Jan de, The true interest and political maxims of the Republick
    of Holland and West Friesland. Written by John de Witt and other
    great men in Holland, (London: n.p. 1702).

Zeuthen, F., Problems of Monopoly and Economic Warfare, (London:
    Routledge and Kegan Paul, 1930).

R.CLARKE   Ph.D.   THESIS   1977

Summary of Thesis

This thesis is concerned to trace the development of the
theories of perfect competition and monopoly in the history of
economic thought, from 1700 to 1926. It is shown that in the process
of this development the concepts of competition and monopoly were
to undergo a number of transformations as they developed from
essentially crude beginnings in the pre-Smithian era to a much more
fully worked out form at the end of our period.

In particular we stress the distinction between the Classical
view of competition and monopoly and that of the French mathematical
economist, Augustin Cournot. The Classical economists, following
Adam Smith (1776), were concerned to analyse <u>free competition</u>, the
mechanism by which economic resources move between trades in order
to equalise profit differentials. In their analysis <u>monopoly</u> was
treated as the opposite of free competition and used to denote cases
where barriers to such movement exist. In contrast, Cournot (1838)
analysed the notion of unlimited or <u>pure competition</u>, a market
structure under which producers are so numerous that each acts as
a price-taker. In his analysis, <u>monopoly</u> is defined as the case of
a single producer, and pure competition and monopoly represent polar
cases in a classification of market structures based on the number
of producers in the market.

The modern theories of perfect competition and monopoly are seen
as evolving from a synthesis of these two strands of thought, pre-
eminently in the work of Marshall (1890). In this synthesis, Cournot's
analysis was integrated with the earlier Classical ideas as far as
competition was concerned, whilst the Classical analysis of monopoly
was abandoned in favour of Cournot's treatment. This compromise
gave rise to a number of conceptual problems which were to be
instrumental in calling into question the traditional belief that
competitive analysis was generally applicable to capitalist economies.