Household Welfare in Mexico after the 1994 Financial Crisis

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Abstract

While the short-run impacts of a crisis on the welfare of individuals and their living standards is a well studied issue, we know rather little about the spatial and temporal dimensions of these impacts. The immediate welfare cost of a crisis can be high, but how quickly do individuals recover? Are the impacts greater for some than for others? If so, who are hit the hardest? And, do households recover as the economy does after a crisis? These are all important questions over which the current literature does not offer yet a definitive answer. The estimations made using the case of the 1994 Mexican financial crisis and the data contained in the Mexican National Income and Expenditures Surveys (ENIGH) made by the Mexican National Institute of Statistics, Geography and Informatics (INEGI) show that the impact of such a crisis was a dramatic deterioration of the welfare of the Mexican households in the immediate years after the crisis. On average, income and expenditure per capita fell by 23% in the immediate years after the crisis in comparison with its pre-crisis levels. Furthermore, by 2006 income and expenditure per capita was still below pre-crisis levels by a 1.5%. The results on the distributional effects of the crisis reveal that households located in rural areas, that don't own their house, headed by males with lower levels of education and with a high number of unemployed members were hit the hardest by the 1994 Mexican financial crisis. Furthermore, the fact that it took them nearly 10 years to recover suggest that the most vulnerable households do not recover with the rest of the economy.

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Introduction

Do households recover as the economy does after a crisis? Empirical evidence has not yet been able to offer a definitive answer. While there have been many studies on the short-term impacts of macroeconomic shocks on measures of aggregate poverty and average living standards, according to Ravallion and Lokshin (2007) we know rather little about the spatial and temporal dimensions of these impacts. The immediate welfare cost of a crisis can be high, but how quickly do individuals recover? Are the impacts greater for some than for others? If so, who are hit the hardest? By Using Mexico's 1994 "Tequila Crisis" as a case study this thesis attempts to answer these questions.

In the last 25 years Mexico has undertaken an economic transformation process in order to modernize its economy. During this process, Mexico has experienced several setbacks, namely severe economic crises, which have had a clear impact on the overall economy and the welfare of the society. In 1982, due to macroeconomic mismanagement and an adverse external environment, a severe crisis struck the country. According to Lustig (2001), falling oil prices and the inability of many commercial banks to continue lending contributed to an unfavorable international environment that exacerbated the consequences of domestic imbalances and contributed to rampant inflation, capital flight,

and chaos in the financial and foreign exchange markets. As a consequence the need to reform the economy towards a freer environment arose.

In the next 10 years, according to Sheahan (1997), Mexico made extraordinary improvements in economic terms. Throughout the 1980's, the Mexican government focused economic policy in restoring stability: inflation rate reduction and keeping tight control on the loss of international reserves. The Mexican government also engaged in the rescheduling of debt payments with external creditors, which were followed with a record compliance and eventually a combination of fiscal discipline and income policies (including pegging the "peso-dollar" rates) brought inflation down successfully from monthly averages close to 10% at the beginning of 1988 to about 1% at the end of the year.

By then it appeared that Mexico had reestablished the preconditions for growth. Fiscal and monetary discipline had been attained, and runaway inflation had been brought to a halt. Even more, in mid-1989, Mexico signed an agreement with its commercial banks to reduce its medium and long term debt under the "Brady Plan" and by the beginning of 1990 the Mexican authorities revealed their interest in a free trade agreement with the United States of America and Canada (NAFTA) and announced the decision to re-privatize banks and sell several public enterprises. The latter events where followed by immediate capital inflows from new foreign investment and capital repatriation.

However, events turned out differently and the recovery became unsustainable. In particular, the external deficit on the current account increased persistently and finally confidence in Mexico's prospects was shattered when, at the end of 1994, Mexico ran out of international reserves and faced a serious foreign exchange crisis, which became to be known as the "Tequila Crisis". As Lederman et al. (2000) acknowledge, the crisis was sparked by the announcement of a 15% nominal devaluation of the peso in December of

1994 which ended with a depreciation of the exchange rate of 43% by March 1995. As capital flew out of the country and the government lost all control of the exchange rate, the price index jumped forward, the GDP growth rate collapsed to an annualized rate of –6.2%, the real minimum wage fell by 13% and real private consumption decreased by 9.6%. Hence, the devaluation of the Mexican Peso in December of 1994 marked the beginning of the crisis.

Mexico's economy recovered quickly from the crisis and since 1996 the average growth rate of GDP has been, according to Lustig (2001), around 5.4% a year. A flexible exchange rate regime and sound macroeconomic management help Mexico withstand the shock waves sent by the 1997-98 East Asian crises, the Russian financial debacle and the drop in oil prices of 1998. The depreciation of the peso created some difficulties in reducing inflation as quickly as had been planned. However, as Galindo and Ros (2008) report, inflation declined to below 10% at the end of 2000 and to 6% at the end of 2006 together with a GDP average growth rate of 4.0% per year between 1996 and 2006.

The impact of an economic crisis on the welfare of households is clear and well studied. However, even when it is agreed that the crisis had a negative effect on the welfare of the individuals, there is no agreement on the extent and nature of the effects. Also, the vast majority of the crisis and household welfare studies for Mexico do not examine the present situation of poverty related to the 1994 crisis.

Given that economic crises have negative effects on the welfare of individuals, it is relevant to analyze the current situation of those affected by the past crisis. This since, as Harrison (2006) states, in 2000, poverty rates in Mexico where higher than they had been ten years before. Hence, it is of high importance to establish if the effects of economic crises on the welfare of households are just immediate or they span into the long-run. The

latter since Fallon and Lucas (2002) argue that "crises have typically proved short-lived but whether households plunged into poverty during a crisis are able to recover as the economy does remain an open question".

Thus, this thesis attempts to find answers to questions such as, how Mexican household welfare was affected by the crisis? To what extent Mexican households were affected? And, have Mexican households recovered as the overall economy did? Furthermore, the results of this investigation will not only be relevant for the Mexican case but will also contribute to the existing literature on the subject.

By focusing on income and expenditure as measurements of welfare such questions might get answered providing valuable information not only for the Mexican case but for the general issues regarding the impacts of economic crises on the welfare of individuals. Furthermore, the analysis is also enriched by evaluating the possibility of using alternative measures of welfare beyond income and expenditure by using an asset based approach to welfare measurement.

The organization of the thesis is the following: Chapter 1 provides the theoretical framework behind the choice of welfare indicators and explains their relevance for this study. Chapter 2 offers a review of the relevant literature concerning the empirical evidence of the effects of a crisis on the welfare of individuals. More specifically, it provides the reader with a discussion of the evidence obtained when using each of the welfare indicators considered in this thesis. Chapter 3 gives place to a description of the data used in this study together with the underlying survey. Chapter 4 provides with poverty measurements. Chapter 5 explains the empirical strategy: regression analysis and the asset index approach. Finally, Chapter 6 and the last section are devoted to the discussion of the empirical results and their policy implications as well as the concluding remarks.

Chapter 1

Household Welfare Indicators: Theory

According to Atkinson (1989), welfare measuring, from an economic perspective, concerns the level of resources of a household and not their personal sense of well-being. This does not mean that what Sen (1976) describes as a "non-welfarist"[1] approach is neglected. However, here the focus will be on the objective indicators which have been the traditional[2] basis for the measurement of welfare, since a contentious issue is the relevance of non-utility information deemed necessary in order to adopt a "non-welfarist" approach and, in particular, the extent to which one believes that individuals know what is best for them[3].

The approaches to welfare measurement based on the comparisons of individual utility involve the use of a money metric utility function -income and expenditure- as described by Samuelson (1974), and consumers' surplus with quasi-linear utility as discussed by Varian (1985). According to Kuklys and Robeyns (2004) the approaches

[1] Sen (1976) argues that a "non-welfarist" social welfare function would be based on "non-individualistic" considerations. The criticism is made on the basis that "Welfarism", i.e. treating social welfare to be functions only of the individual welfare vectors, without admitting any non-welfare description of social states, is restrictive even with all possible welfare information available.

[2] For a detailed discussion on the subject see Atkinson (1989), Slesnick (1998) and Sahn and Stifel (2003).

[3] See Ng (1981) and Ravallion (1992)

above encompass what have been the main stream methodologies for the last two centuries. Furthermore, even when Deaton and Zaidi (1999) acknowledge that money metric measures are limited in their scope, they also state that they are a central component of any assessment of welfare. Hence, income and expenditure welfare measures will be addressed in this section together with a description of some of the alternatives offered by recent economics literature in order to make a well informed choice of which indicators to use when analyzing the changes in the welfare of Mexican households.

1.1 Income versus Expenditure as Welfare Indicators

From a theoretical point of view, welfare measurement has typically, but not exclusively, been based on the theory of consumer demand. According to Blundell, Preston and Walker (1994) and Deaton and Zaidi (1999) welfare measurement can be done by solving the household utility maximization problem. The latter is that of minimizing the expenditure required to attain a specified utility level *u* given a set of prices *p*. This can be expressed as the expenditure function:

$$e(u, p) = \min_{q_1,\ldots q_n} \sum_{i=1}^{n} p_i q_i \text{ Subject to } u(q_1,..., q_n) = \bar{u}, \qquad (1.1.1)$$

where the q_i's are quantities of the *n* goods. The solution to this problem is a set of first order conditions:

$$q_i = q_i^c(u, p), \qquad \forall i = i,..., n, \qquad (1.1.2)$$

which are the compensated demand equations that have a number of specific properties such as symmetry, negativity and adding-up so that:

$$\frac{\partial q_i^c}{\partial p_j} = \frac{\partial q_j^c}{\partial p_i}, \qquad \frac{\partial q_i^c}{\partial p_i} \leq 0, \qquad \sum_{i=1}^{n} p_i q_i^c = e(\bar{u}, p), \tag{1.1.3}$$

where $e(\bar{u}, p)$ is known as the consumer's expenditure function. The expenditure function has a number of useful properties: it is homogeneous of degree zero, non-decreasing and concave in p, and it satisfies the Shephard's lemma which states that:

$$\frac{\partial e(u, p)}{\partial p_i} = q_i^c(u, p), \tag{1.1.4}$$

so that the compensated demands can be derived easily from the consumer cost (or expenditure) function and vice versa. Finally, the cost function can be inverted to yield the indirect utility function, $u=v(x, p)$ where x is the consumer's total expenditure (or income) which shows how the maximum level of utility achievable depends on the nature of the budget constraint.

The substitution of $v(x, p)$ for u into the compensated demand in (1.1.2) yields the uncompensated demand equation $q=q(x, p)$. Since the expenditure function, $e(\bar{u}, p)$, can be thought of as the cost of achieving level of utility $\bar{u}$ at prices p, it also acts as a measure of utility and an indicator of the households living standards (for fixed p). Thus, if a consumer has an income x^0 and faces a change of prices from p^0 to p^1, then the change in welfare could be measured by the difference in the cost evaluated, say, at prices p^1, of achieving the consumer's utilities in the two situations. This is the same as the change in the cost of achieving the original utility $u^0=v(x^0,p^0)$ associated with the new prices and is known as the compensating variation, which is given by:

$$CV \equiv e(u^0, p^0) - e(u^0, p^1) = e(u_1, p^1) - e(u^0, p^1) = x^0 - e(u^0, p^1)$$

$$= \sum_{i=1}^{n} \int_{p_i^0}^{p_i^1} q_i^c(u^0, p) dp_i , \qquad (1.1.5)$$

where the final equality arises because of Shephard's lemma. Similarly, the change in welfare could be measured by the difference in the cost evaluated at original prices p^0. This is the same as the change in the cost of achieving the level of utility associated with the change in prices and is known as the equivalent variation, which is represented as:

$$EV \equiv e(u^1, p^0) - e(u^1, p^1) = e(u^1, p^0) - e(u^0, p^0) = e(u^1, p^0) - x^0$$

$$= \sum_{i=1}^{n} \int_{p_i^0}^{p_i^1} q_i^c(u^1, p) dp_i . \qquad (1.1.6)$$

In summary, the compensating and equivalent variations are in fact observable if the demand functions are observable and if they satisfy the conditions implied by utility maximization. The observed changes in income/expenditure can then be used to observe a measurement of welfare change.

Afriat (1967) and Varian (1985), argue that the consumers' surplus is another valid[4] measure[5] of welfare since it is assumed that, when utility is quasi-linear, the compensating variation equals the equivalent variation, and both are equal to the consumer's surplus integral.

[4] Brown and Calsamiglia (2007) in a paper concerning the non-parametric approach to applied welfare analysis argue that consumer surplus is a valid measure of welfare and offer results using data on non-marketed goods. Furthermore, De Bartolome and Ross (2004) use quasi-linear utility when doing welfare comparison of different equilibria in their analysis of a mono-centric urban model in which the metropolitan area is divided in two income groups.

[5] If $x(p)$ is the demand for some good as a function of its price, then the consumer surplus associated with a price movement from p^0 to p^1 is:

Nonetheless, even when the above suggests that either income maximization or expenditure minimization should lead to the same desired utility and level of welfare, there are several reasons why an analysis based on income may lead to different conclusions than one based on expenditure. A household may have an income below a given threshold and still attain an expenditure level above it by running down savings or borrowing. Budget studies, as the one performed by Anand and Harris (1994)[6], commonly report significant dissavings by low-income groups. It could arise when they receive benefits in kind (e.g. free housing), or when they share consumption with others (as where an elderly person lives with children).

In these cases, it could be argued that income was not correctly measured, although it should be noted that in the case of shared consumption this would require a full accounting for the spillover effects. Conversely, receipt of an income above a given threshold does not imply that a minimum target level of consumption can be achieved, as argued by Srinivasan (1977) "it might be the case that a household might not be able to meet its basic requirements due to unequal initial distribution of real purchasing power, but also market imperfections and failures"[7].

[6] Using data from the Sri Lanka 1981-1982 finance survey and income as the welfare indicator the authors find that the bottom eight deciles of individuals are dissaving.

[7] The author explains that the "basic needs" approach, does not rely solely on income generation or transfers, and places primarily emphasis on the production and delivery to the intended groups of the basic needs basket trough "supply management" and a "delivery system". In a system in which production and consumption decisions are primarily mediated through the market, the failure of the poor to fulfill their basic needs presumably reflects not only an unequal initial distribution of real purchasing power, but also market imperfections and failures.

The literature concerning the choice of income or expenditure as welfare indicators is vast and opinions are divided[8]. Arguments as those given by Slesnick (1993), Atkinson (1991) and Deaton and Zaidi (1999), to mention a few, favor the use of expenditure as a welfare measure on the grounds that even when income is taken as a proxy for living standards, because these are hard to quantify, assessments of welfare based on income need to be qualified. Income may understate or overstate the level of living. If a family can dissave or borrow, its current level of living is not constrained by current income. Similarly, income may overstate the level of living when money alone is not sufficient to buy the necessary goods, for instance, if there is rationing or goods are not available. Finally, if income is used as a proxy for consumption, permanent income may be a closer match than current income, so that in practical terms annual income may be a better indicator than monthly or weekly income.

The above follows the idea formulated by Friedman (1957) when developing the "Permanent Income Hypothesis" which states that the choices made by consumers regarding their consumption patterns are determined not by current income but by their longer-run income expectations. Hence, consumers form estimates of their ability to consume in the long run and then set current consumption to the appropriate fraction of that estimate.

The estimate may be stated in the form of wealth, following Modigliani (1971), in which case the fraction is the annuity value of wealth, or as permanent income. Thus, the key conclusion of this theory is that transitory, short-term changes in income have little

[8] For further discussion and views see: Grootaert (1983), Chaudhuri and Ravallion (1994),Chakravarty and Muliere (2004) , Ravallion (1996) , Blundell and Preston (1996) , Lanjouw and Lanjouw (2001) and Deaton and Zaidi (2002)

effect on consumer spending behavior. Nonetheless, annual income is not often reported in the household income surveys[9].

Choosing income over expenditure as welfare measure can be justified, as in Sahn and Stifel (2003), by a series of measurement problems. First, unlike developed countries, in developing countries consumption and expenditure surveys are intermittent at best, and with few exceptions, of low quality. Second, when consumption data is available, it is normally collected on the basis of recall, usually 14 days, but sometimes a month[10]. Third, when constructing consumption aggregates, there is a need to derive the use of values of goods consumed. Fourth, the choice of deflators is limited since consumer price indices are the exception rather than the rule[11] in poor countries, especially where inflation tends to be high and variable. In this context, being aware that each indicator has its strengths and weaknesses, in this thesis both expenditure and income will be used not only for its theoretical advantages but since the survey containing the Mexican data has sufficient information on expenditure and income and do not suffer most of the methodological problems mentioned above.

[9] The income data reported by the National Household Income and Expenditure Surveys (ENIGH) for Mexico is in monthly terms.

[10] The criterion for the collection of data on consumption expenditure of the ENIGH is based on asking individuals to recall their consumption expenditure in the last month, three months and six months.

[11] CPI's are widely available in historical series since 1950 from Banco de Mexico (Mexico's central bank)

1.2 Alternative Welfare Indicators

Many of the limitations of monetary measures such as the ones addressed in section 1.1, as acknowledged by Hulme and McKay (2005) are widely accepted, but a key difficulty has often been to identify alternative approaches. One important potential alternative approach is to focus on asset ownership, given that assets capture longer term dynamics much better than income measures at different points in time. According to Johnston and Wall (2008)[12], assets based approaches perform better than the ones based on income and expenditure data. Thus, the latter provides enough motivation for the adoption of an assets based approach as an alternative welfare measure using the data from the Mexican ENIGH surveys.

The assets approach is primarily based on the use of an assets index which in turn consists of selecting a set of weights for each asset. That is, an index of the form:

$$A_i = a_1 x_{i1} + ... + a_k x_{ik}, \qquad (1.2.1)$$

where A_i is the asset index for household i, the x_{ik}'s are the individual assets, k is recorded in the survey, and a's are the weights. The two commonly used methods for the construction of the index are those based on "principal components analysis" (PCA) and on

[12] The authors examine closely the literature concerning assets indexes in their study of asset based approaches for policy making in Russia.

"factor analysis" (FA). Both of these methods are purely statistical and are mainly a way of reducing the amount of data required without reducing the information content.

Filmer and Pritchett (2001) use principal components analysis to construct an asset index in which the weights are the standardized first principal component of the variance covariance matrix of the observed household asset. Sahn and Stifel (2000) in turn, use factor analysis instead of principal components analysis, since the latter forces all the components to accurately and completely explain the correlation structure between the assets whilst factor analysis accounts for the covariance of the assets in terms of a much smaller number of hypothetical common variants or factors and it allows for assets-specific influences to explain the variances.

For the latter, Johnston and Wall (2008) and O'Donnell et al. (2007) report that often there is little difference between the approaches mentioned above[13]. Furthermore, Moser and Felton (2009), state that principal components analysis is an appealing method for two reasons. First, it is technically equivalent to a rotation of the dimensional axes, such that the variance from the observations is minimized. This is equivalent to calculating the line from which the orthogonal residuals are minimized. The latter being similar to a regression in terms of minimizing residuals, but in this case the residuals are measured against all of the variables not just one dependant variable. The second reason why principal components analysis is a valuable approach is that the coefficients have a fairly intuitive interpretation. The coefficient on any one variable is related to how much information it provides about the other variables. If ownership of one type of asset is highly indicative of ownership of

[13] Sahn and Stifel (2000) when constructing an index based on factor analysis argue that, despite the advantages of their approach, the Spearman Rank correlation between the principal components and factor analysis asset indices is about 0.98 for each of the samples considered.

other assets, then it receives a positive coefficient. If ownership of an asset contains almost no information about what other assets the household owns, then it receives a coefficient almost equal to zero. And if ownership of an asset indicates that a household is likely to own few other assets, then it receives a negative coefficient. Higher and lower coefficients indicate that ownership of an asset conveys more or less information about other assets.

Given the above, principal components analysis is an appropriate tool to model a presumed underlying continuous variable, such as wealth. If ownership of a given asset is highly correlated with owning any other asset that was asked about in the survey, then it is likely to be correlated with owning other type of assets not covered by the survey. Hence, the principal components analysis will be the one used in order to achieve a measure of the Mexican households' welfare using the ENIGH surveys data.

Formally, principal components analysis for the estimation of an assets index, as derived by Filmer and Pritchett (2001), is a technique for extracting from a set of variables those few orthogonal linear combinations of the variables that capture the common information most successfully. Intuitively, the first principal component of a set of variables is the linear index of all the variables that captures the largest amount of information that is common to all the variables.

Suppose that there is a set of N variables, a^*_{ij} to a^*_{Nj}, representing the ownership of N assets (i.e. i to N) by each household j. Principal components analysis starts by specifying each variable normalized by its mean and standard deviation: $a_{1j} = (a^*_{1j} - a^*_1)/(s^*_1)$, where a^*_1 is the mean of a^*_{ij} (i.e. all assets) across households and s^*_1 is its standard deviation, these selected variables are expressed as linear combinations of a set of underlying components for each household j:

$$
\begin{aligned}
a_{1j} &= A_{1j}v_{11} + ... + A_{Nj}v_{1N} \\
... & \qquad\qquad j = 1, ..., J, \qquad\qquad (1.2.2) \\
a_{1j} &= A_{1j}v_{N1} + ... + A_{Nj}v_{NN}
\end{aligned}
$$

where *A's* are the components and the *v's* are the coefficients on each component for each variable. Since only the left-hand side of each line is observed, the solution to the problem is indeterminate.

Principal components analysis overcomes the latter indeterminacy by finding the linear combination of the variables with maximum variance -the first principal component A_{1j}- and then finding a second linear combination of the variables, orthogonal to the first, with maximum remaining variance, and so on. Technically speaking the procedure solves the equations $(R - \lambda_n I)v_n = 0$ for λ_n and v_n, where R is the matrix of correlations between the scaled variables and v_n is the vector of coefficients on the nth component for each variable. Solving the equation yields the characteristic roots of R, λ_n (eigenvalues) and their associated eigenvectors, v_n. The final set of estimates is produced by scaling the v_n's so the sum of their squares sums to the total variance, another restriction imposed to achieve determinacy of the problem.

The "scoring factors" from the model are recovered by the system implied in (1.2.2), and yield a set of estimates for each of the N principal components:

$$
\begin{aligned}
A_{1j} &= a_{1j}f_{11} + ... + a_{Nj}f_{1N} \\
... & \qquad\qquad j = 1, ..., J. \qquad\qquad (1.2.3) \\
A_{Nj} &= a_{1j}f_{N1} + ... + a_{Nj}f_{NN}
\end{aligned}
$$

The first principal component, expressed in terms of the original variables, is therefore an index of each household based on the expression:

$$A_{1j} = \left[\left(q^*_{1j} - a^*_1 \right) / \sigma^*_1 \right] f_{11} + \ldots + \left[\left(q^*_{Nj} - a^*_N \right) / \sigma^*_N \right] f_{1N} . \qquad (1.2.4)$$

The assets included in the indexes described previously can be placed into two categories: household ownership of consumer durables and characteristics of the household's dwelling. The first category consists of ownership of a radio, television set, refrigerator, bicycle and motorized transport. The second category includes the source of drinking water, toilet facilities and floor material. Since assets are meant to be compared across surveys, the data sets are pooled across and the principal component is estimated from the pooled sample. Then, the principal components analysis is applied to estimate the wealth indexes for each household.

Nonetheless, the methodology described above must be followed with caution since as Kolenikov and Angeles (2009) argue, Filmer and Pritchett (2001) fail to adequately address the important methodological issue that the variables must be positively correlated with the latent variable, and with each other. If all the variables are positively correlated, then the estimates will be greater than or equal to zero and bounded at the top by the value of the first eigenvalue. If they are not, then the first eigenvector may have negative values, meaning that the estimated latent variable would be reduced to asset ownership. The latter only remedied by interpreting ownership of those assets as a sign of lower wealth. If this is plausible, then even negative values of estimated wealth are acceptable since the estimated variable is ordinal and can either be used as it is or rescaled so that they are all positive.

By knowing the advantages and limitations of the money metric and asset index based welfare measures, it seems logical to think how comparable they are. For this, Filmer and Scott (2008) compare how results using various methods to construct assets indices match results using per capita expenditures. Their analysis shows that inferences about

inequalities on education, health care use, fertility, child mortality, as well as labor market outcomes are quite robust to the specific economic status measure used. First, within the class of assets, the results are systematically consistent across aggregation approaches. Second, the economic gradients in outcomes based on asset indices are similar to those based on per capita expenditures. They acknowledge some differences, in particular with regards to health seeking behavior, but inferences about the importance of economic status are not qualitatively affected.

Similarly, Von Maltzahn and Durrheim (2007)[14], find in their results support for the fact that different measures are identifying the same people as belonging to the poor group with high correlation between the two household poverty measures, household income levels and an asset based scores. The latter indicating that different measures provide similar overall pictures on poverty. The high correlations between the two household measures suggest that there is an underlying dimension of poverty that can be detected by using different measures.

Hence, it can be said that, the methodological and theoretical aspects of both the asset index and the money metric utility support their use as welfare measures and they can be used to examine the impact of a crisis on the welfare of households in order to achieve more robust results. Thus, there are sufficient arguments in order to develop both approaches to assess the impacts of a crisis on the welfare of households.

[14] The authors compare poverty using income and asset based measures at the national and household level in Lesotho, Namibia, South Africa, Swaziland and Zambia, all members of the South African Development Community.

Chapter 2

Crisis and Household Welfare: Empirical Literature

The relationship between crisis and household welfare is a phenomenon that caught the interest of many scholars and researchers especially after major episodes such as the financial crisis of Mexico (1995), South East Asia (1997/8), Russia (1998) and Brazil (1999) to mention a few. Thus, the existing literature on the effects that such crises had on the economy and welfare of individuals is considerably large. Furthermore, it can be said that the findings of this literature dwell among well identifiable issues, such as the impacts of the crisis on poverty levels, inequality, vulnerability, labor markets, wages, the distribution of income and growth. However, special focus will be given to the literature concerning income, expenditure and assets indexes as welfare measures in order to highlight, not only the use of such indicators as welfare measurements, but the empirical results derived from such analysis regarding to the impacts of a crisis on household welfare.

2.1 Crises and Their Impacts

In studies of the impacts of the crisis on poverty levels and the disparity between urban and rural poverty, Baldacci, De Mello and Inchauste (2002) and Verner (2005) found that in Mexico, in the post crisis period, poverty rates soared and that the rural-urban poverty gap increased and in some areas is at least four times higher in rural than in urban areas. Similarly plenty has been done to capture the impacts of the crisis on inequality, Lustig (2001); Szekely and Hilgert (1999); and Lopez-Acevedo and Salinas (2000) argue that income inequality in Mexico rose after the 1994 crisis leaving those closest to subsistence levels helpless.

The investigations by Fallon and Lucas (2002)[15] for some East Asian and Latin American countries and Sheahan (1997) for Mexico, Peru and Chile in turn, concentrate on the issues regarding labor markets. They argue that the dominant labor market effect of the crisis was a cut in real wages, rather than in employment and hours of work, though unemployment did emerge. Also, household income issues such as those mentioned by Escobar and Gonzalez de la Rocha (1995) who argue that as a result of the crisis, households have undertaken a restructuring process in which more family members are introduced into the work force in order to compensate for income losses, and also opted for shifts in employment in more profitable or less damaged sectors. Finally, Ferreira,

[15] The authors' examine the impact of the crises in Indonesia 1998, Korea 1998, Malaysia 1998, Thailand 1997, Argentina 1995, Mexico 1995 and Turkey 1994.

Prennushi and Ravallion (1999) state that the impact of an economic crisis varies across sectors of employment, level of wealth, geographic location, gender, and according to various idiosyncratic factors.

Regarding the recovery time of the economy after a crisis, Barro (2001) found that for five east Asian countries[16] that experienced sharp currency and banking crises in 1997-1998 the recovery by 1999-2000 was strong in most cases and argues that the broader analysis found no evidence that the financial crisis had effects on the economy that persisted beyond a five year period. Similarly, Lederman et al. (2000), show that Mexico's economy recovered quite well in the following 5 years after the crisis. However, while Fallon and Lucas (2002) support the latter by arguing that financial crises have typically proved to be short-lived they also acknowledge it remains a matter of concern whether households plunged into poverty during a crisis are able to recover as the economy does.

Analyses performed for the countries involved in similar crises that address the spatial and temporal dimensions of the impacts find no evidence to support that households recover at the same pace as the overall economy, and therefore they can be used as a benchmark. For the latter Ravallion and Lokshin (2007) in a study for Indonesia argue that while there have been many studies of the short term impacts of macroeconomic shocks on measures of aggregate poverty and average living standards, we know very little about the spatial and temporal dimension of these impacts. Also they point out that there is a number of ways in which a short lived crisis could have a lasting welfare impact. The current budgetary costs of bailouts for a financial crisis can entail future welfare costs through reduced public spending on infrastructure, services and transfers. Behavioral responses to

[16] Indonesia, Malaysia, South Korea, the Philippines and Thailand

the crisis can also entail longer term costs, such as when children are taken out of school to supplement family income. As stated in Ravallion and Lokshin (2005), "In the aggregate, a large share -possibly the majority- of those Indonesians who were still poor in 2002 would not have been so without the 1998 crisis". Furthermore, Lokshin and Ravallion (2004) recognize that even if households do recover the adjustment process can be slow.

Similarly, Suryahadi and Sumarto (2003) found that the 1998 East Asian crisis caused a clear deterioration in the welfare of Indonesian people. By piecing together a consistent series of estimates of poverty rates covering the period from 1996 to 2002 they show that even when the poverty rates reached their pre-crisis level in 1999 by 2001 and 2002 they were on the rise again. Also, Cruces and Wodon (2003) found that in the period covering 1995 to 2002 the welfare of households in Argentina decreased dramatically with a higher share of the households being in chronic as opposed to transient poverty.

2.2 Crisis Impact on the Welfare of Households: Income and Expenditure

Given the discussion in Section 1.1 about the arguments in favor of income and expenditure as measures of welfare and knowing that the welfare of households is directly affected by an economic crisis, it's important to analyze the existing empirical literature regarding the measurement of such impacts through objective measures as the ones mentioned above.

Since the 1990's we have witnessed several financial crises such as the ones mentioned at the beginning of this chapter, the empirical literature regarding the impacts of such in welfare using income and expenditure measures is vast. In particular, the Mexican crisis of 1994, the South East Asian crisis of 1997-98 and the Russian crisis of 1998 are among the examples often found in such literature.

As a starting point, McKenzie (2006) used income and expenditure data from national household surveys covering the period 1992-1998 to identify the consumer response to the Mexican 1994 crisis. The results of the above show that Mexican households were unable to shield the level of their consumption from falling during the peso crisis. Expenditure was reduced on non basic necessities in order to shift resources for the consumption of more basic goods. Hence, household welfare measured by income and expenditure was affected to a degree that it caused, in the aftermath of the crisis, consumption smoothing in order to maintain basic living standards.

In another example, Friedman and Levinsohn (2002) develop a methodology to assess the distributional impacts of Indonesia's 1997 financial crisis on household welfare, using income and expenditure as measure. They acknowledge that such methodological design was not possible otherwise. Such methodology consists of using household consumption data before the crisis and then matching it with information on commodity price changes brought on by the crisis to calculate the simple measures of compensating variation -the necessary amount of money to compensate households following price changes and enable them to return to pre-crisis levels of utility. Furthermore, their findings are that virtually every household in their sample was severely affected, although the urban poor fared the worst.

Similarly, in a novel approach to quantify the effects on poverty and inequality of the Indonesian crisis, Robilliard, Bourguignon and Robinson (2002) use a combination of micro-simulation and standard computable general equilibrium (CGE) models to examine counterfactual policy scenarios. In their analysis, the micro-simulation model is based on a detailed representation of a real income generation mechanism at a household level and allows them, in contrast with the CGE model, to capture different channels through which the financial crisis affected household welfare.

According to their findings, compared to standard CGE or before-after analysis, the framework developed allows for the decomposition of the effects of the financial crisis, without resorting to the representative household assumption. The first set of experiments shows that the credit crunch shocks are important driving forces explaining the collapse of GDP, while the devaluation combined with the increase in the market costs of food appear to be the main driving force explaining the increase in the relative prices of food with respect to non food commodities.

Given that one of the main purposes of this thesis is to shed light on the time dimensions of a crisis impacts on the welfare of households it seems logical to mention the findings of Ravallion and Lokshin (2007) on the lasting impacts of the crises mentioned above. Using income and expenditure as measurement of household welfare they argue that the impacts of the crisis proved to span in the long term. Their results suggest that the Indonesian crisis was still having an appreciable impact on living standards 4 years later. Furthermore, in a previous similar study Lokshin and Ravallion (2000) found that the impacts of the Russian 1998 financial crisis on the welfare of households were quite widespread. Such result derived from the use of income and expenditure based welfare indicators show that expenditure poverty rose by 50% in the aftermath of the crisis and

there was a sharp attenuation in the perceptions of economic wellbeing. Income poverty rose much less than expenditure poverty, however, the proportion of Russians with incomes below half the poverty line was actually lower in the aftermath of the crisis than two years earlier.

Finally, Kang and Sawada (2008) argue, by using a consumption Euler equation that the effect of the Korean 1997 crisis on household behavior and welfare was large and negative. During and after that crisis period the probability of facing income reducing credit constraints increased significantly suggesting the gravity of the credit crunch at the household level. The effect on welfare provides more evidence to the widespread use of income and expenditure as objective measures of the welfare of households.

2.3 Crisis Impact on the Welfare of Households: Assets Index

Given the problems in measuring income and expenditure and the fact that existing adjustments in household size and composition are arbitrary, there is an increasing concern to identify alternative measures of household welfare that are robust but less data intensive and subject to a smaller measurement error. Hence, by knowing the caveats and disadvantages of using income and expenditure as welfare indicators and the alternative discussed in section 1.2, it becomes crucial to go ahead with the revision and discussion of some of the empirical work on household welfare measured by an asset index.

Although the literature regarding the use of assets ownership has been developed since the beginning of the 1990's, this literature has mainly focused in the demographic and health related behavior of individuals and not in the measurement of crises impacts on welfare. Montgomery et al. (2000) and Falkingham and Namazie (2001) provide very useful surveys of studies that have used alternative measures of household socio-economic status to examine demographic and health behavior. In their review, mention is given to a series of studies[17] concerning fertility, family planning, child survival and education to mention a few. The latter rely, to different extent, on the aggregation and wealth index formulation using different household assets to determine the socio-economic status of families. However, based on the above, important methodological contributions have been made, primarily, by Filmer and Pritchett (2001) and Sahn and Stifel (2003), who formalize the methodology and apply it to the construction of an asset based index as a measurement of household welfare in the absence of income or expenditure data.

Using data for India, Filmer and Pritchett (2001), estimate the relationship between household wealth and children's school enrolment. In their study, they proxy wealth by constructing a linear index from asset ownership indicators, using principal components analysis to derive weights.

For these Indian data, the index is robust to the assets included, and produces internally coherent results. State-level results correspond well to independent data on per capita expenditure and poverty. Furthermore, to validate the method and to show that the

[17] Jensen (1996) addresses the fertility impact of alternative family planning distribution channels in Indonesia; Speizer (1995) relies on aggregates of assets ownership when analyzing different types of marriage schemes in sub-Saharan Africa; Bollen et al (1995) use the sum of household assets when estimating the demand of contraceptives in Tunisia; and Knodel et al (1990) develop a wealth index based on assets when studying family size and children's education in Thailand.

asset index predicts enrollments as accurately as household expenditure, or more so, they use data for Indonesia, Pakistan and Nepal that contain information on both expenditures and assets.

According to their results, in the four countries examined, the use of an asset index produces reasonable and consistent results since they find less severe measurement errors in the index than in consumption expenditures as a proxy for long-run wealth in predicting educational outcomes.

Similarly, in an attempt to find alternative measures of welfare in the absence of expenditure data, Sahn and Stifel (2000, 2003) argue that an asset index is a valid predictor of a crucial manifestation of poverty such as child health and nutrition. Indicators of relative measurement errors show that the asset index is used as a proxy for long-term wealth with less error than expenditures. Furthermore, by using the Demographic and Health Surveys (DHS) to compare poverty at two or more points in time within and between 11 sub-Saharan African countries[18] they not only find that their results show declines in poverty during the decade of the 1990's but that the use of an asset index circumvented the debilitating problems that characterize attempts to make poverty comparisons over time and countries such as the lack of reliable price deflators and survey methods that are not consistent over time.

In an attempt to improve the understanding of households' labor market strategies and using the Commercial Bank of Syria (CBS) 2003 Unemployment Survey which does not contain information on income and expenditure, Ovensen (2006) developed an asset index as an indicator of households' long-term wealth. The findings show that the index is

[18] The countries included in the sample are Cameroon, Ghana, Kenya, Madagascar, Mali, Senegal, Tanzania, Togo, Uganda, Zambia and Zimbabwe.

generally robust to the assets included and that it produces reasonable comparisons with indicators related to household welfare, e.g. female and male levels of education. Also, it is argued that the distribution of the scores of the asset index across regions and urban and rural locality types seem to be in accord with most common perceptions of the distribution of household welfare in Syria.

Furthermore, Mckenzie (2005) finds that, when constructing an asset index using Mexican data for 1998, the asset based measure provides reasonable proxies for inequalities in living standards. Moreover, when the inequality measures are applied to the Mexican data to examine the relationship between school attendance and state level inequality, the findings show a significant effect of inequality on the probability that a boy aged 14-18 attends school, with more inequality being associated with lower attendance. In conclusion the index performs relatively well, in spite of a fairly limited number of asset variables in the survey, and only a small minority of households owning these assets. Hence, the recommendation is that the asset index may be used as a reference for long-term economic wealth.

However, it is important to highlight that, even when the studies reviewed are well documented analyses and show a clear and undeniable impact of the crisis on the overall economy and the welfare of households, the majority of the studies do not consider more than a 4 year period of time to assess the impacts on household welfare. Furthermore, in the case of the use of an asset index as a measure of welfare, the literature concerning the use of such when trying to assess the impacts of a crisis on the welfare of households, has not been formally and theoretically developed.

Nonetheless, given the empirical evidence and the amount of studies performed to prove the pertinence of income and expenditure as measures of welfare and the validity of

an asset index as an alternative, it is appropriate to consider the possibility of using the three measures when assessing the impacts of a crisis on the welfare of households in order to provide suitable answers to the questions formulated in the introduction of this thesis.

Chapter 3

Data Description

3.1 The Mexican Household Income and Expenditure Survey

Our empirical analysis is based on the Mexican Household Income and Expenditure National surveys (Encuesta Nacional de Ingreso y Gasto de los Hogares, ENIGH) for the period 1992-2006. The Mexican National Institute of Statistic Geography and Informatics (INEGI) has conducted this survey biannually[19] since 1992.The size of the surveys varies from year to year, being 10,530 households in 1992, 12,815 in 1994, 14,042 in 1996, 10,952 in 1998, 10,108 in 2000, 17,167 in 2002, 22,595 in 2004, 23,174 in 2005 and 20,875 in 2006. The surveys contain detailed information at the household and individual level on income, expenditure, demographic and socio-economic characteristics across the population for the purpose of decision making, but also are intended to provide information for international organizations and the scientific community in general.

ENIGH's data is presented in six different data bases each containing the following information:

[19] The only exception for the period from 1992 to 2006 is the 2005 ENIGH survey which is included in the analysis.

1. *Erogaciones* (disbursements). Expenditure on real state, stocks, government bonds and debt payments.
2. *Gastos* (expenditures). Expenditure on food and non-food items.
3. *Hogares* (households). Physical characteristics of the dwellings.
4. *Poblacion* (population). Individual characteristics of household members.
5. *Ingreso* (income). Monetary income and other sources of income of the household and its members.
6. *No monetario* (non-monetary). Non-monetary income, including private and government in-kind transfers, gifts and auto-consumption.

The survey design has the following 4 characteristics:

(1) Probabilistic within Primary Sampling Units (PSU)[20]: All sampling units have the same known and different from zero probability of being selected.

(2) Stratified: The sampling units with similar geographical and socioeconomic characteristics are grouped together to form strata.

(3) Multi-stage: The final unit (household) is selected after at least two stages. The first is the selection of a group of households and the second is the selection of a specific household.

(4) Clustered: The sampling units are grouped and a sample is drawn from within the group.

These four characteristics ought to be taken into consideration when making inferences about the population. The fact that the sample is not purely probabilistic (i.e. the ex-ante

[20] The Primary Sampling Unit used in the ENIGH surveys is called Geo-statistic Basic Area (AGEB) and it consists of delimitated zones within rural and urban areas normally integrated of 25 to 50 street blocks.

probability of not being surveyed is not the same for each unit of observation -the household) introduces a bias in the survey estimates with respect to their population values.

The ENIGH survey like many other household surveys around the world uses a multistage-sampling procedure. In a random sample, the probability of being surveyed is the same for every household in the population irrespective of their characteristics. However it might be in the interest of the surveyor to obtain a representative sample for a particular group of the population such as households living in a given region or under certain income characteristics or perhaps formed by different ethnic groups. When this is the case, the surveyor has two options, either to increase the random sample up to a point where a representative sample for the group of interest is obtained or else to opt for a stratified survey. As it may be suspected the first option involves an increase in the sampling cost, therefore common practice is to perform stratified surveys.

In the case of ENIGH the survey aims to obtain a representative sample for communities with less than 2,500 habitants (rural), therefore two strata are defined below and above this threshold. That implies that more households in communities with less than 2,500 habitants were surveyed compared with the number that would have being surveyed under a simple random sampling (keeping the total number of households constant). Hence the probability of being surveyed is not constant across households and some re-weighting must take place before obtaining population estimates. Each household has to be re-weighted with the inverse of its probability of being sampled; these are called the expansion factors because multiplying (or expanding) each household in the survey by this factor should give the total number of households in the population. Hence while making statistical inferences about the population we should account for survey design effects, i.e.

re-weight the sample accordingly to get the correct point estimates and take into account stratification and clustering to get the correct standard deviation[21].

For the above, the six data bases are summarized and re-weighted by the INEGI in a concentrated table in which information about income, expenditure, individual and household level characteristics are reported and are the ones used in this thesis.

However, even when the surveys for 1992 to 2000 are strictly comparable in terms of sampling frame, sampling methodology, timing (the survey is held during the last quarter of the year), recall periods, and in terms of the questionnaires that capture income, expenditures and assets, which are the key variables of interest, the ENIGH for 2002 presented changes in sample size and design and were maintained in subsequent surveys. The latter giving place to important considerations that must be highlighted when comparing the series of ENIGH surveys.

According to Damian (2007), some of the issues that make comparability difficult are the changes in the sample framework, sample size, questionnaire and definitions of the urban and rural areas. Hence, each one of them needs to be addressed in order to account for the potential drawbacks of using the ENIGH's surveys.

The validity loss of the sample framework constitutes one of the most frequent problems in household surveys' design. For instance, when displacing the sample framework of 1992 to 1994 or 2000 to 2004 they become obsolete due to different demographic and spatial phenomena (migration, new neighborhoods development, etc.).

An additional problem which makes the comparability of the ENIGH's difficult is derived from the increment of sample size which reduces sampling errors. In 1992 the

[21] For a complete discussion on the subject see Deaton (1997).

sample size was just over ten thousand households and had slight fluctuations until 2000 when it increased to 17,167 in 2002 and more than 20,000 from 2004 onwards. Even when ENIGH changed the expansion factors in order to ensure that the sample units' representation is correct, this can bring serious consequences for poverty analysis for this can be reduced due to a better income data collection at the households rather than a real improvement in its real levels.

Among the changes performed in the survey design, the increment in the number of questions that gather the households' income from 36 in 2000 to 48 in 2002 and to 61 in 2004 is noteworthy. The latter can bring along better income data gathering, however, it can also hinder the reliability of real changes in the income of households. Nonetheless is worth pointing out that the 2004 World Bank Report on Poverty in Mexico states that the increase in the number of questions regarding income does not affect the evolution of poverty since they only represent 0.9% of the households' total income.

Another of the issues derived from the alterations in the design of the sample is the changes in the size threshold to define urban and rural localities. For instance, between 1992 and 2004, the definition of an urban area was that of a town with more than 2,500 habitants. In 2000 and 2002 the survey included in is sample framework the metropolitan areas of the National Survey of Urban Employment (ENEU), however the methodological document for the 2004 survey does not clarify if these are still in use.

Despite its generalized use, the ENIGH surveys present some deficiencies regarding the gathering and comparison of information. Nonetheless, until today, the main source of data and information to measure poverty in Mexico is the one provided by the ENIGH surveys. Hence, questioning the adequacy of the surveys when evaluating the welfare of households would involve discarding a long tradition and experience in the production of

reliable statistical data. However, seeing it as the perfect statistical tool, disregarding its weaknesses, would lead to mistaken conclusions.

3.2 Data Description

A household is defined within the surveys as a group of people who habitually reside in the same dwelling and who are sustained by common expenditure on food. Individuals who live together but do not share food expenditure are considered to be distinct households. At a household level, income, expenditure, size, composition, area of residence and socio-economic characteristics such as whether or not households own the house they live in and the number of economically active employed members composing the household are considered to be relevant and are taken into consideration. Similarly at the individual level the analysis is focused on the household head[22] relevant characteristics considered to be age, gender and years of schooling. The descriptive statistics both at a household and individual level for the whole period are shown in table 1.

Household expenditure and income as well as per capita income and expenditure follow an increasing pattern except for the post crisis period from the end of 1994 to 1998 which clearly expresses the impact of the 1994 financial crisis effects on the average income and expenditure of households and its individual members. As for the features of the household, it can be observed that the main family composition in Mexico is a nuclear

[22] The household head is recognized by all the members of the household as such.

one and the majority of the population is concentrated in urban settlements. After the crisis a large reduction in the amount of rural households can be observed due to migration from the countryside in to the cities or abroad, especially to the United States of America. Similarly, even when large shares of households own their house, a reduction of this share can be observed after the crisis period. Nonetheless, the amount of employed household members remained constant as well as the size of the household.

As for the household heads, the average age is around 46 years and it is clear that most are men although it tends to decrease, perhaps due to strong migration patterns of male household heads to the United States of America. Also, even when the average years of schooling were around four, an increase in the average can be observed in the six years after the crisis which gives evidence of the crisis impacts on the schooling decisions of the household members. Furthermore, according to Anand and Harris (1994), it is a common observation from household budget survey reports of developing countries for expenditure to exceed income. In the case of Mexico it is clear from the income and expenditure reports in table 1 and the trend behavior in figure 1 that expenditure does not exceed income in all cases.

Figure 1: Household income and expenditure from 1992 to 2006

(The values are the means for each year)

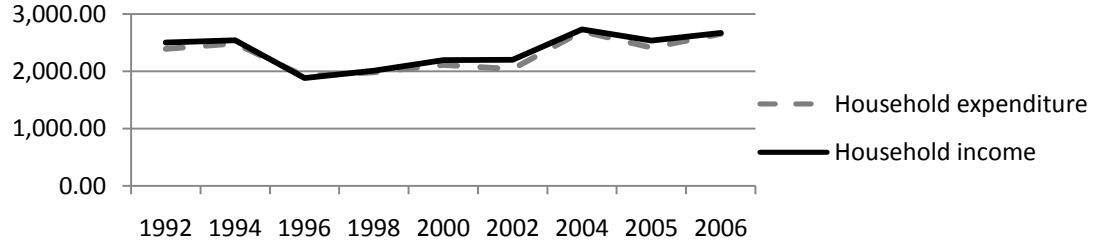


Table 1. Mexico: descriptive statistics

(Percentage values, unless otherwise specified)

	1992 (St. Dev)	1994 (St. Dev)	1996 (St. Dev)	1998 (St. Dev)	2000 (St. Dev)	2002 (St. Dev)	2004 (St. Dev)	2005 (St. Dev)	2006 (St. Dev)
Household expenditure*	**2,391.45**	**2,485.31**	**1,918.07**	**1,984.23**	**2,116.24**	**2041.1**	**2,700.14**	**2,417.23**	**2,653.64**
	(3500.8)	*(3490.6)*	*(3401.5)*	*(2749.8)*	*(3009.7)*	*(3811.3)*	*(4558.1)*	*(3757.0)*	*(3406.5)*
Expenditure per capita*	**643.14**	**697.45**	**540.56**	**597.85**	**651.81**	**615.6**	**870.12**	**767.37**	**865.15**
	(1154.9)	*(1205.8)*	*(1116.3)*	*(1433.3)*	*(1215.8)*	*(1753.2)*	*(2649.0)*	*(1449.2)*	*(1431.0)*
Household income*	**2,504.14**	**2,537.90**	**1882.07**	**2,008.14**	**2195.3**	**2202.51**	**2,730.22**	**2,534.72**	**2,669.08**
	(4203.1)	*(3591.1)*	*(3654.4)*	*(3079.6)*	*(3048.5)*	*(4054.8)*	*(4678.8)*	*(4342.2)*	*(3403.3)*
Income per capita*	**669.79**	**706.92**	**526.37**	**601.77**	**670.76**	**660.13**	**872.59**	**794.51**	**860.79**
	(1353.7)	*(1200.6)*	*(1059.8)*	*(1563.9)*	*(1236.7)*	*(1804.9)*	*(2793.6)*	*(1527.6)*	*(1462.4)*
H typology									
Single	**5.26**	**6.44**	**5.99**	**7.1**	**7.81**	**9.73**	**8.44**	**8.38**	**9.34**
	(0.223)	*(0.245)*	*(0.237)*	*(0.257)*	*(0.268)*	*(0.3)*	*(0.3)*	*(0.3)*	*(0.3)*
Nuclear	**71.82**	**68.9**	**69.98**	**72.02**	**69.18**	**79.75**	**67.02**	**66.65**	**66.08**
	(0.450)	*(0.463)*	*(0.458)*	*(0.449)*	*(0.462)*	*(0.402)*	*(0.470)*	*(0.471)*	*(0.473)*
Extended	**22.14**	**23.82**	**23.17**	**20.24**	**22.18**	**9.27**	**23.58**	**23.79**	**23.57**
	(0.415)	*(0.426)*	*(0.422)*	*(0.402)*	*(0.415)*	*(0.290)*	*(0.424)*	*(0.426)*	*(0.424)*
Complex	**0.62**	**0.7**	**0.54**	**0.29**	**0.46**	**0.41**	**0.54**	**0.67**	**0.52**
	(0.078)	*(0.084)*	*(0.073)*	*(0.054)*	*(0.067)*	*(0.064)*	*(0.073)*	*(0.082)*	*(0.072)*
Other	**0.16**	**0.13**	**0.32**	**0.34**	**0.38**	**0.44**	**0.42**	**0.51**	**0.48**
	(0.040)	*(0.036)*	*(0.057)*	*(0.058)*	*(0.061)*	*(0.066)*	*(0.065)*	*(0.071)*	*(0.069)*
Area of Residence									
Urban	**52.56**	**51.61**	**54.15**	**54.3**	**54.35**	**60.66**	**70.17**	**61.31**	**63.68**
	(0.499)	*(0.500)*	*(0.498)*	*(0.498)*	*(0.498)*	*(0.489)*	*(0.457)*	*(0.487)*	*(0.481)*
Rural	**47.43**	**48.38**	**45.84**	**45.69**	**45.64**	**39.33**	**29.82**	**38.68**	**36.31**
	(0.499)	*(0.500)*	*(0.498)*	*(0.498)*	*(0.498)*	*(0.489)*	*(0.457)*	*(0.487)*	*(0.481)*
H Features									
House ownership	**73.84**	**74.37**	**72.28**	**70.43**	**71.4**	**70.04**	**65.93**	**68.08**	**66.52**
	(0.440)	*(0.437)*	*(0.448)*	*(0.456)*	*(0.452)*	*(0.458)*	*(0.474)*	*(0.466)*	*(0.472)*
Employed **	**1.63**	**1.73**	**1.72**	**1.53**	**1.65**	**1.7**	**1.68**	**1.7**	**1.74**
	(1.080)	*(1.158)*	*(1.135)*	*(0.997)*	*(1.107)*	*(1.099)*	*(1.067)*	*(1.091)*	*(1.129)*
Size**	**4.78**	**4.66**	**4.5**	**4.34**	**4.16**	**4.19**	**4.04**	**4.06**	**3.99**
	(2.384)	*(2.351)*	*(2.288)*	*(2.193)*	*(2.088)*	*(2.068)*	*(1.992)*	*(2.033)*	*(2.038)*
Males**	**2.3**	**2.31**	**2.26**	**2.11**	**2.01**	**2.03**	**1.95**	**1.96**	**1.92**
	(1.498)	*(1.486)*	*(1.409)*	*(1.375)*	*(1.318)*	*(1.308)*	*(1.267)*	*(1.278)*	*(1.278)*
Females**	**2.4**	**2.35**	**2.35**	**2.22**	**2.15**	**2.16**	**2.08**	**2.09**	**2.06**
	(1.488)	*(1.452)*	*(1.451)*	*(1.392)*	*(1.332)*	*(1.325)*	*(1.288)*	*(1.316)*	*(1.306)*
H H Features									
Age***	**44.24**	**45.25**	**44.89**	**45.53**	**46.38**	**46.78**	**46.74**	**47.01**	**46.97**
	(15.58)	*(15.521)*	*(15.452)*	*(15.552)*	*(15.592)*	*(15.444)*	*(15.433)*	*(15.442)*	*(15.733)*
Males	**87.02**	**85.62**	**84.93**	**83.28**	**81.25**	**80.38**	**77.14**	**76.69**	**75.42**
	(0.336)	*(0.351)*	*(0.358)*	*(0.373)*	*(0.390)*	*(0.397)*	*(0.420)*	*(0.423)*	*(0.431)*
Females	**12.97**	**14.37**	**15.06**	**16.71**	**18.74**	**19.61**	**22.85**	**23.3**	**24.57**
	(0.336)	*(0.351)*	*(0.358)*	*(0.373)*	*(0.390)*	*(0.397)*	*(0.420)*	*(0.423)*	*(0.431)*
Years of schooling***	**4.2**	**4.31**	**4.74**	**4.95**	**5.2**	**5.31**	**6.49**	**6.25**	**6.06**
	(4.801)	*(4.876)*	*(4.937)*	*(4.955)*	*(5.102)*	*(4.998)*	*(5.172)*	*(5.212)*	*(4.912)*
observations	**10,530**	**12,815**	**14,042**	**10,952**	**10,108**	**17,167**	**22,595**	**23,174**	**20,875**

Source: Author's calculations based on 1992 to 2006 ENIGH surveys provided by INEGI

*: income and expenditure variables are in local currency at 1994 constant prices for all waves. **: average number of household members***: average in years.

Given that, as stated above and contrary to common belief[23], expenditure does not exceed income, and in fact, it tends to follow the same trend as the latter, it is necessary not only to analyze the components of each of the income and expenditure aggregates but to discuss the particularities that make the reported income and expenditure behave in such way.

According to the discussion in chapter 1, when describing the appropriateness of using either income or expenditure as welfare indicator, even when either income maximization or expenditure minimization should lead to the same desired utility and level of welfare, a household may have an income below a given threshold and still attain an expenditure level above it by running down savings or borrowing. Conversely, having an income above a given threshold does not imply that a minimum level of consumption can be reached allowing for savings to be achieved. For this, according to Anand and Harris (1994) and Deaton (1997), measured income diverges from measured expenditure due to the conceptual differences in the respective terms -it is possible to save from income and to finance consumption from borrowing.

Income is subject to frequent variations, whereas expenditure can be smoothed over time. As a consequence, it is reasonable to expect that expenditure will be more directly related to current living standards than will income, at least for short reference periods. Furthermore, income and expenditure data are difficult to collect. In developed countries, in which a large proportion of the population works in the formal sector and in which consumption patterns are very complex, the balance often tips in favor of measuring

[23] Anand and Harris (1994) argue that "it is a common observation from household-budget survey reports of developing countries that expenditure exceeds income".

income rather than consumption[24]. Even so, the latter faces considerable computational problems when accounting with self-employment, informal economic activities, and wide spread reluctance to disclose information on income to survey enumerators. Furthermore, in developing countries, formal employment is less common, households tend to have many and continually changing sources of income, and home production is widespread. In these contexts, it is generally far easier to measure consumption than income. The expenditure level derived from the ENIGH surveys reflects the reasons why the preference of such over income. However, the design of the total household income variable for the ENIGH surveys overcomes many of the problems attributed to its computation and, therefore, is necessary to give more detailed attention to the analysis of its construction.

The construction[25] of the expenditure variable follows closely the guidelines given by Deaton and Zaidi (1999) when constructing consumption aggregates. Total household expenditure is calculated by summing for each household the values of food expenses, farm produce home consumption, the value of output of non-farm enterprises consumed domestically, rent, imputed rent, utility bills, expenditures on education, daily and yearly non food purchases, use value of household durable goods, remittances paid out, and wages in kind. Furthermore, total household expenditure is then divided by the household size in order to obtain expenditure per capita.

As for total income, in order to achieve an acceptable measure it is necessary, according to O'Donnell et al. (2007), to include in its computation wage income from labor services, rental income from the supply of land, capital or other assets, self-employment

[24] For a detailed discussion see Atkinson (1991)

[25] See the appendix for a detailed description of the items entering the computation of the income and expenditure variables

income, and current transfers from government or nongovernment agencies or other households (transfers and remittances). The data contained in the ENIGH surveys regarding income allows for the imputation of such categories and, therefore, it can be said that it is acceptable to use total household income as a welfare measure equivalent to expenditure.

Chapter 4

Poverty Measurements

Poverty lines in Mexico are officially calculated by the National Council of Social Development Policy Evaluation (CONEVAL) using data and information from the ENIGH surveys and available to the public in the *Report of Actualized Values of Poverty for 2006* formulated by CONEVAL. The poverty lines are divided into rural and urban and it covers the period taken into consideration (1992-2006). Three income thresholds are used then to define:

- *Nutritional:* Minimum monthly net total income that an individual must have in order to cover food and nutritional requirements.
- *Capabilities:* Minimum monthly net total income that an individual must have in order to cover its nutritional, health and education requirements
- *Patrimony:* Minimum monthly net total income that an individual must have in order to cover its nutritional, health, education, clothing, transport and housing requirements.

The reported poverty lines by CONEVAL refer to each year month of August current prices. Therefore, it was necessary to adjust the values to 1994 August prices in order to be able to use them with the adjusted income and expenditure data derived from the ENIGH surveys. The poverty line to be used in this thesis is the one concerning the "patrimonio"

(patrimony) since this is the one offering a wider coverage of the relevant range of categories. Table 2 shows the monetary values of the poverty lines described above.

Table 2. Poverty lines 1992-2006

	Alimentary*		**Capabilities***		**Patrimony***		**Patrimony ****	
year	urban	rural	urban	rural	urban	rural	urban	rural
1992	167.96	124.75	206.00	147.49	336.99	226.37	392.08	263.37
1994	193.40	142.87	237.21	168.92	388.04	259.25	388.04	259.25
1996	388.81	289.47	476.87	342.24	780.10	525.28	419.54	282.50
1998	524.45	388.13	643.24	458.89	1052.25	704.31	411.15	275.20
2000	626.62	463.36	768.55	547.83	1257.26	840.81	386.22	258.29
2002	672.27	494.78	824.54	584.97	1348.85	897.82	371.51	247.29
2004	739.60	548.17	907.12	648.10	1483.94	994.70	374.77	251.21
2005	790.74	584.34	969.85	690.87	1586.55	1060.35	385.46	257.62
2006	809.87	598.70	993.31	707.84	1624.92	1086.4	381.56	255.11

Source: Author's calculations and CONEVAL 2006. All values are in local Mexican currency "pesos".*: values in each year august prices. **: values adjusted to 1994 august prices

The incidence of poverty presented in table 3 below is formulated using the FGT poverty index proposed by Foster et al. (1984)[26].The FGT index is attractive since it nests, according to Carraro (2006), three of the well-know poverty measures. First, when $\alpha=0$ the FGT index yields the commonly know poverty rate, $P_0 = \frac{Q}{n}$, which is the head count index that gives the share of the population below the poverty line. Given a poverty line *z*, a

[26] The index is expressed as:

$$P_\alpha = \frac{1}{n}\sum_{q=1}^{Q}\left(\frac{z-y_q}{z}\right)^\alpha$$

where *n* is the size of the population, *Q* is the number of households below the poverty line, *z* is the household specific poverty line, and *y* is income. The parameter $\alpha,\ 0 \le \alpha \le \infty,$ indicates the degree of aversion to poverty such that as α increases there is an increasing weight given to the poorest households.

person is consider to be poor if $y < z$ and not poor if $y \geq z$. In this case poverty is a discrete state reflecting the fraction of persons who have not yet attained a minimally adequate level of income to meet basic socially determined needs. However, the latter has some limitations. It does not take into account how close or far the income levels of the poor are with respect to the poverty line nor the distribution among the poor. The poverty gap, $\alpha=1$, is then the average income shortfall of the population relative to the poverty line. Since the greater the shortfall, the higher the gap, this measure overcomes the first limitation of the head count index. Finally the severity of poverty, $\alpha=2$, is sensitive to the distribution of income among the poor, transfers among the poor will leave unaffected the headcount index or the poverty gap, but will change this measure. It gives a relatively higher weight to the largest poverty gaps.

However, while the definition above is, according to Ziliak (2005), at once intuitive and transparent, and thus can be readily grasped by policy makers, voters and the media, it is also vague because of the notion of poverty depends on the resources being measured and where the cutoff separating the poor from the non-poor is drawn, each of which may be subjectively determined across time and space. Furthermore, there are also deeper concerns about the failure of the poverty rate to capture any notion of deprivation as stated by Sen (1977) when referring to the "non-welfarist" approach.

Table 3. FGT indices

INCOME

Year	Urban			Rural		
	p0	**p1**	**p2**	**p0**	**p1**	**p2**
1992	34.63	11.83	5.55	56.46	24.19	13.28
1994	30.71	9.93	4.50	51.86	20.81	10.91
1996	51.03	20.84	11.08	65.14	31.24	18.49
1998	42.95	16.29	8.04	61.74	29.17	17.30
2000	34.89	12.04	5.64	49.61	21.35	11.75
2002	32.04	10.05	4.42	51.16	21.86	12.18
2004	26.69	8.43	3.78	46.11	19.91	11.33
2005	28.21	9.14	4.12	47.81	20.62	11.62
2006	24.88	7.56	3.26	41.84	16.57	8.83

EXPENDITURE

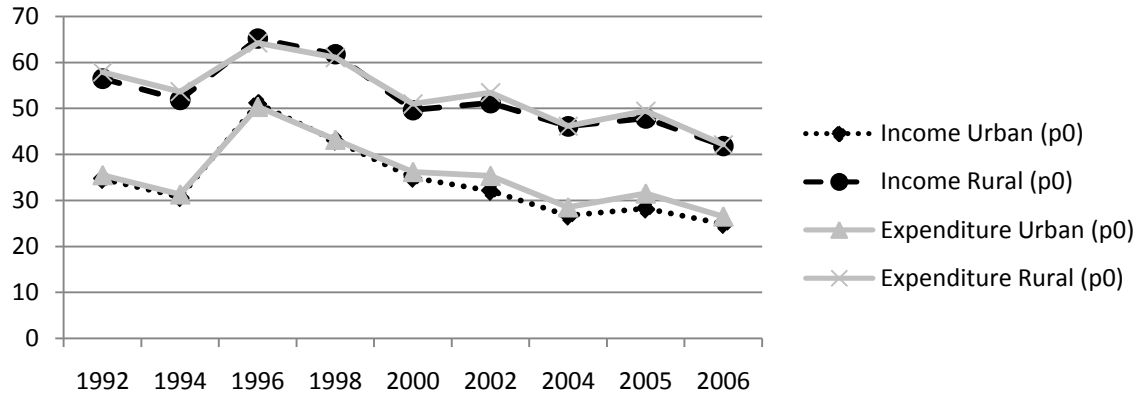
Year	Urban			Rural		
	p0	**p1**	**p2**	**p0**	**p1**	**p2**
1992	35.52	11.98	5.54	57.88	24.85	13.72
1994	31.33	10.36	4.69	53.64	21.52	11.17
1996	50.37	19.98	10.34	64.21	29.58	17.04
1998	43.22	15.78	7.75	61.06	27.88	16.02
2000	36.20	12.48	5.78	50.98	21.11	11.47
2002	35.36	11.35	5.03	53.44	22.82	12.67
2004	28.52	9.01	4.00	46.13	19.28	10.63
2005	31.52	10.45	4.77	49.43	20.76	11.44
2006	26.52	8.18	3.56	42.12	16.20	8.40

Source: author calculations using the ENIGH surveys provided by INEGI and CONEVAL poverty lines for the period 1992-2006

From the distributions observed in table 3, the change in the percentage of households below each of the poverty lines discussed above is clear. The head count index, the average income shortfall of the population relative to the poverty line and the severity of poverty all show a sharp increase in the immediate period after the crisis both for income and expenditure and urban and rural. Figure 2 below clearly shows that the impact of the crisis on poverty was immediate after the crisis but does not affect the poor for long since the share of the population below the poverty line returned to pre-crisis levels by the year

2000. Furthermore, it is worth noticing here that the percentage of rural household below each of the poverty lines both in terms of income and expenditure are well higher than the ones for urban households. This adding to the evidence of the disparity between urban and rural households.

Figure 2. Share of the population below the poverty line



According to Verner (2005), historically, poverty in Mexico has been closely associated with agriculture. The main explanation for the increased poverty rate in agriculture can be traced to migration out of the sector and into services by some of the most skilled and, in part, to the structure of land ownership and the quality of land and climate. Rural land ownership is characterized by a high degree of concentration of land in a few large establishments and a large number of small farms unable to sustain a family by agricultural employment alone.

Furthermore, it should be mentioned that one of the most controversial aspects of NAFTA has been its effects on the agricultural sector in Mexico and the perception that it has caused a higher amount of worker displacement in the agricultural sector than in other

sectors of the economy. While some of the changes in the agricultural sector are a direct result of NAFTA, as Mexico faced increasing import competition from the United States of America, many of the changes are also attributable to Mexico's unilateral agricultural reform measures. Mexico began to reform its agricultural sector in the 1980's; most domestic agricultural and trade policy reform measures included privatization and resulted in increased competition. Mexico's unilateral reform measures included eliminating state enterprises related to agriculture and removing staple price supports and subsidies.

Similarly, with the reform of Mexico's Agrarian Law, lands that had been distributed to community rural groups following the 1910 revolution gained the right to privatize. Another major reform was the abolishment of the National Company of Popular Subsistence (CONASUPO), Mexico's primary agency for government intervention in agriculture. The agency bought staples from farmers at guaranteed prices and processed the products or sold them at low prices to processors and consumers. By 1999, the company was abolished. Thus, many of Mexico's domestic reforms in agriculture coincided with NAFTA and the 1994 crisis making a very difficult task to isolate the effects of each on the welfare of the rural households.

One quarter of Mexico's population lives in rural areas, with limited access to basic infrastructure and services. The rural poor are primarily smallholders, sharecroppers, and informal wageworkers that depend on a diverse strategy of income generating activities in which the subsistence production of corn, beans, sorghum, and small livestock predominates. Farmers lack modern production technology, basic infrastructure to stock harvest produce in order to take advantage of cyclical price fluctuations, technical assistance to improve productivity, and organized marketing facilities. Hence, the latter

provides arguments to say that the rural population is more vulnerable than their urban counterparts.

Table 4 below shows mean household size, the percentage of those households headed by a female and the mean number of household members above 12 years of age by income and expenditure quintile. As it can be observed, the mean number of household members and those above the age of 12 is rather constant across quintiles; both tend to decrease as the time increases. Also, it can be observed that the number of households headed by a female is larger in the lower quintiles compared with the share of the highest quintiles. Overall it can be inferred that average number of households members, the gender of the head and the amount of adults do influence the living standard of households since, as observed, those with more members, less adults and headed by a female tend to concentrate in the lower quintiles.

For the latter, according to Pearce (1978), in the context of increasing number of female headed households, the "Feminization of Poverty" theory implies that more and more women bear an unequal share of the burden of poverty, and that families headed by a female are more vulnerable than those headed by men. Especially in developing countries, disadvantages in the labor market of women put them in a worse position when heading their own household. For the latter, it can be observed that the largest concentration of female headed households is located in the lowest quintile both in terms of Income and Expenditure. Furthermore, in Mexico, female-headed households have increased from 13.6% of the total in 1977[27] to almost 20% and 25% in 2002 and 2006 respectively.

[27] See Acosta (1998)

Table 4. Mean household size, percentage of female headed households and average number of household members above 12 years of age by income and expenditure quintile.

Income

	Q1			Q2			Q3			Q4			Q5			all		
	mhs	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**
1992	4.21	14.81	2.61	4.73	12.01	3.01	4.90	11.82	3.31	5.13	13.24	3.70	4.94	12.96	3.74	4.78	12.97	3.27
1994	4.77	17.32	2.61	4.70	14.08	3.04	4.62	14.59	3.35	4.59	14.16	3.66	4.64	11.70	3.70	4.66	14.37	3.27
1996	4.11	17.19	2.66	4.56	15.06	3.06	4.69	15.05	3.37	4.88	15.09	3.63	4.65	12.92	3.63	4.50	15.06	3.27
1998	4.46	19.76	2.54	4.24	16.16	2.87	4.35	16.38	3.14	4.36	16.25	3.44	4.28	10.02	3.50	4.34	16.71	3.10
2000	3.72	23.88	2.52	4.09	18.59	2.84	4.26	18.35	3.10	4.29	18.19	3.24	4.46	14.69	3.47	4.16	18.74	3.03
2002	3.67	23.50	3.06	4.08	20.62	3.06	4.34	18.69	3.12	4.47	19.96	3.04	4.41	16.31	3.08	4.19	19.61	3.07
2004	4.03	26.54	2.51	4.04	24.45	2.76	4.02	22.77	3.06	4.08	22.41	3.39	4.04	18.10	3.39	4.04	22.85	3.02
2005	3.63	22.52	2.55	3.95	23.08	2.83	4.17	23.73	3.12	4.32	23.43	3.36	4.21	23.73	3.41	4.06	23.30	3.05
2006	4.00	28.62	2.42	3.99	25.07	2.74	4.03	24.62	3.05	4.00	24.88	3.35	3.94	19.68	3.38	3.99	24.57	2.99

Expenditure

	Q1			Q2			Q3			Q4			Q5			all		
	mhs	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**	**mhs**	**fhh(%)**	**hm12-65**
1992	4.16	14.38	2.60	4.8	12.20	3.10	4.94	12.25	3.33	5.11	13.34	3.67	4.89	12.67	3.68	4.78	12.97	3.27
1994	4.73	17.10	2.62	4.72	14.31	3.11	4.61	15.06	3.33	4.65	12.48	3.67	4.60	12.91	3.62	4.66	14.37	3.27
1996	4.03	17.65	2.63	4.61	14.88	3.11	4.74	14.16	3.36	4.91	15.63	3.67	4.60	12.99	3.57	4.50	15.06	3.27
1998	4.42	19.35	2.53	4.28	16.52	2.90	4.32	14.92	3.18	4.40	17.39	3.44	4.28	15.38	3.44	4.34	16.71	3.10
2000	3.67	23.49	2.53	4.10	18.74	2.87	4.31	17.46	3.09	4.36	18.94	3.30	4.38	15.09	3.39	4.16	18.74	3.03
2002	3.67	22.51	3.06	4.10	20.65	3.09	4.35	19.86	3.04	4.47	18.43	3.13	4.38	16.63	3.05	4.19	19.61	3.07
2004	4.02	25.69	2.54	4.02	24.07	2.85	4.07	23.69	3.12	4.05	21.88	3.35	4.05	18.94	3.26	4.04	22.85	3.02
2005	3.62	22.74	2.57	4.02	22.82	2.90	4.21	23.68	3.14	4.32	23.02	3.34	4.11	24.23	3.3	4.06	23.30	3.05
2006	4.00	28.14	2.45	4.02	25.77	2.81	3.98	24.23	3.09	4.00	24.74	3.33	3.97	20.00	3.26	3.99	24.57	2.99

Source: Author's estimations based on 1992 to 2006 ENIGH surveys provided by INEGI

Note: mhs: mean household size; fhh: percentage of households headed by a female; hm 12 -65: average number of household members between 12 and 65 years of age

However, caution must be had when assessing the overall welfare of female headed households. The latter especially in the case of Mexico since, according to Villarreal and Shin (2008), contrary to the case of female headed household in the United States of America, female headed households in Mexico have median per-capita income levels that are the same or higher than those headed by men and are no more likely to be living in poverty. These finding are surprising, given the many disadvantages that Mexican women face in the labor market and the added difficulties for mothers to manage work and family life.

There are at least four explanations for the above. A first explanation has to do with the stage in the life course of female heads. Compared to male heads, according to Chant (1997), female heads in Mexico tend to be older and more frequently widowed or divorced and have adult children. Because they are in a later stage in their life course than their male counterparts, Mexican female headed households may have access to additional sources of income. Older widowed and divorced female heads may receive income from retirement pensions, child support from previous partners, as well as greater returns to investments accumulated over a lifetime. These additional sources of income also place them in a better position than female heads that have never been married.

A second explanation for the mitigation of the negative economic impacts of female headed household in Mexico is that they tend to receive greater assistance from extended family networks compared to male headed households. Economic contributions from individuals outside the nuclear family tend to compensate for the income disadvantages that a female headed household may have. The latter may occur in two different ways: co-residence with extended family members and through direct financial transfers from non-

resident kin. However, co-residents and extended family members will only represent a benefit if they actually contribute to households' income.

A third possible cause has to do with the differences in the rates of international migration between residents of female and male headed households. First, remittances from family members working in The United States of America have been shown, according to Fussel and Massey (2004) and Hanson (2007), to make up a substantial portion of the income of Mexican families who stay behind. If female heads receive a disproportionate share of remittances and they are sufficiently large, they may explain why female headed households do not fare any worse than male households.

Households headed by women may be no worse than their male counterparts because their partners are living abroad. Temporary or long term absence of their partners may in fact be the reason why females are considered household heads in the first place. Households headed by a woman whose partner is a migrant will generally be better off given that partners will contribute to the household in ways that may not be fully captured by remittances alone.

Finally, a fourth possible explanation has to do with the selection into headship among Mexican women. Despite the increase in female headship, a majority of Mexican women with children do not head their own households, but instead live in households headed by someone else such as their partner or another relative. Part of the reason they do not head their own household is precisely the lack of economic resources to do so. Married or cohabitating women may choose to remain in the household headed by their partners even under the most strenuous circumstances if they do not have the income necessary to gain independence. In that sense, since single mothers who move into their parents' household and married women who stay with their partners despite marital problems and

difficulties are likely to be those with fewer economic resources, those who do become household heads are then better off economically in the first place. Becoming a household head, therefore, involves a selection process whereby those with lower income expectations are selected out of headship (or those with higher expected incomes are selected into it). This selection process provides yet another explanation to why, even when after the 1994 crisis female headed households increased, they might not fared any worse than any other male headed household. Hence, despite the increase in female headed households in the last 15 years and especially after the "Tequila Crisis", it can be observed in Table 5, that the explanations given above do seem to be backed by the fact that the amount of female headed household is distributed evenly among quintiles. The latter since in the difference between the lowest and highest quintile before the crisis is only around 2% and prevails until 2006.

According to Verner (2005) education levels are strongly related to poverty. That is, having incomplete or some complete level of education is important when assessing the impacts of a crisis in the welfare of households[28]. Table 5 shows the percentage of household heads per education level by quintile based on income and expenditure. Five levels are considered, the lowest being that in which the household head has no education at all and the highest being those with a university degree.

[28] McKenzie (2003) argues that the education of the household head is found to be among the main determinants of how severely the 1994 financial crisis in Mexico affected a given household. Cortez (1997), using the ENIGH for 1992, estimates a logistic regression of the probability of being poor as a function of several economic, demographic and location variables. He finds that the probability of being poor decreases with the number of years of education and increases with the burden of dependency and if the household is located in a rural area. Similarly, Székely (1998), using a different approach and based on the 1984, 1989 and 1992 surveys reaches the conclusion that lack of education is the single most important factor in explaining poverty in the country.

The distribution of the individuals is quite even with regards to the first quintiles for each wave; the largest amount of household heads is concentrated in the first category and the lowest quintile. This suggests that households with higher levels of education might have fared better than those headed by an unschooled individual. This, contrasting with Mckenzie (2001)'s findings, in a study of the consumer response the Mexican peso crisis, that households with a highly educated head were the ones suffering the greatest impacts of the crisis.

The results presented in table 5 show a constant distribution of schooling levels for all quintiles with an average of 50% of individuals in the lowest category (those with no schooling whatsoever) for each quintile and an average of 5.5% of individuals in the highest category (those with an university degree or higher) in 1994. However, by 1996 the distribution changes dramatically since the average percentage of individuals in the lowest category increased to almost 60% for the first three quintiles and decreased to 25% for the two highest ones. Similarly, the average percentage of individuals in the highest category for the three first quintiles decreased to only 0.6% and increased to almost 15% in the highest ones.

Cunningham and Maloney (2000) propose that the least educated suffered no more than their more educated counterparts due to having put other members of the household in the labor market. However, Table 4 showed that the average number of economically active members increases to three for the higher quintiles in comparison with the average two members for the lower two. Thus, a plausible explanation of the results reported in Table 6 is the fact that the more educated households were those integrating more household members into the work force in order to mitigate the effects of the crisis.

Table 5. Educational characteristics of the household head

Income*

	Q1					Q2					Q3					Q4					Q5				
	NE	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**
1992	78.82	16.05	3.99	1.00	0.14	61.82	25.59	10.35	2.04	0.19	51.19	27.59	15.29	4.94	1.00	41.50	28.21	17.43	9.26	3.61	22.36	21.75	16.67	18.61	20.61
1994	49.43	23.33	13.85	7.69	5.70	51.89	22.36	12.68	7.88	5.19	50.99	23.29	12.84	7.37	5.50	50.33	23.80	12.84	7.45	5.58	50.18	24.03	12.06	7.88	5.85
1996	74.19	18.55	6.23	1.00	0.04	56.34	27.31	12.71	3.31	0.32	44.89	28.98	17.76	7.01	1.35	34.72	27.35	21.33	11.72	4.88	20.58	17.98	18.09	19.76	23.58
1998	50.07	23.23	13.28	8.17	5.25	44.98	25.16	16.53	7.67	5.66	43.04	24.46	16.98	9.13	6.39	41.83	24.79	17.63	9.27	6.48	39.91	24.02	18.45	9.50	8.13
2000	72.75	17.95	7.81	1.43	0.05	50.94	26.41	16.42	5.39	0.84	41.02	26.82	20.44	8.91	2.82	29.53	25.02	23.34	14.00	8.11	18.06	18.80	17.37	18.85	26.92
2002	72.07	18.78	7.83	1.19	0.12	49.23	26.68	18.93	4.46	0.70	38.44	27.52	23.79	8.04	2.21	29.42	24.70	26.10	14.07	5.71	15.82	17.71	19.57	22.87	24.03
2004	31.73	22.46	23.89	10.38	11.55	32.96	23.04	22.60	9.87	11.53	31.02	21.80	23.35	11.22	12.61	32.00	22.33	23.68	10.36	11.64	31.51	21.97	24.03	10.13	12.35
2005	63.93	21.32	11.35	2.65	0.76	42.91	26.04	22.87	6.41	1.77	31.74	27.10	25.31	11.13	4.72	22.29	22.31	28.24	15.23	11.93	9.82	14.35	21.10	17.16	37.57
2006	30.25	37.39	11.74	9.53	11.09	30.44	38.73	11.64	9.15	10.04	30.13	38.30	11.95	8.79	10.83	30.01	37.58	12.22	9.15	11.04	30.80	36.77	11.57	9.27	11.59

Expenditure*

	Q1					Q2					Q3					Q4					Q5				
	NE	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**	**NE**	**P**	**S**	**C**	**U**
1992	78.16	16.19	4.51	0.95	0.19	62.87	24.74	9.54	2.71	0.14	52.71	27.30	14.43	4.37	1.19	39.46	28.87	19.14	8.78	3.75	22.51	22.08	16.10	19.04	20.28
1994	50.29	22.51	13.34	8.15	5.70	50.80	23.64	12.99	7.49	5.07	50.84	23.14	13.54	6.91	5.58	50.41	23.88	12.41	7.92	5.38	50.49	23.64	11.98	7.80	6.09
1996	74.19	18.73	5.98	1.03	0.07	56.77	26.35	13.14	3.35	0.39	45.50	28.87	17.12	7.26	1.25	34.72	27.39	21.15	11.61	5.13	19.55	18.84	18.73	19.55	23.33
1998	48.97	23.78	14.01	8.03	5.20	45.80	24.38	15.89	7.72	6.21	43.04	25.01	17.12	8.67	6.16	42.51	24.75	17.40	9.45	5.89	39.50	23.74	18.45	9.86	8.45
2000	72.90	17.95	7.57	1.48	0.10	53.26	25.96	15.28	4.95	0.54	39.63	26.87	21.33	8.66	3.51	29.33	26.56	23.39	14.05	6.68	17.17	17.66	17.81	19.45	27.91
2002	71.67	18.78	8.04	1.37	0.15	52.32	25.20	17.74	4.05	0.70	37.36	29.24	23.76	7.48	2.15	29.07	24.93	25.78	14.56	5.65	14.56	17.24	20.91	23.16	24.12
2004	31.84	22.55	23.83	10.31	11.46	32.29	22.17	23.06	10.56	11.93	31.71	22.55	23.92	9.96	11.86	31.62	22.57	23.17	10.56	12.08	31.75	21.75	23.57	10.58	12.35
2005	65.48	20.76	10.98	2.31	0.47	43.58	27.18	21.19	6.11	1.94	31.22	27.51	26.28	10.20	4.79	21.29	22.59	28.48	15.73	11.91	9.11	13.08	21.95	18.23	37.63
2006	29.82	38.01	11.74	9.56	10.87	30.71	39.21	11.09	8.24	10.75	30.73	36.43	12.84	10.01	9.99	29.60	37.77	12.05	8.81	11.76	30.78	37.34	11.40	9.27	11.21

Source: Author's calculations based on 1992 to 2006 ENIGH surveys provided by INEGI
Note: NE: non education; P: primary education; S: secondary education; C: college education; U: university education
*All Values are in percentage terms for each of the quintiles.

Chapter 5

Empirical Strategy

5.1 Repeated Cross-Sections Estimation

Since one of the objectives of this thesis is to analyze to what extent Mexican household welfare was affected by the crisis and whether households recovered as the overall economy did, the choice of econometric tools is given due consideration.

According to Verbeek (2008) in many countries there is a lack of genuine panel data where specific individuals or firms are followed over time. However, repeated cross-sectional surveys may be available, where a random sample is taken from the population at consecutive points in time. ENIGH surveys are not a panel but several large household surveys that are carried out every two years, samples from these surveys are randomly drawn in each period so that individual households cannot be traced over time. Hence, in the absence of suitable panel data, repeated cross-sectional (RCS) surveys carried out with a regular periodicity such as the ENIGH surveys might provide a viable alternative.

The major limitation of repeated cross-sectional data is that the same observation is not followed over time, so that individual histories are not available for inclusion in a model, constructing instruments and transforming a model to first-differences or in

deviations from individual means. All of these options are often applied to genuine panel data. On the other hand, repeated cross-sections suffer less from typical panel data problems like attrition and non-response, and are very often substantially larger, both in number of individuals or households and in the time period they span.

Cameron and Trivedi (2005) explain that, for a random effects model, repeated cross-section data pose no challenges. If the individual effects are uncorrelated with the explanatory variables consistent estimation from repeated cross-sections can be made by pooling all observations and performing ordinary least squares. However, in many applications the individual effects are likely to be correlated with some or all of the explanatory variables leading to inconsistent parameter estimates. When genuine panel data are available, this can be solved by using a fixed effects approach which treats the individual effects as fixed unknown parameters. Nonetheless, when repeated observations on the same unit are not available, such an approach cannot be used.

Hence, using a Pooled Ordinary Least Squares model (POLS) for independent cross sections raises minor statistical complications. Typically, to reflect the fact that the population may have different distributions in different time periods, the intercept is allowed to differ across periods, in this case years. This is easily accomplished by including dummy variables for all but one year, where the earliest year in the sample is usually chosen as the base year. Sometimes the pattern of coefficients on the year dummy variables is itself of interest.

In its simplest form, the pooled model takes the following form:

$$Y_{nt} = x_{nt}\beta_k + \varepsilon_{nt}, \qquad (5.1.1)$$

where $n = 1 \ldots N$ cross–sections, $t = 1 \ldots T$ time points[29] and x a vector of correlates including an indicator variable for the crisis year.

In the design above the standard OLS assumptions are retained but easily violated. As Stimson (1985) and Hicks (1994) acknowledge, violations of errors assumptions for regression equations estimated from pooled data with OLS procedures tend to be autocorrelated and heteroskedastic. Hence, the POLS model is rather restrictive and there are certain drawbacks to it. According to Sayrs (1989) a very serious weakness of the model is the inability to distinguish variance unique to independent cross-sections or theoretically meaningful groups of cross-sections. Also, when the pool contains a large number of cross sections, the assumption that the relationship between X_i and Y_i will be the same for all cross-sections is simply unrealistic. Nonetheless, it must be recognized that, the methodology discussed here is primarily formulated as a response to the absence of panel data and it is not necessarily the case that it will yield inferior results. New samples are drawn for each survey year, therefore representativeness is constantly maintained.

The basic model (5.1.1) for assessing the impact of the crisis is straightforward in its formulation. Household living standards, measured by their per capita income and expenditure, are determined by a number of household attributes as well as those of their head member leading to the following characterizations:

$$\ln Y_{it} = \beta_1 X_{it} + \beta_2 Z_t + \varepsilon_{it}, \qquad (5.1.2)$$

and

[29] Since different households are observed in each period, n does not run from 1 to N for each t

$$\ln E_{it} = \beta_1 X_{it} + \beta_2 Z_t + \varepsilon_{it}, \qquad (5.1.3)$$

where Y_{it} and E_{it} are income and expenditure per capita for household *i* at time t[30] respectively, X_{it} is a set of household characteristics and other determinants of household *i's* per capita income/expenditure at time *t*, Z_t is a binary variable indicating the post-crisis year or interactions between variables and ε_{it} is a random disturbance term.

Income and expenditure per capita are expressed in Mexican Pesos at 1994 prices by adjusting the original data to account for inflation using 1994 as the base year and the August[31] Consumer Price Index for each of the waves from 1992 to 2006 provided by the Mexican Central Bank (Banco de Mexico). Furthermore, the 1992 wave was adjusted to "new pesos"[32] to account for the redenomination of the currency which took place at the end of 1992 and consisted in the adjustment of the denomination from the millions to the thousands. Thus, all the monetary values are expressed by the thousands.

The variables included in the X_{it} vector are briefly described below:

(a) *Household typology and area of residence*: this includes linear terms in household type binary variables defined for as nuclear, extended, complex and other types of household as well as area of residence.

(b) *Household Demographics, labour market and home ownership*: this includes linear and quadratic terms in household size as well as linear terms in the number of

[30] The periods considered here are from 1992 to 2006 in order to see the effects over time that the crisis may have had.

[31] The CPI for August is the one considered since it is the one that correspond to the survey implementation month (August) for each wave.

[32] The term "new pesos" came to use after the redenomination of the "peso" in 1992 which is the name for the Mexican currency.

employed members in the household and a binary variable indicating whether the household owns the house they live in or not.

(c) *Characteristics of the household head*: this includes linear terms in years of education, age and gender.

(d) *Dummy and interaction variables*: this includes dummies for each year considered and interaction variables to isolate yearly effects of the crisis.

The definition of the household typology variables is that given by the Mexican National Institute of Geography, Statistics and Informatics (INEGI). Households are considered to be nuclear, extended, complex, and other type of household. A household is considered to be nuclear when it is composed of a household head and a partner with or without children or a household head with or without partner but with children. Extended households are composed of a nuclear household with the addition of consanguineous and in-law relatives. Complex households are an extended household additionally including non-relatives. The final category, other types of household, describes those households that do not fit in any of the categories above. Furthermore, the area of residence variables are defined as urban if the household is located in a settlement of no less than 2,500 habitants and rural otherwise.

The inclusion of household composition and size as explanatory variables is derived from the fact that, according to Lanjouw and Ravallion (1995), there is considerable evidence of a strong negative correlation between household size and expenditure (or income) per person in developing countries. It is often concluded that people living in larger and (generally) younger households are typically poorer. Furthermore, a quadratic term of the household size is introduced in order to appreciate the changing effects of household size related to income and expenditure. Also, the location variables will help to

evaluate and compare the extent and differences of the impacts in rural and urban households. The latter since there is evidence[33]to support the argument that rural households tend to fare worse than their urban counterparts. Hence, including size, composition and location variables allows for measurement of the impacts of the crisis on households.

As for the number of employed members in the household variable, the rationale behind it follows Ferreira, Prennushi and Ravallion (1999)'s arguments about changes in labour demand as one of the channels by which a crisis impacts households. This as a consequence of contractionary policies which reduce aggregate demand. Thus, the adjustment can have as consequence layoffs, reduced working hours and increased unemployment.

The characteristics of the household head become relevant in the analysis since age, gender and education are found to have a strong relation with the living standard of households. The latter since Pearce (1978) acknowledges that poverty is somewhat more prevalent among female headed households. Furthermore, the education level of the household head appears to be a significant indicator of household well being. In this respect Grootaert (1999) found that household living standards are correlated positively with education. The more educated a household head is the less vulnerable the household will be to experience the shocks of a crisis.

Finally, the use of dummy and interaction variables allows capturing the influence of categorical variables, isolate the marginal effects of time and account for joint effects of

[33] See Verner (2005), Thomas et al. (1999) and Frankenberg et al. (1999)

time with the household head level of education and number of employed members in the household.

5.2 Assets Index Construction

The construction of the assets index follows the methodology developed by Filmer and Pritchett (2001) and Sahn and Stifel (2000) discussed in section 2.3. Here, the ENIGH surveys are used since they include data on more than 35 assets that can be grouped into three different categories: dwelling characteristics, transportation and durable goods. To ensure compatibility, only variables that appear in all 9 waves and were phrased similarly are included. Table 1 lists these variables.

The decision about which assets to include is not trivial, the Houweling et al.(2003) study of ten countries shows that changing the composition of an asset index substantially affected the ranking of households. However, Falkingham and Namazie (2001) show that most indices[34] use information on dwelling characteristics, ownership of consumer durables and access to water or energy sources. Nonetheless, they are critical of approaches they feel take components of the index from a generic list and acknowledge the need to tailor measures in order to reflect country-specific or region-specific circumstances.

The inclusion of human capital as an asset in the construction of the index is not considered here. This is because the only representation of human capital is given by the

[34] The indices are based on data from the Demographic and Health Surveys (DHS) for different countries

level of education of the household head in the ENIGH surveys and, as Moser and Felton (2009) argues, this only reflects human capital partially. Including human capital in the construction of the index is challenging and difficult since it is usually measured at the individual level, not household level and the development of an aggregation method is needed.

Since the data contained in the ENIGH surveys matches the asset categories used in the DHS and World Bank Assets Indexes[35] , the formulation of the index is based on binary indicators on 26 variables that constitute the dwelling characteristics such as ownership of the dwelling, infrastructure and construction materials of the dwelling, water supply, sewage availability, electricity and telephone line services. Also, six types of transportation assets and seven different private household assets, namely the presence or absence of a radio, television, fridge, gas cooker, computer and heater, and other type of household appliances, were considered.

Table 6 reports the scoring factors from the principal components analysis of the 39 asset components selected from all the waves (1992 to 2006). Since all assets variables (except "number of rooms") take only the values 0 or 1, the weights have an easy interpretation: a move from 0 to 1 changes the index by f_{1i} / s^*_i (reported in column 4). That is, a household that owns its dwelling has an assets index higher by 0.13 that one that does not; owning a car raises a household's asset index by 0.40 units; having low quality materials walls in the dwelling lowers the asset index by 0.61.

[35] The World Bank Asset Index is elaborated in Gwatkin et al. (2000). Similarly, the DHS Wealth Index is formulated in Rutstein and Johnson (2004).

Once the asset index was calculated by using principal components analysis, households are divided into 5 quintiles, from the poorest to the richest[36]. The mean value of the index is close to zero by construction and the mean in each quintile is distinctly different from each other. The last five columns of table 6 compare the average ownership of each asset across the bottom and top quintiles. Differences can be found across groups for almost all assets. As an example, dwelling ownership is 13% for the poorest group in the sample versus 16% of the richest group. Also, 14% of the poorest group does not have sewage availability of any kind; whereas none of the household in the richest group is deprived of this amenity.

After categorizing the households into 5 quintiles by using the assets index, it can be observed that the principal components analysis groups the asset index quite well, in other words, it can be used to measure household socio-economic positions since the index produces significant differences among different socio-economic groups, especially in the assets with high factor scores. Households in the fourth and fifth quintile usually have the assets with high factor scores such as kitchen as a separate room, flush toilet, tube water inside the dwelling, high quality building materials, automobile, computer and a gas fueled cooker, while none of or a very small share of the households in the lower two quintiles would have such assets. In contrast, a high percentage of households in the first and second quintiles would own assets with low factor scores such as the use of well water, latrine, low quality building materials, bicycle etc.

[36] Some studies such as Filmer and Pritchett (2001) use cut-off points to differentiate households into broad socio-economic categories, and the approaches where either arbitrarily defined (based on the assumption of an index uniformly distributed), or data driven. However the more widely use categorization is to divide households into quintiles as in Vyas and Kumaranayake (2006) and Gwatkin et al. (2000).

Table 6. Scoring factors and summary statistics for variables entering the first principal component computation

	1992 to 2006				Means				
	SF	**Mean**	**SD**	**SF /SD**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**
dwelling									
ownership of dwelling	0.056	0.763	0.424	0.13	0.131	0.146	0.158	0.161	0.165
number of rooms in dwelling	0.234	3.221	1.710	0.14	0.357	0.458	0.611	0.767	0.998
kitchen	0.154	0.889	0.313	0.49	0.132	0.171	0.188	0.197	0.199
toilet	0.218	0.870	0.335	0.65	0.095	0.175	0.198	0.199	0.199
flush toilet	0.237	0.468	0.498	0.48	0.002	0.028	0.114	0.152	0.170
tube water inside dwelling	0.290	0.595	0.490	0.59	0.005	0.040	0.154	0.196	0.199
tube water outside dwelling	-0.160	0.25	0.433	-0.37	0.091	0.120	0.035	0.002	0.000
well water inside dwelling	-0.092	0.063	0.244	-0.38	0.033	0.020	0.007	0.001	0.000
well water outside dwelling	-0.142	0.063	0.243	-0.58	0.048	0.012	0.001	0.000	0.000
water delivered by pipe to dwelling	-0.032	0.016	0.125	-0.26	0.005	0.006	0.002	0.000	0.000
other type of water supply	-0.040	0.083	0.277	-0.14	0.027	0.017	0.012	0.012	0.013
sewage connected to main sewage	0.264	0.583	0.492	0.54	0.007	0.062	0.141	0.179	0.193
sewage connected to septic pit	-0.013	0.129	0.335	-0.04	0.015	0.045	0.043	0.018	0.006
sewage connected to river, lake, etc	-0.028	0.026	0.159	-0.18	0.006	0.011	0.006	0.001	0.000
no sewage	-0.249	0.215	0.411	-0.61	0.144	0.064	0.006	0.000	0.000
low quality materials walls	-0.178	0.093	0.290	-0.61	0.072	0.015	0.004	0.000	0.000
high quality materials walls	0.192	0.793	0.405	0.47	0.078	0.162	0.174	0.183	0.193
other type of walls materials	-0.113	0.028	0.167	-0.68	0.026	0.001	0.000	0.000	0.000
low quality materials roofing	-0.144	0.104	0.305	-0.47	0.063	0.022	0.012	0.004	0.001
high quality materials roofing	0.157	0.801	0.398	0.39	0.100	0.161	0.168	0.179	0.192
other type of roofing materials	-0.105	0.034	0.182	-0.58	0.027	0.004	0.002	0.000	0.000
low quality flooring	-0.205	0.120	0.326	-0.63	0.096	0.020	0.003	0.000	0.000
high quality flooring	-0.047	0.523	0.499	-0.09	0.081	0.166	0.158	0.095	0.020
other type of materials flooring	0.190	0.355	0.478	0.40	0.022	0.012	0.038	0.103	0.179
electricity	0.179	0.944	0.228	0.79	0.145	0.199	0.199	0.200	0.199
telephone line	0.227	0.360	0.480	0.47	0.003	0.013	0.045	0.112	0.184
transportation									
automobile	0.169	0.233	0.423	0.40	0.004	0.013	0.026	0.055	0.134
truck	0.061	0.095	0.293	0.21	0.005	0.014	0.016	0.021	0.036
motorcycle	0.022	0.019	0.137	0.16	0.001	0.002	0.004	0.004	0.006
bicycle	-0.038	0.181	0.385	-0.10	0.042	0.049	0.042	0.028	0.018
animal pulled vehicles	-0.022	0.008	0.093	-0.24	0.003	0.003	0.001	0.000	0.000
other types of transportation	-0.013	0.005	0.075	-0.17	0.002	0.001	0.001	0.000	0.000
durables									
radio	0.038	0.279	0.448	0.08	0.044	0.050	0.051	0.057	0.074
television	0.208	0.867	0.338	0.62	0.098	0.178	0.192	0.198	0.199
PC	0.143	0.115	0.319	0.45	0.000	0.000	0.004	0.016	0.091
gas fueled cooker	0.223	0.845	0.361	0.62	0.082	0.174	0.192	0.197	0.199
refrigerator	0.252	0.705	0.456	0.55	0.032	0.116	0.164	0.193	0.199
heater	0.129	0.136	0.343	0.38	0.000	0.002	0.017	0.042	0.072
other type of household appliances	0.069	0.092	0.298	0.23	0.006	0.010	0.013	0.020	0.041

Source: Author's calculations based on the 1992 to 2006 ENIGH surveys provided by the INEGI

Chapter 6

Empirical Results and Discussion

6.1 Regression Analysis Results

As stated before in Chapter 1 the question of interest can be summarized as: after controlling for other observable factors, what has happened to the welfare of Mexican households over time? The factors controlled for are size, composition and location of household; number of employed members in a household and the age, gender and years of schooling of the household head as well as some interaction variables. The signs and magnitudes of most of the estimated parameters for the determinants of household living standards are reasonable and they seem to be quite consistent across the period considered. Table 7 below shows the estimated results.

The base year is 1992. The coefficient on the year dummy variables shows a sharp drop in the income per head levels of household members in the period after the 1994 crisis. As an example the coefficient on the dummy year variable for 1996 in models 1 to 4

Table 7. Estimated income and expenditure models

	Model 1				Model 2				Model 3				Model 4				Model 5			
	Income +		**Expenditure ++**		**Income+**		**Expenditure++**		**Income +**		**Expenditure ++**		**Income +**		**Expenditure ++**		**Income +**		**Expenditure++**	
variable[37]	**β**	**S.E.**	**B**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**	**β**	**S.E.**
nuclear	-0.084***	0.011	-0.095***	0.011	-0.093***	0.011	-0.105***	0.011	-0.085***	0.011	-0.097***	0.011	-0.094***	0.011	-0.106***	0.011	-0.081***	0.010	-0.091***	0.011
extended	-0.062***	0.012	-0.088***	0.012	-0.063***	0.012	-0.088***	0.012	-0.065***	0.012	-0.091***	0.012	-0.064***	0.012	-0.091***	0.012	-0.050	0.012	-0.069***	0.012
complex	0.005	0.031	-0.031	0.031	-0.017	0.030	-0.053*	0.030	0.003	0.031	-0.034	0.031	-0.018	0.030	-0.055*	0.030	0.013***	0.030	-0.019	0.030
otherhc	0.153***	0.037	0.167***	0.038	0.082**	0.036	0.095***	0.036	0.153***	0.038	0.166***	0.038	0.082**	0.037	0.095***	0.037	0.154***	0.036	0.168***	0.036
urban	0.706***	0.005	0.681***	0.005	0.642***	0.005	0.616***	0.005	0.706***	0.005	0.680***	0.005	0.642***	0.005	0.616***	0.005	0.713***	0.004	0.686***	0.004
houseowned	0.031***	0.005	0.018***	0.005	0.061***	0.005	0.047***	0.005	0.033***	0.005	0.020***	0.005	0.062***	0.005	0.049***	0.005	0.026***	0.004	0.013***	0.004
employed	0.097***	0.002	0.078***	0.002	0.098***	0.002	0.079***	0.002	0.092***	0.007	0.060***	0.006	0.100***	0.007	0.068***	0.006	0.103***	0.002	0.082***	0.002
hsize	-0.170***	0.004	-0.162***	0.004	-0.173***	0.004	-0.165***	0.004	-0.171***	0.004	-0.163***	0.004	-0.173***	0.004	-0.165***	0.004	-0.175***	0.003	-0.167***	0.003
hsizesq	0.005***	0.000	0.005***	0.000	0.006***	0.000	0.006***	0.000	0.005***	0.000	0.005***	0.000	0.006***	0.000	0.006***	0.000	0.005***	0.000	0.005***	0.000
hhage	0.003***	0.000	0.002***	0.000	0.004***	0.000	0.003***	0.000	0.003***	0.000	0.002***	0.000	0.004***	0.000	0.003***	0.000	0.002***	0.000	0.002***	0.000
hhmale	-0.073***	0.006	-0.094***	0.006	-0.085***	0.006	-0.106***	0.005	-0.071***	0.006	-0.090***	0.006	-0.083***	0.006	-0.102***	0.005	-0.085***	0.005	-0.104***	0.005
yearsofsch~g	0.037***	0.000	0.037***	0.000	0.074***	0.002	0.074***	0.002	0.036***	0.000	0.036***	0.000	0.074***	0.002	0.074***	0.002	0.038***	0.000	0.037***	0.000
dummy1994	0.046***	0.011	0.049***	0.011	0.358***	0.014	0.359***	0.014	-0.009	0.019	-0.049***	0.019	0.331***	0.021	0.289***	0.021				
dummy1996	-0.266***	0.009	-0.209***	0.009	-0.271***	0.012	-0.207***	0.012	-0.212***	0.017	-0.171***	0.017	-0.213***	0.020	-0.165***	0.019				
dummy1998	-0.192***	0.011	-0.155***	0.011	0.111***	0.015	0.151***	0.015	-0.235***	0.020	-0.248***	0.020	0.091***	0.023	0.080***	0.023				
dummy2000	-0.096***	0.010	-0.090***	0.010	-0.109***	0.013	-0.102***	0.013	-0.079***	0.019	-0.075***	0.018	-0.087***	0.021	-0.083***	0.021				
dummy2002	-0.126***	0.009	-0.155***	0.009	-0.138***	0.012	-0.165***	0.012	-0.098***	0.016	-0.121***	0.016	-0.103***	0.019	-0.123***	0.018				
dummy2004	-0.044***	0.010	-0.026***	0.010	0.353***	0.013	0.374***	0.013	-0.104***	0.017	-0.139***	0.017	0.315***	0.020	0.281***	0.020				
dummy2005	-0.054***	0.009	-0.067***	0.009	-0.121***	0.012	-0.144***	0.011	-0.017	0.016	-0.005	0.016	-0.083***	0.018	-0.081***	0.018				
dummy2006	0.031***	0.010	0.051***	0.010	0.415***	0.014	0.436***	0.014	-0.015	0.018	-0.052***	0.018	0.390***	0.020	0.352***	0.020				
schooling1994					-0.074***	0.002	-0.073***	0.002					-0.074***	0.002	-0.073***	0.002				
schooling1996					-0.003	0.002	-0.004**	0.002					-0.004**	0.002	-0.005**	0.002				
schooling1998					-0.066***	0.002	-0.067***	0.002					-0.066***	0.002	-0.067***	0.002				
schooling2000					-0.005**	0.002	-0.005**	0.002					-0.005**	0.002	-0.005***	0.002				
schooling2002					-0.004**	0.002	-0.005***	0.002					-0.005**	0.002	-0.005***	0.002				
schooling2004					-0.073***	0.002	-0.073***	0.002					-0.073***	0.002	-0.073***	0.002				
schooling2005					-0.001	0.002	0.001	0.002					-0.001	0.002	0.000	0.002				
schooling2006					-0.074***	0.002	-0.074***	0.002					-0.074***	0.002	-0.074***	0.002				
employed1994									0.032***	0.009	0.058***	0.009	0.015	0.009	0.040***	0.009				
employed1996									-0.031***	0.008	-0.021***	0.008	-0.031***	0.008	-0.022***	0.008				
employed1998									0.028**	0.010	0.060***	0.010	0.013	0.010	0.045***	0.010				
employed2000									-0.010	0.009	-0.008	0.009	-0.013	0.009	-0.011	0.009				
employed2002									-0.016**	0.008	-0.019***	0.008	-0.020***	0.008	-0.023***	0.008				
employed2004									0.036***	0.009	0.069***	0.008	0.023***	0.009	0.055***	0.008				
employed2005									-0.021**	0.008	-0.035***	0.008	-0.021***	0.008	-0.034***	0.008				
employed2006									0.027**	0.009	0.061***	0.008	0.014*	0.009	0.048***	0.008				
dposty																	-0.120***	0.006	-0.110***	0.005
constant	5.934***	0.015	5.993***	0.015	5.741***	0.016	5.800***	0.016	5.9423***	0.019	6.022***	0.019	5.736***	0.020	5.818***	0.020	5.964***	0.014	6.020***	0.014
r squared	**0.369**		**0.366**		**0.398**		**0.396**		**0.370**		**0.368**		**0.400**		**0.399**		**0.275**		**0.309**	
N	**142285**		**142285**		**142285**		**142285**		**142285**		**142285**		**142285**		**142285**		**142285**		**142285**	

+ Log. Income per capita ++ Log. Expenditure per capita;*** significant at the 1 percent level, **significant at the 5 percent level, *significant at the 10 percent level; robust standard errors are reported.

[37] See the appendix for a detailed list of names and labels for the variables reported in table 7.

for income and expenditure implies that, holding other factors fixed, the per capita income and expenditure of household members in the immediate period after the crisis drop, in average, by a 20-23% compared to that of the pre-crisis period. Similarly, the post-crisis year coefficient of model 5 shows the reduction both of income and expenditure as a consequence of the crisis. The coefficient of the dummy variables for 2004 and 2005 in models 1 and 3 show that the income of each household member was still negatively impacted but only by a 4-5% in comparison to pre-crisis period. This suggests that, in general, the impact of the 1995 crisis on the welfare of Mexican households deteriorated dramatically in the immediate years after the crisis (1996-2002) and tended to recover towards the latter years (2004-2006).

These results contradict those of Barro's (2001) analysis of five East Asian countries that experienced sharp currency and banking crises in 1997-98 and recovered strongly by 1999-2000 leading to conclude that the broader analysis found no evidence that the crisis had effects that persisted beyond a five year period. Furthermore, the results obtained match with those of Ravallion and Lokshin (2005, 2007), Suryahadi and Sumarto (2003) and Cruces and Wodon (2003) since, as with their results, it appears that households do not recover as the overall economy does.

The results of models 1 to 5 imply that household's composition and size is negatively related to income and expenditure per-capita. This result is in accordance with the results of Davis, Handa and Soto (2004) which show that additional children and adolescents increased the probability of being poor in Mexico in 1996. Furthermore, the result also agree with McKenzie (2003), when concluding that the coping strategy of adding more household members to the labor force and increasing the number of labor hours of those already employed was not widely used by Mexican households.

Nonetheless, the household size variable quadratic term does not show a negative relationship with income and expenditure. This result suggests that more members, as long as they are employed, do protect a household from the negative impacts of a crisis to certain extent but above a given level the household size hinders household welfare. This result follows the rationale of Lanjouw and Ravallion (1995) who while stating that the existence of economies of scale in household's welfare cautions against concluding that larger families tend to be poorer.

The location variable values show that urban settled households are positively related to income and expenditure. However, this result contrasts with the findings of Mckenzie (2001) and Verner (2005) which show that the rural-urban difference appears to have narrowed and in fact urban households tended to be hit more adversely by the crisis than rural households. A possible explanation for the latter is that higher unemployment and soaring inflation had a stronger impact in the urban households, particularly those slightly above the poverty line. At the same time, as discussed in section 4.3 the incidence of poverty remained much higher in rural areas than in urban areas.

The positive relationship of house ownership variable with income and expenditure shows consistency with previous studies such as the one by Baldacci, De Mello and Inchauste (2002). Because other sources of income, including labor income, typically fall during crises, owning a house can protect the household from the risk of falling into poverty as home owners do not need to spend any share of income on rent.

The number of employed members in a household shows that income and expenditure will increase with the number of individuals in the work force. This being closely related to household size since even when the results given by the household size and composition variables shows a decline in income and expenditure as the household size increases this

might not be the case if the members are actually employed. Hence, it follows that the results are credible since more members will improve the welfare of the household as long as they are employed. This gives more strength to the arguments of Lanjouw and Ravallion (1995) that a bigger household is not necessarily detrimental. However when providing interaction between number of employed members and the year dummy variables the results are far from homogeneous. In models 3 and 4 the value of the interaction variable fluctuates sufficiently to subtract require qualifications on the above conclusion.

As for the household head characteristics, as expected, the years of schooling and age also have a positive relationship with income and expenditure per capita. Furthermore, when interacting years of schooling with the year dummy variables in model 2 the relationship becomes positive. Table 8 below shows the values of the schooling interaction variables with respect to the crisis year.

These results are not surprising as it is widely accepted that more educated individuals will fare better than their less educated counterparts. As described by Cortes (1997); Szekely (1998); and Cunningham and Maloney (2000) the data suggest that the more educated fared better during the crisis. Nonetheless this result should be interpreted with caution since more educated households might have mitigated the effect of the crisis by putting more members of the household in the labor market, even though McKenzie (2003) states that that was not the case for Mexican households.

Table 8. Schooling interaction variables

	Income			Expenditure		
Year	$\beta_{schooling} + \beta_{schooling*year}$		**Difference**	$\beta_{schooling} + \beta_{schooling*year}$		**Difference**
1994	0.074	-0.074	0.000	0.074	-0.073	0.001
1996	0.074	-0.003	0.071	0.074	-0.004	0.070
1998	0.074	-0.066	0.008	0.074	-0.067	0.007
2000	0.074	-0.005	0.069	0.074	-0.005	0.069
2002	0.074	-0.004	0.070	0.074	-0.005	0.069
2004	0.074	-0.073	0.001	0.074	-0.073	0.001
2005	0.074	-0.001	0.073	0.074	0.001	0.075
2006	0.074	-0.074	0.000	0.074	-0.074	0.000

Source: Author calculations.

It is worth noticing that a male household head appears to have a negative relationship with income and expenditure. This suggests that female headed households might have an advantage in the years after the crisis. This result is not surprising given the discussion in section 4.3 about the implications of the gender of the household head and the fact that female headed households might be better protected than their male counterparts. Furthermore, Baldacci, De Mello and Inchauste (2002) found in their analysis that the gender of the household head had no significant impact on the risk of poverty.

Similarly, the estimated relationship between the age of the household head and income or expenditure gives reasons to agree with Verner (2005) when saying that those households with older heads fare better than the ones with young heads since the findings show that older household heads tend to escape poverty as they accumulate more assets and their fertility rate tends to drop.

6.2 Asset Index Results

By following the methodology described in section 3.2, an asset index is constructed by performing Principal Components Analysis on dwelling and asset data collected from the samples contained in the ENIGH surveys from 1992 to 2006. Table 9 present the assets that formed the final index as well as the weights given by the PCA analysis.

Table 9. Assets weightings

Assets	Weight	Assets	Weight
dwelling		**transportation**	
ownership of dwelling	0.132	automobile	0.400
number of rooms in dwelling	0.137	truck	0.208
kitchen	0.492	motorcycle	0.161
Toilet	0.651	bicycle	-0.099
flush toilet	0.476	animal pulled vehicles	-0.237
tube water inside dwelling	0.592	other types of transportation	-0.173
tube water outside dwelling	-0.370	**durables**	
well water inside dwelling	-0.377	radio	0.085
well water outside dwelling	-0.584	television	0.615
water delivered by pipe to dwelling	-0.256	PC	0.448
other type of water supply	-0.144	gas fueled cooker	0.618
sewage connected to main sewage	0.537	refrigerator	0.553
sewage connected to septic pit	-0.039	heater	0.376
sewage connected to river, lake, etc	-0.176	other type of household appliances	0.232
no sewage	-0.606		
low quality materials walls	-0.614		
high quality materials walls	0.474		
other type of walls materials	-0.677		
low quality materials roofing	-0.472		
high quality materials roofing	0.394		
other type of roofing materials	-0.577		
low quality flooring	-0.629		
high quality flooring	-0.094		
other type of materials flooring	0.397		
Electricity	0.785		
telephone line	0.473		

Source: author calculations based on the 1992 to 2006 ENIGH surveys provided by the INEGI.

The signs of the weights are all as expected, with positive weights on all but the assets that are defined relative to left out variables that indicate greater wealth (i.e. no tube water, no toilet facilities and low quality construction materials). Large positive values are found on ownership of durable assets as well as tube water inside the dwelling, electricity, high quality construction materials and toilet facilities. Relatively large negative weights are also assigned to non motorized transport, low quality construction materials and the unavailability of sewage and piped water. After appending all the observations of all the 9 waves and calculating an asset index for all the 142,258 observations and categorizing the final index into 5 quintiles, table 10 shows the percentage of households in each wave that fall within each of the 5 quintiles of the overall sample. In other words, the percentage column in table 10 shows the percentage of households in each wave to be among the first quintile for the appended sample (142,258 observations) - i.e. for the 1992 wave the percentage of household that fell within the first overall first quintile (the 20% of the 142.258 observations) was 30.4%.

As it can be observed a higher concentration of households is located in the lower quintiles in each of the waves. Also, it is notorious that the concentration of households in the lower quintiles increases between the years prior to the 1994 crisis to those after the crisis. As an example, 30% of the household in 1992 were concentrated in the lowest quintile while in 1996 the percentage increased to 34%. Similarly, the concentration of households in the highest quintile was almost 15% in the pre-crisis period and this percentage declined to 6.4% after the crisis. Figure 3 shows the changes in concentration among the lowest and highest quintile for the period 1996-2006.

The results in table 10 show the negative impact of the crisis in the assets ownership of Mexican households. However, in contrast with the income and expenditure measures, it

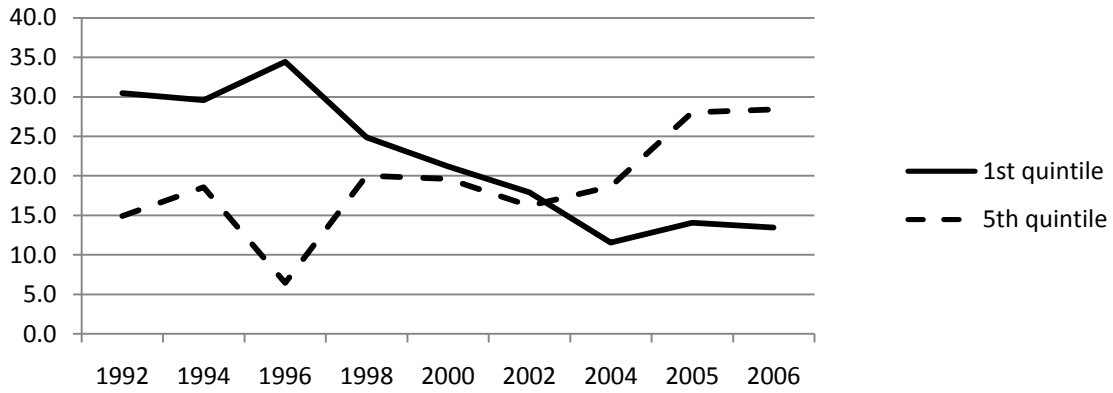
can be observed that the concentration of households in the lowest quintile tends to diminish to better levels than in the pre-crisis period from 1998 onwards. Hence, the results of the distributions using the assets index seem to suggest that the household welfare was indeed affected by the crisis but the effects do not persist over time.

Table 10. Means and standard deviations by assets index and percentage of households for each quintile for each wave

			Q1			Q2			Q3			Q4			Q5		
Year	**Var**	**Obs**	**Mean**	**Std**	**%H**	**Mean**	**Std**	**%H**	**Mean**	**Std**	**%H**	**Mean**	**Std**	**%H**	**Mean**	**Std**	**%H**
1992	39	10530	-0.105	0.728	**30.4**	-0.023	0.197	**23.6**	0.008	0.089	**17.1**	0.019	0.195	**14.0**	0.034	0.326	**14.9**
1994	39	12815	-0.119	0.758	**29.6**	-0.028	0.218	**23.0**	0.009	0.094	**15.0**	0.023	0.215	**13.9**	0.052	0.407	**18.6**
1996	39	14042	-0.145	0.807	**34.4**	-0.031	0.232	**21.7**	0.013	0.114	**20.9**	0.030	0.240	**16.6**	0.017	0.224	**6.4**
1998	39	10952	-0.083	0.622	**24.9**	-0.023	0.196	**22.0**	0.008	0.091	**16.9**	0.023	0.215	**16.2**	0.047	0.387	**20.0**
2000	39	10108	-0.064	0.547	**21.2**	-0.023	0.198	**24.3**	0.008	0.089	**17.6**	0.023	0.211	**17.3**	0.043	0.369	**19.6**
2002	39	17167	-0.089	0.629	**17.9**	-0.035	0.231	**23.8**	0.017	0.131	**20.6**	0.049	0.308	**21.4**	0.058	0.417	**16.2**
2004	39	22595	-0.077	0.583	**11.6**	-0.028	0.206	**15.0**	0.030	0.171	**27.0**	0.083	0.392	**27.8**	0.087	0.503	**18.7**
2005	39	23174	-0.098	0.669	**14.1**	-0.034	0.229	**17.1**	0.020	0.140	**19.5**	0.066	0.356	**21.3**	0.140	0.065	**28.0**
2006	39	20875	-0.084	0.621	**13.5**	-0.031	0.220	**17.6**	0.018	0.133	**19.2**	0.060	0.338	**21.3**	0.129	0.628	**28.4**

Source: Author's calculations based on the 1992 to 2006 ENIGH surveys provided by the INEGI

Figure 3. Percentage changes in concentrations among the lowest and highest quintile from 1992 to 2006.



It can be clearly observed in figure 3 that the increase of households concentrated in the lowest quintile was dramatically high in 1996 compared to the years previous to the crisis. Similarly, the concentration of household in the highest quintile decreased sharply in the immediate period after the crisis. Nonetheless, it would also seem that the return of the concentration of households, both in the lowest and highest quintiles of the population, to pre-crisis levels was quite fast too.

Knowing that the ENIGH surveys contain data both on income and expenditure, the correlation with the asset index can be examined. By using a Spearman correlation index it is found that the correlation between household quintiles ranked by the assets index, household income and household expenditure is about 0.30. The later being consistent with O'Donell et al. (2007) who argues that living standard indices based on principal components analysis often have a weak relationship with income and expenditure measures, with correlation coefficients often in the region of 0.20 to 0.40. Table 11 shows the results of the Spearman[38] correlation index.

Table 11. Spearman correlation

	Income	Expenditure	Assets Index
Income	1.0000		
Expenditure	0.8929	1.0000	
Assets index	0.2980	0.2938	1.0000

Source: Author's calculations based on the 1992 to 2006 ENIGH surveys provided by the INEGI

[38] For a formal treatment of the Spearman Rank Correlation Index, see Spearman (1904) and Zar (1972).

Furthermore, in order to enhance the comparison between welfare measures, a comparison between households classified by the asset index and both household income and expenditure for the period 1992 to 2006 reveals that 37% of the first quintile of households classified by the asset index matched with those classified both by household income and expenditure, while 36% of the household in the fifth quintile matched between these three classifications, see table12.

Table 12. Comparison between households classified by income, expenditure and assets index.

	INCOME						EXPENDITURE					
assets index	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**TOTAL**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**TOTAL**
Q1	10,613	6,503	4,589	3,638	3,109	28,452	10,562	6,515	4,603	3,641	3,131	28,452
%	**37.30**	22.86	16.13	12.79	10.93	100.00	**37.12**	22.90	16.18	12.80	11.00	100.00
Q2	6,364	7,029	6,243	4,931	3,886	28,452	6,321	7,072	6,155	5,021	3,884	28,452
%	22.37	**24.70**	21.94	17.33	13.66	100.00	22.22	**24.86**	21.63	17.65	13.65	100.00
Q3	4,673	6,289	6,534	6,103	4,851	28,451	4,709	6,162	6,602	6,065	4,912	28,451
%	16.42	22.10	**22.97**	21.45	17.05	100.00	16.55	21.66	**23.20**	21.32	17.26	100.00
Q4	3,671	4,919	6,385	7,177	6,302	28,452	3,672	4,970	6,328	7,156	6,328	28,452
%	12.90	17.29	22.44	**25.22**	22.15	100.00	12.91	17.47	22.24	**25.15**	22.24	100.00
Q5	3,131	3,712	4,700	6,603	10,303	28,451	3,188	3,733	4,763	6,569	10,196	28,451
%	11.00	13.05	16.52	23.21	**36.21**	100.00	11.20	13.12	16.74	23.09	**35.84**	100.00
TOTAL	28,452	28,452	28,451	28,452	28,451	142,258	28,452	28,452	28,451	28,452	28,451	142,258

Source: author calculations based on the 1992 to 2006 ENIGH surveys provided by the INEGI

Given the discussion of the results of the regression analysis, using income and expenditure per-capita as dependant variables, the results of the asset index provide a useful alternative. The results of tables 10 and 12 agree with Filmer and Pritchett (2001), Sahn and Stifel (2003) and McKenzie (2005) when arguing that in the absence of information on household income or expenditure, data on assets can be used to measure living standards and welfare of households.

6.3 Policy Implications

From the results obtained in this thesis, considerations concerning policy issues can be made. The specific policy responses to crises will vary considerable from country to country. However, a few factors are common one way or another: real depreciation of the currency is achieved, aggregate demand is reduced and the living standards of many groups of people decline for some period of time. Concern for the latter should guide the choice of responses right from the start. Distributional concerns have to be taken into account in the design of policy responses including both the basic elements of a stabilization program, and the micro-level interventions implemented of the reform program. Appropriate policies can help mitigate the impacts of a crisis on the more vulnerable by preventing or dampening changes in the key variables that negatively affect household incomes and expenditures - prices, labor earnings, returns to assets and public services. The case for a policy change is strong when the adverse welfare impacts arise from the initial shocks. When, instead, the adverse welfare impacts are the result of a package for policy responses (such as the

elimination of a food subsidy as part of a general rationalization of public finances), care needs to be taken.

Some policies that increase overall economic efficiency, and may lead to future growth with positive long-term effects on the poor, may nevertheless imply short-term income losses for them. In these cases, wherever fiscally possible, the aim should be to compensate for the change through a less distortionary, and possibly temporary, instrument, rather than to prevent the efficiency enhancing policy from being implemented. Hence, in the particular case of the Mexican "Tequila Crisis", it is worth exploring the role of two of Mexico's larger social programs designed as a response to the 1994 crisis and their impacts: the Direct Support Program for rural Areas (PROCAMPO) and the Education, Health and Food Program (PROGRESA), now called the Oportunidades (Opportunities) program.

PROCAMPO is a program providing cash transfers to farmers who had cultivated any of the nine staple crops[39] during the 1991-1993 agricultural seasons. The stated objective of this program, which was established in 1994, is to compensate for the expected negative impact of NAFTA on the producers of these crops and the program is to be phased out after 15 years. Uniform payments are provided on a per-hectare basis and are decoupled from current land use. Payments were to remain constant in real terms for the first 10 years of the program, then phase out over the remaining 5 years. However, the real value of payments fell 35% between the inception of the program in 1994 and 1996. Only 2001 did payments per hectare, as well as total PROCAMPO expenditures, reach the original 1994 levels in

[39] Maize, Bean, Wheat, Rice, Sorghum, Soy, Cotton, Carthamus and Barley.

real terms. The per-hectare payment in 2002 was set at 875 Mexican pesos, or US$ 90. According to Fox (2002), PROCAMPO reaches almost three million producers each year.

PROGRESA, on the other hand, which is the Mexican government's premier poverty alleviation program, provides cash transfers to very poor rural households provided they comply with a very complex set of responsibilities. These include ensuring that children are enrolled in school and maintain 85% attendance, that children and adults receive regular preventive health check-ups and vaccinations, and that mothers of beneficiary families attend a monthly health talk. In return for compliance, families receive cash payments depending on the number of children attending school and the level of schooling they have attained. In addition to these educational subsidies, each student received a package of school supplies twice a year, and the family received a monthly income supplement of approximately US$10. Since 1997, these payments have increased in real terms by 47%. As of the end of 1998, over 1.9 million households were receiving PROGRESA benefits. When the Fox administration took office in 2001, PROGRESA changed its name to "Oportunidades" and expanded operations to urban and semi-urban areas. Thus, from the analysis of this thesis and the description of the programs above an important question can be formulated: Did PROCAMPO and PROGRESA play an important role in mitigating the effects of the crisis among the rural population?

According to the results obtained by Davis, Handa and Soto (2004) without PROCAMPO mean consumption in 1996 would have been 1.5% lower and all the poverty indicators[40] would have been higher. The latter results derived from the estimation of the relationship between PROCAMPO benefits and household consumption calculated by

[40] They consider as poverty indicators the number of poor, poverty gap, and squared poverty gap.

including the monetary value of PROCAMPO benefits in their consumption regression for 1996. As for the potential poverty reducing impact of PROGRESA, the authors acknowledge that the analysis was more complicated since RPOGRESA only began distributing benefits at the end of 1997. Hence, a more suitable question would be: what would the impact on poverty have been had PROGRESA begun distributing benefits in 1996?

According to their findings, 55% of rural households in the 1996 ENIGH were later incorporated into PROGRESA. Of these future beneficiaries, 15% were incorporated in the first two phases of PROGRESA, and 70% were incorporated in the fourth phase. For the latter an important assumption is that by the end of 1996 only the first two phases of PROGRESA had been completed[41]. In this scenario, the number of poor would have decreased by 1.1%, and the squared poverty gap would have decreased by 3.9%. Furthermore, if phase four of the program had been completed by the end of 1996, the incidence of poverty would have declined by 6.8%, the poverty gap by 13% and the squared poverty gap by 17.5%.

The whole of the discussion above provide useful arguments in order to have an idea of the extent to which the current PROGRESA program would serve as a safety net in the case of macroeconomic crisis such as that of 1994. Note, also that PROGRESA had a larger impact than PROCAMPO on the poverty indicators since PROGRESA is targeted towards the poorest rural families.

Finally, it can be said that Mexicos's PROGRESA program, although designed to stimulate investment in the long-run human capital of the poorest, could play and important

[41] This is probably the most realistic assumption, given the timing of the macroeconomic shock and the complexity involved in setting up PROGRESA.

safety net function during macroeconomic crisis. The later being an important results for other countries considering or implementing demand-side interventions to raise the human capital of the very poorest.

Conclusions

Since the main objective of this thesis has been to try and find answers to questions such as: The immediate welfare cost of a crisis can be high, but how quickly do individuals recover? Are the impacts greater for some than for others? If so, who are hit the hardest? And, do households recover as the economy does after a crisis? The results obtained considering the case of the 1994 Mexican financial crisis and using the data contained in the Mexican National Income and Expenditures Surveys (ENIGH) allow giving answers to such questions. Furthermore, this thesis also proves to be useful when assessing the methodological and theoretical issues of welfare measurement and provides new results on this topic.

The results reported in chapter 5 shows that there was a sharp decline in income per capita levels of households in the period after the 1994 crisis. Thus, supporting the idea that the immediate welfare cost of a crisis can be high. The same results show that for 2004 and 2005 the income of each household member was still negatively impacted but only by a 4-5% in comparison to the pre-crisis period, and in fact, by 2006 the value rose to 3%, only 1.5% below the pre-crisis levels.

The latter suggesting that in general, the 1994 crisis led to a dramatic deterioration in the welfare of Mexican households in the years after and tended to recover until the latter years. Similarly, when considering expenditure, the result suggest that expenditure per

capita fell right after the crisis but there was a slow systematic recovery and by 2006 was above pre-crisis levels by 0.2 %. Thus, this result suggests that the recovery time of household after the 1994 crisis was almost of 10 years. The latter in contrast with the idea that households recover as the overall economy does.

The results obtained concerning the distributional aspects of the impacts of a crisis on the welfare of households show that household composition and size is negatively related to income and expenditure per-capita. This suggests that households with a larger number of members fared worse than others. Nonetheless, the household size variable quadratic term does not show the mentioned negative relationship with income and expenditure. The latter implying that more members do protect a household from the negative impacts of a crisis to a certain extent but after a given level the household size hinders household welfare.

Similarly, the location variable values show that urban settled households are positively related to income and expenditure. However, this result contrasts with previous findings, which show that the rural-urban differences appear to have narrowed and in fact urban households tended to be hit more adversely by the crisis than rural households.

The positive relationship between house ownership and income and expenditure is consistent with the other results since other sources of income, including labor income, typically fall during crises, owning a house can protect the household from the risk of falling into poverty as home owners do not need to spend any share of income on rent.

As for the number of employed members in a household the results show that income and expenditure will increase with the number of individuals in the work force. This variable is closely related to household size since, even when the result given by the household size and composition variables shows a decline in income and expenditure as the household size increases, this might not be the case if the members are actually employed.

Hence, it follows logic to say that the results are coherent since more members will improve the welfare of the household as long as they are employed. This lends strength to the argument that a bigger household is not necessarily detrimental. However when providing interaction between number of employed members and the year dummy variables the results are far from conclusive. The value of the interaction variable fluctuates sufficiently to subtract power to the conclusion given above.

The household head characteristics, the years of schooling and age also have a positive relationship with income and expenditure per capita. When interacting years of schooling of the household head with the year dummy variables the relationship becomes positive. This result is not surprising since it is widely accepted that more educated individuals will fare better during a crisis than their less educated counterparts. Nonetheless, the latter must be taken with caution since more educated households might have mitigated the effect of the crisis by putting more members of the household in the labor market.

It is worth noticing that a male household head appears to have a negative relationship with income and expenditure. This suggests that women headed households might have an advantage in the years after the crisis. The result follows the discussion of section 4 about the possibility that female headed households might be better protected than male counterparts. Thus, differences in gender do not appear to matter in terms of the vulnerability of a household to the effects of a crisis.

Similarly, the relationship of the age of the household head with income and expenditure gives place to say that those households with older heads fare better than the ones with young heads since the findings show that the household head age is positively related to income and expenditure.

The utilization of an asset index as a measure of welfare, allowed for an alternative way of assessing the impacts of the crisis on the welfare of the Mexican households. The results obtained support the validity of such an instrument and allow conclusion to be arrived at with confidence.

After categorizing the sample households into 5 quintiles for each wave using the asset index for all of the waves the percentage of households per quintile was obtained. The results show a higher concentration of household is located in the lower quintiles in each of the waves. Also, it is notable that the concentration of households in the lower quintiles increases from the years previous to the 1994 crisis to those after the crisis. The latter suggestive of the negative impact of the crisis, measured by assets ownership, on Mexican households.

Nonetheless, the number of households concentrated in the lowest quintile tends to diminish compared to the pre-crisis period from 1998 onwards. Hence, the results of the distributions using the assets index seem to suggest that the household welfare was indeed impacted by the crisis but such impact did not persist as it was observable only in the immediate years after the crisis. The latter results might contrast with the ones obtained using the conventional measures of welfare, however, it must be noted that the asset index does not take into account any of the household characteristics considered in the analysis using income and expenditure as welfare indicators.

Whilst, the asset index results lack the specificity of those achieved by income and expenditure a few important results are derived. First, the asset index is able to identify the impact of a crisis. The latter since it was possible to observe the difference in quintile concentration before and after the crisis. Second, by using a Spearman correlation index it is found that the correlation between household quintiles determined by the assets index,

household income and household expenditure is about 0.30. The later being consistent with previous studies arguing that living standard indices based on principal components analysis often have a weak relationship with income and expenditure measures, with correlation coefficients often in the region of 0.20 to 0.40.

Furthermore, in order to enhance the comparison between welfare measures, a comparison between households classified by the asset index and both household income and expenditure for the period 1992 to 2006 reveals that 37% of the first quintile households classified by the asset index matched with those classified both by household income and expenditure, while 36 percent of the household in the fifth quintile matched between these three classifications.

Hence, given the discussion of the result of the regression analysis, using income and expenditure per-capita as dependant variables, the results of the asset index provide a viable alternative. Thus agreeing with Filmer and Pritchett (2001), Sahn and Stifel (2003) when arguing that in the absence of information on household income or expenditure, data on household assets can be used to measure living standards and the welfare of households.

Finally, even when acknowledging the limitations and drawbacks both of the empirical methodology and the ENIGH surveys, the results achieved show that it is possible to portray the impacts of a crisis on the welfare of households over time and give answers to the questions driving the motivation of this thesis.

Hence, the immediate welfare cost of a crisis can be high, but how quickly do individuals recover? And, do households recover as the economy does after a crisis? The immediate impact of the 1994 crisis on the welfare of the Mexican households was a reduction in per capita income and expenditure, on average, of 20-23% compared to that of the pre-crisis period and recovery took almost ten years since it was not until 2006 that they

returned to pre-crisis levels. Evidence shows that the Mexican economy recovered in the immediate 5 years after the crisis. However, from the results derived in this thesis it appears safe to conclude that, measured by income and expenditure, the welfare of households do not recover as the overall economy did.

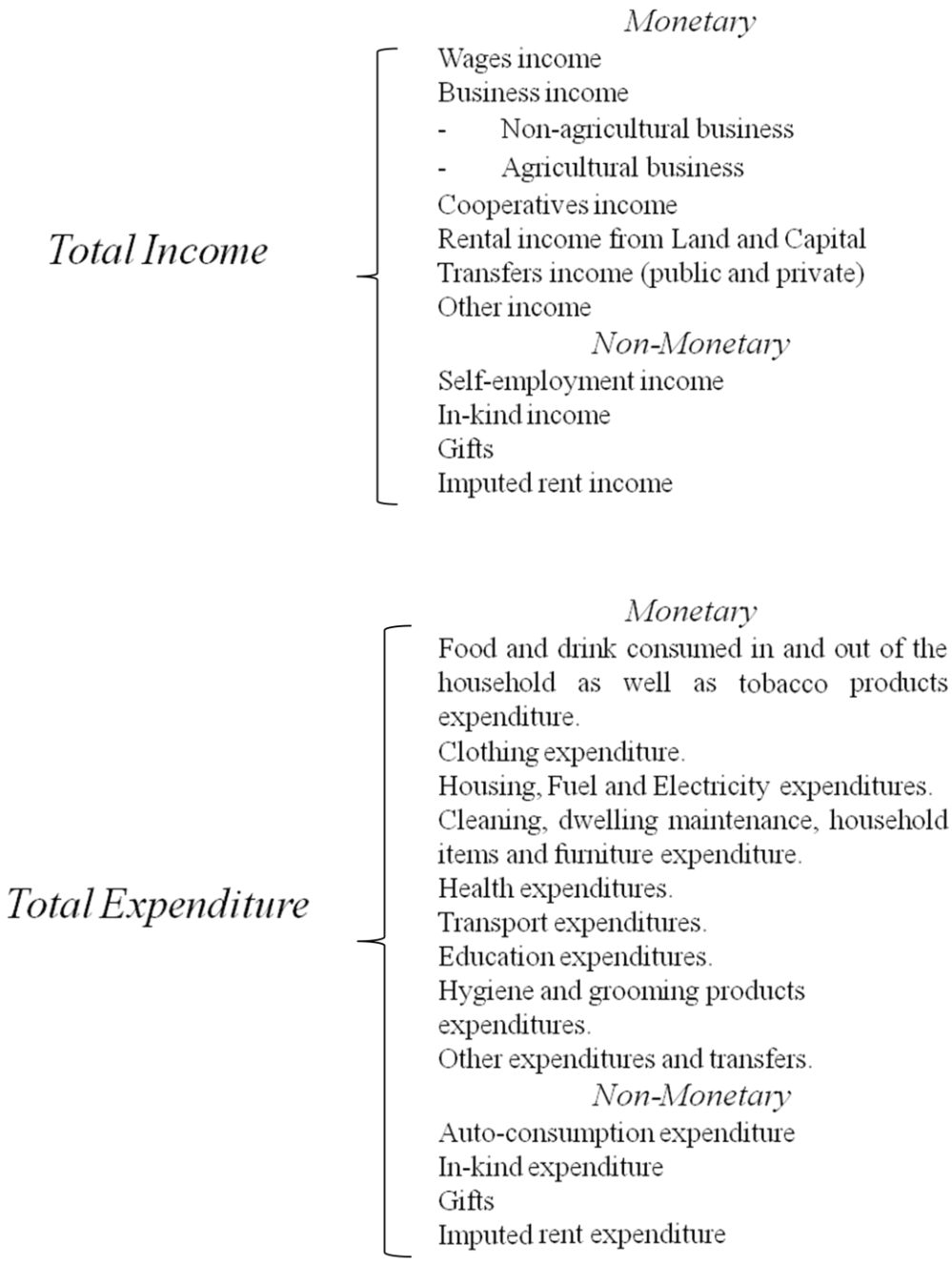
Are the impacts greater for some than for others? And if so, who are hit the hardest? The results of this thesis show that households located in rural areas, not owning a house, headed by males with lower levels of education and with a high number of unemployed members were among those to be hit the hardest by the 1994 Mexican financial crisis.

Appendix

Names and labels

Income / Expenditure		
Household expenditure	texp	Total expenditure of the household
Per head expenditure	texpph	Total expenditure of each household member
Household income	ttinc	Total income of the household
Per head income	tincph	Total income of each household member
Household typology		
Single	single	Single (hhead) member family composition
Nuclear	nuclear	Hhead plus partner with or without children family composition
Extended	extended	Nuclear + relatives family composition
Complex	complex	Extended + nonrelatives family composition
Other	otherhc	Other family composition
Area of Residence		
Urban	urban	Urban households
Household Features		
House ownership	houseowned	Households that own their house
employed	employed	Economically active EMPLOYED members of the household
size	hsize	Number of members in a household
Household Head Features		
age	hhage	Age of the household head
gender	hhmale	Male household heads
years of schooling	yearsofschooling	Years of completed education of the household head
Dummy and interaction variables		
Dummy(year)	Post crisis year	Indicates each of the post crisis years (1996 – 2006)
DpostY	All post crisis years	Indicates the post crisis period as a whole
Schooling(year)	Schooling*dummy	Years of schooling of the head times a year dummy variable
Employed(year)	Employed*dummy	Employed times a year dummy

Items entering the computation of the income and expenditure variables



Source: ENIGH methodological document provided by INEGI.

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