

Does Economic Policy Uncertainty Drive CDS Spreads?

Tomasz Piotr Wisniewski¹

University of Leicester
School of Management
Ken Edwards Building
University Road
Leicester LE1 7RH, UK
Tel: +44 116 252 3958
E-mail: t.wisniewski@le.ac.uk

Brendan John Lambe

University of Leicester
School of Management
Ken Edwards Building
University Road
Leicester LE1 7RH, UK
Tel: +44 116 252 5141
E-mail: bl84@le.ac.uk

¹ Corresponding author.

Does Economic Policy Uncertainty Drive CDS Spreads?

Abstract

This study analyzes the dynamic interactions between changes in economic policy uncertainty and the fluctuations in cost of credit protection. We find that the differenced iTraxx and CDX indices are Granger-caused by variations in the political environment. Within a Vector Autoregressive framework, impulse response functions show a significant reaction of the CDS spreads to shocks in the policy risk. Implied in these findings is the possibility that country-level risk can permeate to the corporations. Furthermore, financial institutions and traders should closely monitor political developments in order to better predict the CDS premia.

JEL Codes: G12; G13; G22; P16

Keywords: Credit Default Swaps; Credit Protection; Economic Policy Uncertainty

1. Introduction

Political decisions affect the economic environment and the financial markets. Economic outcomes are often the product of the ruling party's ideological position (Hibbs, 1977) and incumbents may have incentives to manipulate the business cycle in order to stay in power (Nordhaus, 1975). Their decisions reverberate in the prices of ordinary stocks which aggregate all relevant information (Santa-Clara and Valkanov, 2003; Booth and Booth, 2003) and may also influence the flows of foreign direct investments (see for instance Harms and Ursprung, 2002). It is rather surprising that little evidence has been provided to date on the relationship between changes in political circumstance and the price of credit insurance. This lack of awareness is somewhat perplexing when one considers the size of the CDS market. According to the Bank of International Settlements, the value of the notional principal outstanding on CDS contracts in December 2013 exceeded \$21 trillion, a figure much higher than the entire value of goods and services produced in the US in the same year.

The objective of this study is to address this notable gap in empirical research. To this end, we focus on the dynamic interactions between a measure of economic policy uncertainty and the cost of credit insurance. We take aggregative representations of the European and US credit default swap market which are found in the iTraxx and CDX indices compiled by Markit and model these within a Vector Autoregressive (VAR) framework to understand how they relate to the underlying political risk. We find that changes in political uncertainty Granger-cause the first differences in the aforementioned indices. Furthermore, a one standard deviation shock to that differenced uncertainty measure induces a statistically significant positive response in debt protection cost. The same result is maintained regardless of whether or not we include theoretically relevant exogenous variables in the model.

Many researchers have engaged in the empirical investigation of CDS spread determinants, however they focused predominantly on firm-level characteristics. In fact, the

structural models of credit risk to a large extent encourage such endeavors. Yet, this preoccupation ignores the fact that the presence of broader issues in general and political factors in particular may also influence the CDS premia. Hazards created through inept political decision-making can have an effect which may seep down to the micro level. The behavior and performance of companies and investors can be adversely affected, thus changing conditions within the credit market.

This study falls within a particular niche, in that it scrutinizes credit default indices, rather than individual reference entities. To date, only very few papers have tackled the issue of modeling CDS indices, most notably Byström (2005) and Alexander and Kaeck (2008), from which we draw upon. It is also important to note that we add further insight through considering the economic political uncertainty index as one of the possible determinants. To the best of our knowledge, only Aizenman *et al.* (2013) attempted to control for an isolated political factor in the form of fiscal discipline. They used measures of fiscal balance and debt to explicate the behavior of CDS spreads on sovereign debt. In this particular case it is clear that the indebtedness of the borrower should be one of the drivers, however in this study we are able to document the more contagious and general characteristics of political risk. Specifically, this risk appears to manifest itself as we move across to considering corporate default premia.

A brief reflection on our findings may highlight a range of practical ramifications. Firstly, it would not be entirely unexpected to see bond yields increase in response to economic policy uncertainty, as such an increase would compensate fixed income investors for the risk undertaken. However, the CDS market offers an opportunity to benefit without taking on the political risk, as there is no requirement to hold the contract's underlying asset. By showing that CDS spreads are predictable based on historical political information, we hint at the possibility to generate abnormal trading profits and point to a violation of the

Efficient Market Hypothesis. Secondly, the fact that price of default insurance and economic policy uncertainty covary significantly, holds important implications for portfolio diversification. Elevated political risk engenders a decline in stock and bond prices (Berkman and Jacobsen, 2006; Gao and Qi, 2013) and holding CDSs in the portfolio could serve to cushion such falls. While it is possible to enter into tailor-made insurance contracts covering particular political events, such as expropriation, war or terrorist attacks², such contract are too specific to capture the general level of political uncertainty felt by the markets. It is our belief that CDSs are superior vehicles for diversification purposes.

The remainder of the paper is organized as follows. The next section examines the studies related to the credit default swap market and those analyzing the impact of politics on financial markets. Section 3 outlines our methodological approach, while section 4 provides definitions of the variables, data sources and summary statistics. The bulk of our empirical investigation is contained in Section 5, which is followed by further considerations. The final section concludes the paper with some reflections and recommendations.

2. Literature Review

2.1. Credit Default Swaps and CDS Spreads

Credit default swaps are one of the most popular credit derivatives and like most derivatives are a zero sum game created through a bilateral contract. The protection buyer pays a premium to insure against a credit event of a reference entity which has issued a bond or has taken out a loan. In exchange for this periodic premium payment, the protection seller becomes obliged to cover the losses of the counterparty should the reference entity fall into a

² For instance, Overseas Private Investment Corporation offers similar insurance for U.S. private sector entities who intend to pursue FDI in developing countries.

position where it is unable to honor its debt obligations.³ The premium is typically paid quarterly until a credit event or the maturity of the contract, with its annualized equivalent per 100 currency units being called a CDS spread. Should this credit event occur, the protection buyer can deliver the reference asset at its par value or receive a cash payment equivalent to the difference between the asset's par and current market value. Credit default swaps are useful instruments as they allow the transfer of credit risk to the party willing to bear it. Prior to the financial crisis of 2007-2008 the market was highly unregulated and opaque, and many have argued that credit default swaps were one of the underlying reasons exacerbating the downturn. CDSs may reduce incentives to monitor the lenders and to negotiate restructuring with companies in difficulty, as well as create a web of exposures in which problems within one institution can spread to the wider financial system (see Stulz (2010) for a discussion of some of the issues). After the crisis a more stringent regulatory approach was taken, with the U.S. Dodd-Frank Act (Title VII) being enacted to improve the transparency and accountability of the CDS market (Tang and Yang, 2013). According to figures provided by the Bank of International Settlements between December 2004 and the same month in 2007 the market grew from about \$6.4 trillion in terms of notional principal to \$58.2 trillion. Following the crisis, the size fell and by the end of 2013 stood at \$21 trillion.

The CDS market features both single-name contracts and indices which include a pool of constituents. Although there are many similarities between these two financial instruments, a credit event of one index member will not result in an expiration of the contract. Rather, the relevant constituent is excluded from the index, with the contract continuing to trade at a reduced notional amount (Alexander and Kaeck, 2008). Indices which average CDS contracts on different companies are available, for instance, for Europe (iTraxx Europe) and the United

³ This may materialize in cases of bankruptcy, missed payments or default on obligations, acceleration, repudiation or moratorium and the most legally contentious - a restructuring (Blanco *et al.* 2005).

States (CDX North America Investment Grade).⁴ In the case of iTraxx Europe, 125 CDS spreads of the most liquid reference entities from five sectors are equally weighted to construct the index. Similarly, CDX averages 125 liquid reference entities from across a range of sectors. These indices are the primary focus of our investigation here.

In our empirical investigation we choose to use CDS rather than bond spreads which can be attributed to several reasons. First of all, bond spreads need to be computed in relation to a risk-free rate and choosing it may prove problematic (Anneart *et al.* 2013). Second, bonds may have embedded options and their yields may contain tax premia (Tang and Yan, 2010; Pan and Singleton, 2008). Third, the CDS spread is not affected by bond covenants, coupons and maturity (Stulz, 2010). Finally, Blanco *et al.* (2005) argue that the CDS market leads credit spreads in terms of price discovery.

The literature is dominated by two theoretical approaches related to the pricing of credit risk. The more recent of the two - the reduced form approach – does not specify the reason for default and models its timing using hazard rates (Jarrow and Turnbull, 1995; Jarrow *et al.*, 1997; Duffie and Singleton, 1999). Since it does not provide economic justification for the emergence of a credit event, it has not gained as much popularity amongst practitioners and academics as the second theoretical framework, namely structural models. This approach originates from the seminal Black and Scholes (1973) option pricing model, which has been applied in the context of insolvency by Merton (1974). In structural models, default arises whenever liabilities of the firm exceed a particular threshold. Merton's (1974) probability of default is a nonlinear function of leverage, volatility and interest rates. High values of volatility raise the likelihood of crossing the default boundary, while leverage determines the default barrier (Blanco *et al.*, 2005). Furthermore, interest rate increases risk-

⁴ At the moment of writing the paper, CDX NA IG included 1 Canadian and 124 US entities.

neutral drift of the firm and thereby reduces the probability of insolvency (Longstaff and Schwartz, 1995).

A number of studies looking at firm-level CDS spreads have confirmed the predictions of structural models (see for instance Ericsson *et al.*, 2009; Blanco *et al.*, 2005; Greatrex, 2008). Several scholars preferred to use implied rather than realized volatility due to its forward-looking nature (Tang and Yan, 2010; Cao *et al.*, 2010). Others also considered variables such as liquidity (Annaert *et al.*, 2013; Tang and Yan, 2013; Bongaerts *et al.*, 2011; Fabozzi *et al.*, 2007), accounting numbers (Chiaramonte and Casu, 2013; Tang and Yan, 2010; Zhang *et al.*, 2009) and credit ratings (Fabozzi *et al.*, 2007; Zhang *et al.*, 2009; Greatrex, 2008). Das *et al.* (2009) argued that the most successful models of CDS spread include both accounting metrics and market-based measures.

Our study is concerned with index rather than company-level CDS spreads. There are only a few papers employing this perspective. They depart from individual firm accounting data and focus only on the bare essentials of the structural models. Byström (2005) noted that the iTraxx index is an autoregressive process which correlates with stock market index returns and their volatility. While using a different methodology, the determinants chosen by Alexander and Kaeck (2008) have much in common with those in Byström (2005). Although Tang and Yan (2010) do not model an index *per se*, they analyze the average CDS spreads of individual companies and, in doing so, they utilize macroeconomic aggregates. Even though these studies are rare, they serve to illuminate and guide our own investigation.

We endeavor to consider another factor omitted from those abovementioned studies, namely fluctuations in economic policy uncertainty. In what follows we will show that this variable, which was constructed to measure national concerns, has also ramifications for corporations. The only tangentially related study in the extant literature is that of Aizenman *et al.* (2013), which shows that the fiscal balance and debt relative to the tax base can partially

explain the variation in CDS spreads on sovereign bonds. Our study departs from this in at least two respects. To begin with, our focus is on corporate rather than sovereign spreads and we are able to document that political risk trickles through from macro to micro level. We use a different measure of political uncertainty, namely the recently constructed index by Baker *et al.* (2013). This index is particularly interesting from a scientific point of view because it aggregates both the actual and perceived political risk level.

2.2. The Impact of Politics

A number of prior studies have examined the nexus between stock market returns and political developments. Since the objectives of political parties will depend upon the preferences of the electorate that has supported them, potential economic outcomes may vary across the political spectrum. Parties leaning towards the left typically favor low unemployment – high inflation constellations, while those exhibiting right-wing inclinations prefer policies on the other end of the Phillips curve (Hibbs, 1977). Interestingly, Santa-Clara and Valkanov (2003) argue that excess stock market returns in the US were significantly higher under Democratic rather than Republican presidencies. This return gap allows investors to design profitable trading strategies based on this anomaly (Hensel and Ziemba, 1995). While these results appear to be convincing in the US context, they are not easily generalizable to other nations (Cahan *et al.*, 2005; Bohl and Gottschalk, 2006; Döpke and Pierdzioch, 2006; Bialkowski *et al.*, 2007).⁵

Scholars have also looked at specific political events and the influence they may have on the value of equity. Berkman and Jacobsen (2006) illustrate the negative impact of international conflicts by claiming that they suppress global stock market returns by about 4

⁵ Politicians may also attempt to manipulate the business cycle to maximize their chances of re-election (Nordhaus, 1975), which seems to be reflected in the behavior of stock markets (Herbst and Slinkman, 1984; Booth and Booth, 2003). Elections may also influence return volatility (Bialkowski, *et al.* 2008; Pástor and Veronesi, 2012) and option prices (Kelly *et al.*, 2014).

percentage points per annum and increase investment risk. A similar analysis was conducted by Frey and Kucher (2000), who examined the response of bond prices to crucial events during the World War II. Diamonte *et al.* (1996) looked at political risk upgrades and downgrades and concluded that they lead to significant stock price movements. Furthermore, Wisniewski and Moro (2014) showed that the linguistic characteristics of the communiqués issued by the European Council correlate with stock market returns around the dissemination date.⁶

Particularly interesting for our own research are studies that have utilized the economic policy uncertainty index constructed by Baker *et al.* (2013). In their own paper, the creators of the index argue that it is related to real activity. Positive shocks to the index were shown to induce statistically significant declines in industrial production and employment. This is consistent with the findings of Karnizova and Li (2014) who argue that this measure performs well at forecasting future US recessions. Leduc and Liu (2014) consequently compare positive innovations in the policy uncertainty index to negative aggregate demand shocks, in that they both yield similar macroeconomic outcomes.

The ramifications are not limited to the macroeconomy and also extend into financial markets. Policy uncertainty has been reported to induce higher stock volatility (Pástor and Veronesi, 2013) and to be negatively correlated with stock market returns (Antonakakis *et al.* 2013). At a firm-level, Gulen and Ion (2015) document that capital investments are reduced and delayed whenever the Baker *et al.* (2013) measure reaches high values. To date, however, no study has been conducted to investigate how this index co-varies with the CDS spreads. We intend to fill this void through our study and, in doing so, we document that political uncertainty predicts the price of corporate default protection.

⁶ Another intriguing body of literature that has been produced relates to the political economy of Foreign Direct Investment (FDI). Important contributions in this field include Oneal (1994), Li and Resnick (2003), Jensen (2003), Asiedu and Lien (2011), Jensen (2003), Choi and Samy (2008) and Harms and Ursprung (2002).

Baker *et al.* (2013) index is a composite measure aggregating variables related to uncertainty about fiscal policy and inflation, as well as a media indicator constructed from the number of articles pertaining to economic policy risks. Such construction is justified in light of the prior literature. Fiscal volatility shocks were shown by Fernández-Villaverde *et al.* (2011) to depress aggregate output, consumption and investment. Similarly, uncertainty about inflation tends to reduce the output growth rate (Elder, 2004) and discourage investment spending (Able, 1980). Finally, media stories seem to have a casual effect on financial markets (Engelberg and Parsons, 2011) and sometimes induce reactions similar to self-fulfilling prophecies (Wisniewski and Lambe, 2013). Aggregation of all these important factors into an index in order to capture the multitudinal aspects of policy peril seems therefore to be warranted. Our empirical model presented below relies upon this index.

3. Methodology

The first immediate concern when choosing the appropriate modeling framework is that one cannot be sure that the economic policy uncertainty is truly exogenous. Whilst it has a potential to influence the price of debt insurance, a string of major defaults could also potentially destabilize the political environment. Considering these circumstances, a Vector Autoregression (VAR) developed by Sims (1980) is an appropriate methodology to follow. This approach is less restrictive than the structural models and oftentimes produces superior forecasting ability. In our particular application, we estimate the following system of equations:

$$\mathbf{y}_t = \mathbf{c} + \sum_{i=1}^p \boldsymbol{\Phi}_i \mathbf{y}_{t-i} + \boldsymbol{\Psi} \mathbf{x}_{t-1} + \boldsymbol{\varepsilon}_t, \quad t = 1, 2, \dots, T \quad [1]$$

where \mathbf{c} is the vector of intercepts, \mathbf{y}_t is an 2×1 vector of endogenous variables including changes in economic policy uncertainty and changes in CDS spread index. The optimal number of lags p is determined here by using the Akaike Information Criterion (Akaike,

1973, 1974). \mathbf{x}_{t-1} is an 3×1 vector of predetermined control variables including stock market returns, differenced risk-free rate and implied volatility index. In some variations of our model we set $\Psi = \mathbf{0}$. $\boldsymbol{\varepsilon}_t$ is the vector of residuals, where $E(\boldsymbol{\varepsilon}_t) = 0$, $E(\boldsymbol{\varepsilon}_t \boldsymbol{\varepsilon}_t') = \boldsymbol{\Sigma}$ and $\boldsymbol{\Sigma} = \{\sigma_{ij}, i, j = 1, 2\}$. The variance-covariance matrix can be expressed using Cholesky decomposition as $\boldsymbol{\Sigma} = \mathbf{P}\mathbf{P}'$.

We first employ Granger causality analysis (Granger, 1969) which is based on the VAR framework and allows for the disentangling of the cause from the effect. To implement it, we estimate the VAR model given in [1] while restricting $\Psi = \mathbf{0}$. We say that variable $y_{i,t}$ Granger causes another series $y_{j,t}$ if the null hypothesis of $H_0: \boldsymbol{\Phi}_1(j,i) = 0, \dots, \boldsymbol{\Phi}_p(j,i) = 0$ is rejected. If the F -test used to test the null rejects it, variable $y_{i,t}$ will be considered endogenous.

Beyond the Granger-causality, there are several other techniques in the VAR toolbox, including impulse response functions and variance decomposition. The idea behind the former is to introduce an innovation equal to one standard deviation to a variable and track the accumulated response of the system until it reverts back to equilibrium. In pursuing this, we utilize the generalized impulse responses introduced by Pesaran and Shin (1998), which unlike its alternatives, are invariant to the ordering of variables. To describe this idea more formally, we note that in the case of stationary processes we can rewrite equation [1] as a moving average representation:

$$\mathbf{y}_t = \boldsymbol{\alpha} + \sum_{i=0}^{\infty} \mathbf{A}_i \boldsymbol{\varepsilon}_{t-i} + \sum_{i=0}^{\infty} \mathbf{G}_i \mathbf{x}_{t-i-1}, \quad t = 1, 2, \dots, T \quad [2]$$

where the values of $\boldsymbol{\alpha}$, \mathbf{A} and \mathbf{G} can be obtained through recursive substitution. After we introduce one standard deviation shock to the j -th VAR equation at time t , the generalized impulse-response of the system at time $t+n$ can be written as:

$$\mathbf{IR}_j(n) = \frac{1}{\sqrt{\sigma_{jj}}} \mathbf{A}_n \boldsymbol{\Sigma} \mathbf{e}_j, \quad n = 0, 1, 2, \dots \quad [3]$$

where \mathbf{e}_j is a 2×1 selection with unity as its j -th element and zero as the other element. We subsequently cumulate the impulse-responses over a n -month period to arrive at accumulated response.

Finally, we turn our attention to the variance decomposition within the VAR framework. According to Lütkepohl (1991) the forecast error variances in the endogenous variables can be attributed to innovations in themselves and the other variables in the system. The proportion θ_{ij} of the n -period-ahead forecast error variance of variable i that can be accounted for by the innovations in variable j can be computed as follows:

$$\theta_{ij}(n) = \sum_{k=0}^n (\mathbf{e}'_i \mathbf{A}_k \mathbf{P} \mathbf{e}_j)^2 / \sum_{k=0}^n (\mathbf{e}'_i \mathbf{A}_k \mathbf{P} \mathbf{e}_j)^2 \quad [4]$$

4. Data

An important time series we intend to utilize is the Economic Policy Uncertainty Index created by Baker *et al.* (2013). The first element of the US index relates to the number of articles in 10 large US newspapers mentioning simultaneously the phrases ‘uncertainty’ or ‘uncertain’, ‘economic’ or ‘economy’ and at least one of the following: ‘congress’, ‘deficit’, ‘federal reserve’, ‘legislation’, ‘regulation’ or ‘white house’. The raw count is scaled by the total number of articles in a given month and normalized. The second element captures uncertainty through the discounted value of scheduled federal tax code expirations over a 10-year horizon. Lastly, the index incorporates dispersion of CPI inflation predictions made by professional forecasters and their disagreement regarding purchases of goods and services by federal and state/local governments. Subsequently, each of the series is standardized by its standard deviation and aggregated into a general index.

The index for Europe is constructed in a similar manner, except it excludes the tax code expiration component. In order to construct the news-based measure, the focus is on the five largest EU economies, namely Germany, Spain, Italy, France and the UK. In each of the countries, two major broadsheets were selected for analysis under similar stipulations to that of the American sample. The forecaster disagreement relates here to the CPI inflation and government budget balance. Both the media and the totality of disagreement constituents are equally weighted in the index. More detailed descriptions of the economic policy uncertainty indices and their components are included in Table I. Figure I graphically depicts the constituent variables in the index, while summary statistics are contained in Table II.

[Table I about here]

[Figure I about here]

[Table II about here]

It is apparent from Table II that the Baker *et al.* (2013) aggregate series for Europe has a unit root and we therefore choose to model the first differenced variables. It is also clear that the economic policy uncertainty has intensified in the US over the considered timeframe, however, this may be unrelated to the disagreement about future inflation or the risk generated by possible revenue loss from tax code expirations. In Europe a similar tendency in policy uncertainty is observed with all of its components rising. Furthermore, what can be inferred from Figure I is that the series fluctuated significantly throughout the sample period, which may have been a reflection of the subprime mortgage and the European sovereign debt crises.

The main objective of our paper is to verify whether these political uncertainty measures are predictive of the movements in CDS spread indices. Following the existing literature, we decided to concentrate upon CDS premia on five-year bonds, as these have

been the most frequently traded (Blanco *et al.*, 2005, Alexander and Kaeck, 2008; Forte and Peña, 2009; Cao *et al.*, 2010; Annaert *et al.*, 2013; Chiaramonte and Casu, 2013; Aizenman *et al.*, 2013). More specifically, we have selected Markit CDX North America Investment Grade and Markit iTraxx Europe expressed as percentage yield to act as the endogenous variables in our models. Figure II juxtaposes the CDS spreads against the relevant economic policy uncertainty indices. The data expressed in levels shows a very high degree of co-variation for the variables on both sides of the Atlantic. However, we decided to apply first differencing both to the CDS spreads and political uncertainty indices to purge them of any trends.

[Figure II about here]

In order to control for the recognized determinants outlined in the Merton (1974)-type of structural models, we include a number of exogenous variables. Following Alexander and Kaeck (2008), we use the first difference in implied volatility – VIX for the US and VSTOXX for Europe. Furthermore, we constructed equally-weighted stock market indices that mirror the composition of both CDX and iTraxx. This composition changes on a six-monthly basis, which means that our stock market indices needed to be rebalanced with similar frequency. The continuously compounded stock index returns are included in our models to proxy for the variation in the firms' leverage. Lastly, we capture the changes in the interest rates by looking at the first difference of the three-month Euribor in Europe and the 3-month Treasury Bill rate in the US. Definitions of these variables, alongside their sources, are summarized in Table III. We employ monthly data over a period which ranges from October 2006 to March 2014 for the US and from February 2007 to March 2014 for Europe. Data availability dictated the sample selection.

[Table III about here]

Table IV provides the summary statistics for the remaining variables used in the study and paints a picture of the trends that were witnessed. Throughout the period considered, the CDS spreads rose by 0.33 basis points per month in the US and 0.61 basis points in Europe. The increase in the implied volatility indices by about 0.02 percentage points per month in both regions seems to confirm these tendencies in riskiness. This is entirely unsurprising, as the financial crisis period and its aftermath is encapsulated within our sample. Policy turmoil, as reflected in the positive means of $\Delta Political_US$ and $\Delta Political_Europe$, was a defining characteristic of this timeframe. The average stock returns were low by historical standards, with the European average falling within negative territory of -0.37% per month. At the same time, central banks attempted to alleviate recessionary pressures within their respective economies by cutting interest rates. This is reflected in the negative averages of ΔInt_Rate_US and ΔInt_Rate_Europe reported in Table IV.

[Table IV about here]

5. Results

[Table V about here]

[Table VI about here]

We start our analysis of covariation by examining the Pearson and Spearman rank-order correlations between the main variables in the study. When examining Table V it becomes apparent that there are common trends in the movement of CDS spreads between Europe and the US. Since some of the economic and political threats can transcend national borders, it comes as no surprise that the economic policy uncertainty is strongly correlated in these two regions. In the European context the price of default insurance tends to move closely alongside the riskiness of political decision-making. For the US, the respective correlation is positive as anticipated, however not significant. As will be demonstrated in the

Granger causality tests that follow, the US CDS market reacts to political developments with a delay rather than contemporaneously. This suggests that there may be an informational market inefficiency that could be exploited by the traders.

The upper section of Table VI reports our results of Granger causality testing for the US, while the lower part focuses on Europe. The optimal lag length is three months in the case of the US and two months for Europe. For the American market the causality appears to run one way, with changes in CDS spreads being the effect. With this in mind, the results are close to indicating a feedback loop. In Europe, however, the relationship is cleanly bi-directional with each variable being affected by the other. We also want to note at this stage, that due to data availability, the timeframe for each of the tests differs.

The fact that causality runs from the cost of insurance against financial distress to the political uncertainty in Europe, but not in US, warrants further reflection. One possible explanation could relate to the fact that the political arrangements differ markedly between the regions. The US operates a presidential system in which the president holds the executive power and is elected for a fixed period of four years. European countries function under parliamentary systems and the president or monarch hold largely a symbolic position. The executive power is in the hands of a prime ministerial figure who is elected by the legislature and whose length of tenure is less certain. In instances of political pressure, coalitions may disintegrate and new political governing constellations may be produced. Governments may also receive a vote of no confidence from the parliament, which in turn may result in early elections. In periods of severe financial turmoil, budgets of the governments are put under pressure and so are their coalition ties. As a result those governments could dissolve, which has been vividly illustrated in the case of Greece. During the period from 2007 until 2015 the country has had six prime ministers. In our judgment, the reverse causality in Europe can, at least in part, be attributable to the Europeans sovereign debt crisis and the relative fragility of

the parliamentary systems in a crisis scenario. It seems that investors recognize this fragility, since the FDI flows more abundantly to countries with presidential system (Wisniewski and Pathan, 2014).

We estimate two VAR systems for each geographical region. The first is a simple VAR including only the endogenous variables and their lags, whilst the second controls for other possible determinants of CDS spreads. These include changes in implied volatility, average equity returns of reference entities and first differenced risk-free rates. These exogenous variables are entered into each of the VAR equations with one lag, to remove the possibility of endogeneity arising from entering them concurrently, and because the models are designed to be predictive in nature. The optimal lag length for the models is selected using the Akaike information Criterion (Akaike, 1973, 1974) and more details regarding this selection can be found in the appendix to this paper. Following the estimation of each VAR, we compute the impulse responses, as described in the methodology section.

[Figure III about here]

[Figure IV about here]

Figures III and IV depict the magnitudes of the accumulated responses to shocks in each of the regions with their respective confidence intervals. Whenever the lower bound of the confidence interval is above zero, the positive response is considered to be statistically significant. Introducing an innovation to the change in policy uncertainty leads to a jump in the CDS spreads. For the VARs without exogenous controls, the accumulated impulse-response function for CDS spread peaks at 8.62 basis points in the US (t -stat=2.90, p -value=0.0049) and at 12.31 basis points in Europe (t -stat=3.82, p -value=0.0002). These reactions are somewhat attenuated in models with exogenous variables, but even then they remain statistically significant for at least a part of the period. The magnitude of the

abovementioned estimates seems to be large enough to generate some trading profits, even after transaction costs are taken into account. The bid-offer spread on iTraxx Europe remained typically below 1.5 basis points in the post-2008 period (Markit, 2014: 22) and the quoted bid-ask spread averaged across all combinations of series and tenor of the CDX NA IG index was estimated by Loon and Zhong (2014: Table 5) to be 1.61 basis points. Consequently, institutions and traders should make attempts to forecast periods of heightened political instability, as the increases in the cost of debt protection during such periods are non-trivial. Last but not least, accumulated response of differenced policy uncertainty to a shock in CDS spread changes demonstrates significance in Europe, but much less so in the US. This pattern seems to re-confirm the earlier results of the Granger causality tests.

Finally, we move to the variance decomposition analysis. It allows us to measure what is the proportion in the n -step ahead forecast error variance in a given variable that is accounted for by innovations in another variable in the VAR system. Their relative contributions are broken down in Table VII. The share of changing political uncertainty in the differenced CDS spread forecast error variance is substantial, accounting for almost 25 percent in the European context. The contribution of the change in default insurance premia to the decomposed variance of differenced political uncertainty is substantially smaller.

[Table VII about here]

While the fact that economic policy uncertainty affects CDS spreads has been established empirically, a further reflection on the mechanisms through which this relationship establishes itself in the data is needed. Firstly, fiscal and monetary policies could stimulate the economy through their impact on aggregate demand. Bowles *et al.* (1989) consequently note that expansionary policies narrow the spread between the yields offered by corporate and government bonds, which is symptomatic of reduced corporate default risk in a

booming economy. However, for the positive effect of these policies to be fully transmitted to the real economy, there has to be no insecurity about their implementation. This point is highlighted in the results of Abaidoo and Kwenin (2013) who report that fiscal policy uncertainty diminishes long-run corporate profit growth. Reduced profitability would, in turn, lead to higher costs of insurance against insolvency and this could explain our findings.

The second channel through which the relationship described in this paper could operate relates to the notion of systematic risk. Fiscal and monetary shocks were shown to be a common risk factor for stock prices both in the theoretical literature (Blanchard, 1981; Shah, 1984) and in numerous empirical studies (see for instance Darrat, 1990; Thorbecke, 1997; Sellin, 2001). It can therefore be argued that these shocks can be viewed as non-diversifiable sources of risk that affect the volatility of a firm's operations. In the structural models high volatility increases the probability of falling below the default boundary and therefore raises the CDS spread. Consequently, our recommendation is that the estimates of future σ in the Merton (1974)-type models take into account the current level of economic policy uncertainty.

6. Further Considerations

It is interesting to note that prior studies resorted to using different transformations of the CDS spread when employing it as a variable. Similarly to this paper, a number of authors applied first differencing to the spread series (Blanco *et al.*, 2005; Alexander and Kaeck, 2008; Greatrex, 2008; Ericsson *et al.*, 2009; Zhang *et al.*, 2009). However, others have examined the percentage growth (Byström, 2005) or the continuously compounded growth rate (Forte and Peña, 2009). As a robustness check we have estimated a set VAR models where both the CDS spread and the Economic Policy Uncertainty were expressed in terms of

simple growth rates. Furthermore, we considered a second set of VARs where these variables were transformed by taking a difference of the logged series. Regardless of the transformation applied and the country examined, we are able to observe that the CDS spreads respond positively and significantly when one standard deviation shock is introduced to the policy uncertainty. This corroborates our earlier conclusions.⁷

Interestingly, Baker *et al.* (2013) have also developed indices for some of the emerging economies. When evaluating this data we discovered that for Russia and China it is possible to find both the policy uncertainty index and the CDS spreads. Several words of caution need to be offered at this stage. First, even though the CDS indices are for 5-year horizons, they cover only sovereign bonds. This departs significantly from the analysis performed, in that our interest thus far has been on the corporate impact. Second, we are unable to construct exogenous variables, as these countries do not have established implied volatility indices and stock returns cannot be calculated for the reference entities. Despite these non-trivial reservations, we have decided to conduct an exploratory impulse response analysis and the results are reported in Figure V. The findings suggest that shocking the political environment induces increases in CDS premia in both China and Russia to the tune of 11 and 21 basis points, respectively. Introducing an innovation to the cost of debt protection, however, does not engender a strong reaction in the differenced economic policy uncertainty index.

[Figure V about here]

Since the aggregate economic policy uncertainty indices are available with monthly sampling frequency, we are effectively modeling long-term trends. While our VAR models can generate far-reaching predictions, their usefulness for high-frequency traders can be questioned. An interesting avenue for further research to explore would be to construct and

⁷ More detailed results can be obtained from the authors upon request.

model political variables measured at shorter time intervals. Such variables could be derived, for instance, from the number of tweets, Wikipedia views, or Google searches referring to relevant policy uncertainty keywords. Alternatively, one could gauge the frequency with which Facebook users ‘reshare’ political items. Measures constructed in such a way are likely to contain more noise, however, they may prove useful to short-term speculators.

Although our study concentrated on CDS indices, it may be argued that political risk is also meaningful for individual defaultable securities. One could, for instance, envision the application of Lando (1998) or Duffie and Singleton (1999)- type reduced-form models adopted for this particular purpose. Political uncertainty could be taken as a factor that is relevant to the default intensity and calibration of these models could be performed in order to generate predictions. In our judgment, pursuing this research path would be better for individual contingent claims subject to default risk and we would like to encourage fellow researchers to pursue this line of investigation.

7. Conclusions

Political uncertainty is crucial to economic interactions within the wider society, but has hitherto been a difficult concept to quantify. The introduction of the indices by Baker *et al.* (2013) offers an important step towards resolving this problem. In this study we endeavored to verify whether there is an association between the cost of credit protection and variation in these indices. To this end, we utilized a Vector Autoregression approach in order to model the dynamic interactions between the variables. Some interesting findings emerged, which illuminate our understanding of credit derivative pricing.

First, we discover that economic policy uncertainty Granger-causes CDS spread index in the US. The relationship between the cost of default insurance and political risk in Europe appears to have a bi-directional feedback. Second, we constructed two versions of the VAR

model – one with a range of theoretically-inspired exogenous variables and one without. In both cases the accumulated impulse-response functions revealed a positive and statistically significant reaction of spreads to shocks in uncertainty. Finally, the variance decomposition approach confirmed the presence of the abovementioned relationship.

Our paper sheds some light on the range of structural models of credit risk, instigated by Merton's (1974) contribution. While we do not provide evidence to invalidate this framework, we note that CDS spreads may be determined by a wider array of factors than postulated in the original models. Perceived default risk moves beyond the conventional company-specific measurements and may be embedded within a broader context in which firms operate. Uncertainty generated by incompetent policy-making creates hazards for companies and their clients, possibly through a range of channels. In the face of political risks, corporate investments and output may be reduced (Bittlingmayer, 1998; Julio and Yook, 2012), capital flight may occur (Alesina and Tabellini, 1989) and consumer confidence may be undermined (De Boef and Kellstedt, 2004). Even more importantly from the point of view of CDS market, a diminished long-term corporate profit growth may ensue (Abaidoo and Kwenin, 2013) combined with an elevated level of systematic risk (Blanchard, 1981; Shah, 1984). As a result, it is reasonable to surmise that this provides economic rationale for our observation that policy uncertainty can influence CDS spreads.

Our study has implications for financial institutions who regularly trade credit default swaps in the OTC market. Taking into account the variations in the political environment could aid in the more accurate timing of trades. At the same time, policy-makers should become more aware that their decisions and actions have tangible ramifications for corporations and financial markets. Lastly, fellow researchers ought to realize that ours is merely one of the first attempts to link political uncertainty to the cost of default insurance. More study is required in this field in order to explore all aspects of this nexus. Future

research could, for instance, look into the impact of specific political events or different aspects of the political environment. These issues, however, are beyond the scope of our current investigation.

References

- Abaidoo, R. and Kwenin, D. O. (2013) Corporate Profit Growth, Macroeconomic Expectations and Fiscal Policy Volatility, *International Journal of Economics and Finance*, 5 (8), pp. 25-38.
- Able, S.L. (1980) Inflation Uncertainty, Investment Spending, and Fiscal Policy, *Economic Review*, Federal Reserve Bank of Kansas City, February.
- Aizenman, J., Hutchison, M. and Jinjarak, Y. (2013) What is the Risk of European Sovereign Debt Defaults? Fiscal Space, CDS Spreads and Market Pricing of Risk, *Journal of International Money and Finance*, 34, pp. 37-59.
- Akaike, H. (1973) Information Theory and an Extension of the Maximum Likelihood Principle. In 2nd International Symposium on Information Theory, Petrov, B. N. and Csáki, F. (Eds.) Budapest: Akadémiai Kiadó, 267-281.
- Akaike, H. (1974) A New Look at the Statistical Model Identification, *IEEE Transactions on Automatic Control*, 19 (6), 716-723.
- Alesina, A. and Tabellini, G. (1989) External Debt, Capital Flight and Political Risk, *Journal of International Economics*, 27 (3-4), 199-220.
- Alexander, C. and Kaeck, A. (2008) Regime Dependent Determinants of Credit Default Swap Spreads, *Journal of Banking and Finance*, 32 (6), pp. 1008-1021.
- Antonakakis, N., Chatziantoniou, I. and Filis, G. (2013) Dynamic Co-Movements of Stock Market Returns, Implied Volatility and Policy Uncertainty, *Economics Letters*, 120 (1), pp. 87-92.
- Annaert, J., Ceuster, M., Van Roy, P. and Vespro, C. (2013) What Determines Euro Area Bank CDS Spreads? *Journal of International Money and Finance*, 32, pp. 444-461.
- Asiedu, E. and Lien, D. (2011) Democracy, Foreign Direct Investments and Natural Resources, *Journal of International Economics*, 84 (1), pp. 99-111.
- Baker, S.R., Bloom, N. And Davis, S. J. (2013) Measuring Economic Policy Uncertainty, available at: <http://www.policyuncertainty.com/media/BakerBloomDavis.pdf>, last accessed 16th October 2014.
- Berkman, H. and Jacobsen, B. (2006) War, Peace and Stock Markets, SSRN working paper, available on <http://ssrn.com/abstract=828645>, last accessed, 16th October 2014.
- Bialkowski, J., Gottschalk, K. and Wisniewski, T. P. (2007) Political Orientation of Government and Stock Market Returns, *Applied Financial Economics Letters*, 3 (4), pp. 269-273.
- Bialkowski, J., Gottschalk, K. and Wisniewski, T. P. (2008) Stock Market Volatility around National Elections, *Journal of Banking and Finance*, 32 (9), pp. 1941-1953.

- Bittlingmayer, G. (1998) Output, Stock Volatility, and Political Uncertainty in a Natural Experiment: Germany, 1880-1940, *Journal of Finance*, 53 (6), 2243-2257.
- Black, F. and Scholes, M. (1973). The Pricing of Options and Corporate Liabilities, *Journal of Political Economy*, 81 (3), pp. 637-654.
- Blanchard, O. J. (1981) Output, the Stock Market, and Interest Rates, *American Economic Review*, 71 (1), pp. 132-143.
- Blanco, R., Brennan, S. and Marsh, I. W. (2005) An Empirical Analysis of the Dynamic Relationship between Investment-Grade Bonds and Credit Default Swaps, *Journal of Finance*, 60 (5), pp. 2255-2281.
- Bohl, M. T. and Gottschalk, K. (2006) International Evidence on the Democrat Premium and the Presidential Cycle Effect, *North American Journal of Economics and Finance*, 17 (2), pp. 107-120.
- Bongaerts, D., De Jong, F. and Driesses, J. (2011) Derivative Pricing with Liquidity Risk: Theory and Evidence from the Credit Default Swap Market, *Journal of Finance*, 66 (1), pp. 203-240.
- Booth, J. R. and Booth, L. C. (2003) Is Presidential Cycle in Security Returns Merely a Reflection of Business Conditions?, *Review of Financial Economics*, 12 (2), pp. 131-59.
- Bowles, D., Ulbrich, H. and Wallace, M. (1989) Default Risk, Interest Differentials and Fiscal Policy: A New Look at Crowding Out, *Eastern Economic Journal*, 15 (3), pp. 203-212.
- Byström, H. (2005) Credit Default Swaps and Equity Prices: The iTraxx CDS Index Market, *Working Papers, Department of Economics, Lund University* (24).
- Cahan, J., Malone, C. B., Powell, J. G. and Choti, U. W. (2005) Stock Market Political Cycles in a Small, Two-Party Democracy, *Applied Economics Letters*, 12 (12), pp. 735-40.
- Cao, C., Yu, F. and Zhong Z. (2010) The Information Content of Option-Implied Volatility for Credit Default Swap Valuation, *Journal of Financial Markets*, 13 (3), pp. 321-343.
- Chiaromonte, L. and Casu, B. (2013) The Determinants of Bank CDS Spreads: Evidence from the Financial Crisis, *European Journal of Finance*, 19 (9), pp. 861-887.
- Choi, S. W. and Samy, Y. (2008) Reexamining the Effects of Democratic Institutions on Inflows of Foreign Direct Investment in Developing Countries, *Foreign Policy Analysis*, 4 (1), pp. 83-103.
- Darrat, A. F. (1990) Stock Returns, Money and Fiscal Deficits, *Journal of Financial and Quantitative Analysis*, 25 (3), pp. 387-398.
- Das, S. R., Hanouna, P. and Sarin, A. (2009) Accounting-Based versus Market-Based Cross-Sectional Models of CDS Spreads, *Journal of Banking and Finance*, 33 (4), 719-732.

- De Boef, S. and Kellstedt, P. M. (2004) The Political (and Economic) Origins of Consumer Confidence, *American Journal of Political Science*, 48 (4), 633-649.
- Diamonte, R. L., Liew, J. M. and Stevens, R. L. (1996) Political Risk in Emerging and Developed Markets, *Financial Analysts Journal*, 52 (3), May-June, pp. 71-76.
- Döpke, J. and Pierdzioch, C. (2006) Politics and the Stock Market, *European Journal of Political Economy*, 22 (4), pp. 925-943.
- Duffie, D. and Singleton, K. (1999) Modelling Term Structures of Defaultable Bonds, *Review of Financial Studies*, 12 (4), pp. 687-720.
- Ericsson, J., Jacobs, K. and Oviedo, R. (2009) The Determinants of Credit Default Swap Premia, *Journal of Financial and Quantitative Analysis*, 44 (1), pp. 109-132.
- Elder, J. (2004) Another Perspective on the Effects of Inflation Uncertainty, *Journal of Money Credit and Banking*, 36 (5), pp. 911-928.
- Engelberg, J. E. and Parsons, C. A. (2011) The Casual Impact of Media in Financial Markets, *Journal of Finance*, 66 (1), pp. 67-97.
- Fabozzi, F. J., Cheng, X. and Chen, R. R. (2007) Exploring the Components of Credit Risk in Credit Default Swaps, *Finance Research Letters*, 4 (1), pp. 10-18.
- Fernández-Villaverde, J., Guerrón-Quintana, P. A., Kuester, K. and Rubio-Ramírez, J. (2011) Fiscal Volatility Shock and Economic Activity, *NBER Working Paper Series*, Working Paper 17317.
- Forte, S. and Peña, J. I. (2009) Credit Spreads: An Empirical analysis on the Informational Content of Stocks, Bonds, and CDS, *Journal of Banking and Finance*, 33 (11), pp. 2013-225.
- Frey, B. S. and Kucher, M. (2000) History as Reflected in Capital Markets: The Case of World War II, *Journal of Economic History*, 60 (2), pp. 468-496.
- Gao, P. And Qi, Y. (2013) Political Uncertainty and Public Financing Costs: Evidence from U.S. Gubernatorial Elections and Municipal Bond Markets, *Working Paper*, available at: http://www.usc.edu/schools/business/FBE/seminars/papers/F_3-29-13_GAO-Election.pdf, last accessed 23rd Jan 2015.
- Granger, C.W.J. (1969) Investigating Casual Relations by Econometric Models and Cross Spectral Methods, *Econometrica*, 37 (3), 424-438.
- Greatrex, C. A. (2008) The Credit Default Swap Market's Determinants, *Discussion Paper Series, Department of Economics, Fordham University*, Discussion Paper No: 2008-05.
- Gulen, H. and Ion, M. (2015) Policy Uncertainty and Corporate Investment, *SSRN Working Paper*, available at: <http://ssrn.com/abstract=2188090>, last accessed 20th April 2015.
- Harms, P. and Ursprung, H. W. (2002) Do Civil and Political Repression Really Boost Foreign Direct Investments? *Economic Inquiry*, 40 (4), pp. 651-663.

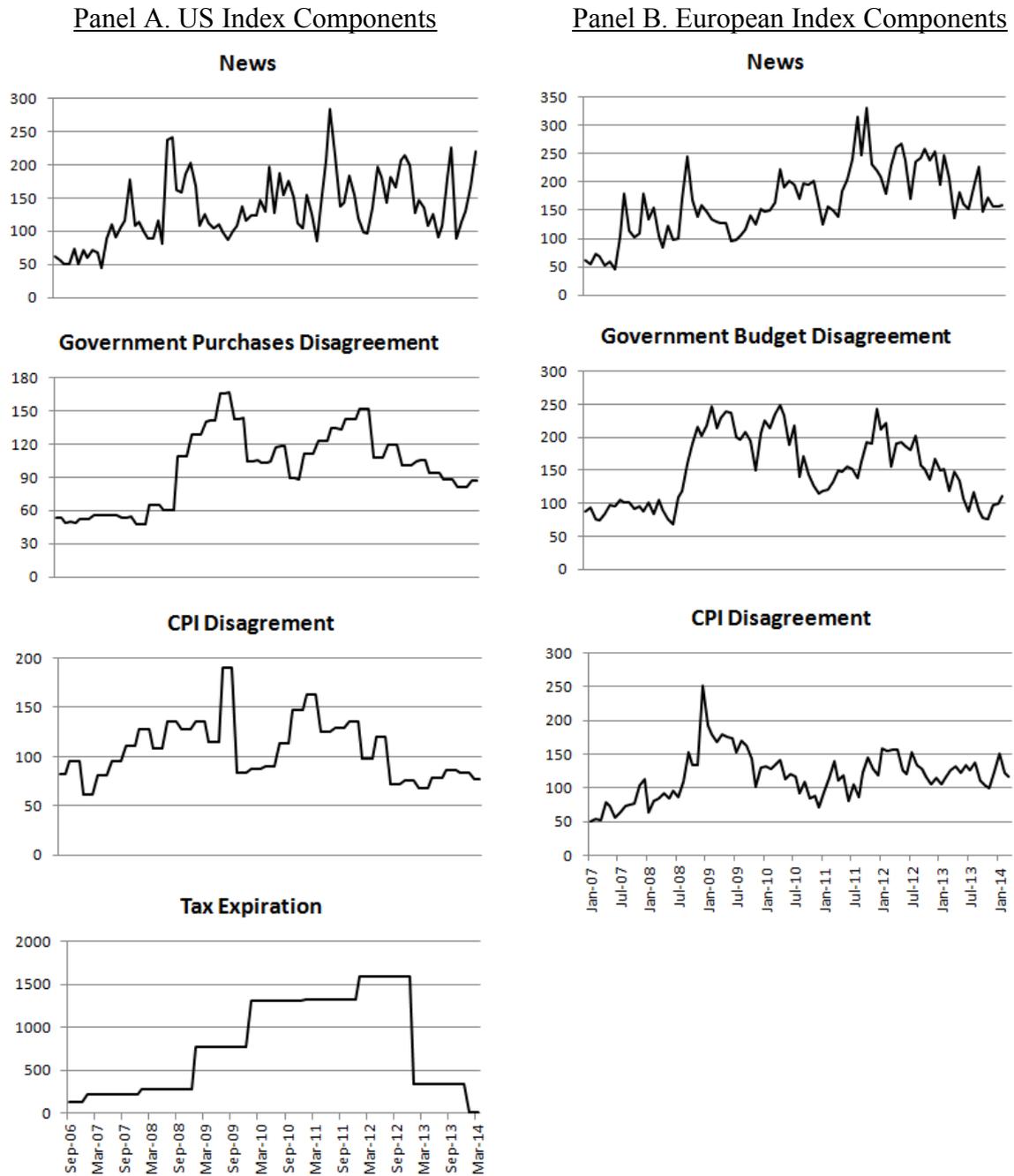
- Hensel, C. R. and Ziemba, W. T. (1995) United States Investment Returns during Democratic and Republican Administrations, 1928–1993’, *Financial Analysts Journal*, 51 (2), March–April, pp. 61–9.
- Herbst, A. F. and Slinkman, C. W. (1984) Political–Economic Cycles in the US Stock Market, *Financial Analysts Journal*, 40 (2), March–April, pp. 38–44.
- Hibbs, D. A. (1977) Political Parties and Macroeconomic Policy, *American Political Science Review*, 71 (4), pp. 1467-1487.
- Jarrow, R. A., Landau, D. and Turnbull, S. (1997) A Markov Model for the Term Structure of Credit Spreads, *Review of Financial Studies*, 10 (2), pp. 481-523.
- Jarrow, R. A. and Turnbull, S. (1995) Pricing Derivatives on Financial Securities Subject to Credit Risk, *Journal of Finance*, 50 (1), pp. 53-86.
- Jensen, N. M. (2003) Democratic Governance and Multinational Corporations: Political Regimes and Inflows of Foreign Direct Investment, *International Organization*, 57 (3), pp. 587-616.
- Julio, B. and Yook, Y. (2012) Political Uncertainty and Corporate Investment Cycles, *Journal of Finance*, 67 (1), 45-83.
- Karnizova, L. and Li, J. C. (2014) Economic Policy Uncertainty, Financial Markets and Probability of US Recessions, *Economics Letters*, 125 (2), pp. 261-265.
- Kelly, B., Pástor, L. And Veronesi, P. (2014) The Price of Political Uncertainty: Theory and Evidence from the Option Market, *SSRN Working Paper*, available at: <http://ssrn.com/abstract=2356588>, last accessed 16th October 2014.
- Lando, D. (1998) On Cox Processes and Credit Risky Securities, *Review of Derivatives Research*, 2 (2-3), pp. 99-120.
- Leduc, S. and Liu, Z. (2014) Uncertainty Shocks are Aggregate Demand Shocks, *Federal Reserve Bank of San Francisco Working Paper*, Working Paper 2012-10.
- Li, Q. and Resnick, A. (2003) Reversals of Fortunes: Democratic Institutions and Foreign Direct Investment Inflows to Developing Countries, *International Organization*, 57 (1), pp. 175-211.
- Longstaff, F.A. and Schwartz, E. (1995) A Simple Approach to Valuing Risky Fixed and Floating Rate Debt, *Journal of Finance*, 50 (3), pp.789-821.
- Loon, Y. C. And Zhong, Z. (2014) Does Dodd-Frank Affect OTC Transaction Costs and Liquidity? Evidence from Real-Time CDS Trade Reports, *SSRN Working Paper*, available at: <http://ssrn.com/abstract=2443654>, last accessed 23rd April 2015.
- Lütkepohl, H. (1991) Introduction to Multiple Time Series Analysis, Springer-Verlag, Berlin, Germany.

- Markit (2014) The CDS Market – An International Perspective, available at: http://www.jscc.co.jp/en/data/en/2014/06/cds_seminar_20140603_program1.pdf, last accessed 23rd April 2015.
- Merton, R. C. (1974) On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *Journal of Finance*, 29 (2), pp. 449-470.
- Nordhaus, W. D. (1975) The Political Business Cycle, *Review of Economic Studies*, 42 (2), pp. 169–90.
- Oneal, J. R., (1994) The Affinity of Foreign Investors for Authoritarian Regimes, *Political Research Quarterly*, 47 (3), pp. 565-588.
- Pan, J. and Singleton, K. J. (2008) Default and Recovery Implicit in the Term Structure of Sovereign CDS Spreads, *Journal of Finance*, Vol. 63 (5), pp. 2345-2384.
- Pástor, L. and Veronesi, P. (2012) Uncertainty about Government Policy and Stock Prices, *Journal of Finance*, 67 (4), pp. 1219-1264.
- Pástor, L. and Veronesi, P. (2013) Political Uncertainty and Risk Premia, *Journal of Financial Economics*, 110 (3), pp. 520-545.
- Pesaran, H.H. and Shin, Y. (1998) Generalized Impulse Response Analysis in Linear Multivariate Models, *Economics Letters*, 58 (1), 17-29.
- Santa-Clara, P. and Valkanov, R. (2003) The Presidential Puzzle: Political Cycles and the Stock Market, *Journal of Finance*, 58 (5), pp. 1841-1872.
- Sellin, P. (2001) Monetary Policy and the Stock Market: Theory and Empirical Evidence, *Journal of Economic Surveys*, 15 (4), pp. 491-541.
- Shah, A. (1984) Crowding Out, Capital Accumulation, the Stock Market, and Money-Financed Fiscal Policy, *Journal of Money Credit and Banking*, 16 (4), pp. 461-473.
- Sims, C.A. (1980) Macroeconomics and Reality, *Econometrica*, 48 (1), 1-46.
- Stulz, R. M. (2010) Credit Default Swaps and the Credit Crisis, *Journal of Economic Perspectives*, 24 (1), pp. 73-92.
- Tang, D. Y. and Yan, H. (2010) Market Conditions, Default Risk and Credit Spreads, *Journal of Banking and Finance*, 34 (4), pp. 743-753.
- Tang, D. Y. and Yan, H. (2013) What Moves CDS Spreads?, *Working Paper*, available at: www.sef.hku.hk/~yjtang/TangYan-CDSMove_21Jun2013.pdf, last accessed 16th October 2014.
- Thorbecke, W. (1997) On Stock Market Returns and Monetary Policy, *Journal of Finance*, 52 (2), pp. 635-654.
- Wisniewski, T. P. and Moro, A. (2014) When EU Leaders Speak, the Markets Listen, *European Accounting Review*, 23 (4), pp. 519-551.

- Wisniewski, T. P. And Pathan, S. K. (2014) Political Environment and Foreign Direct Investment: Evidence from OECD Countries, *European Journal of Political Economy*, 36, pp. 13-23.
- Wisniewski, T.P. and Lambe, B. (2013) The Role of Media in the Credit Crunch: The Case of the Banking Sector, *Journal of Economic Behavior and Organization*, 85 (1), pp. 163-175.
- Zhang, B. Y., Zhou, H. and Zhu, H. (2009) Explaining Credit Default Swap Spreads with Equity Volatility and Jump Risks of Individual Firms, *Review of Financial Studies*, 22 (12), 5099-5131.

Figure I

Components of the Economic Policy Uncertainty Indices

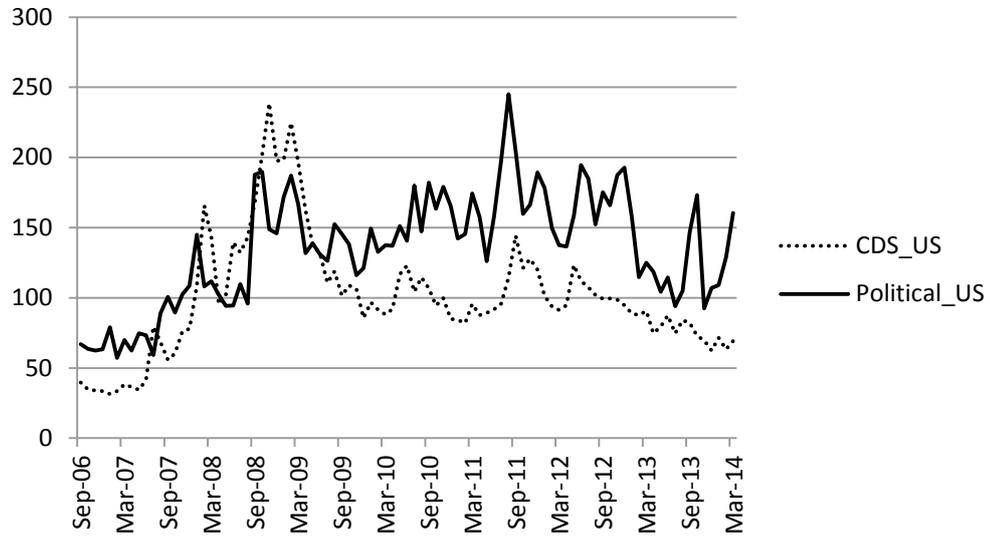


Note: This figure depicts the components of the US and European Economic Policy Uncertainty indices constructed by Baker *et al.* (2013).

Figure II

Plots of the Key Variables

Panel A. United States Data



Panel B. European Data

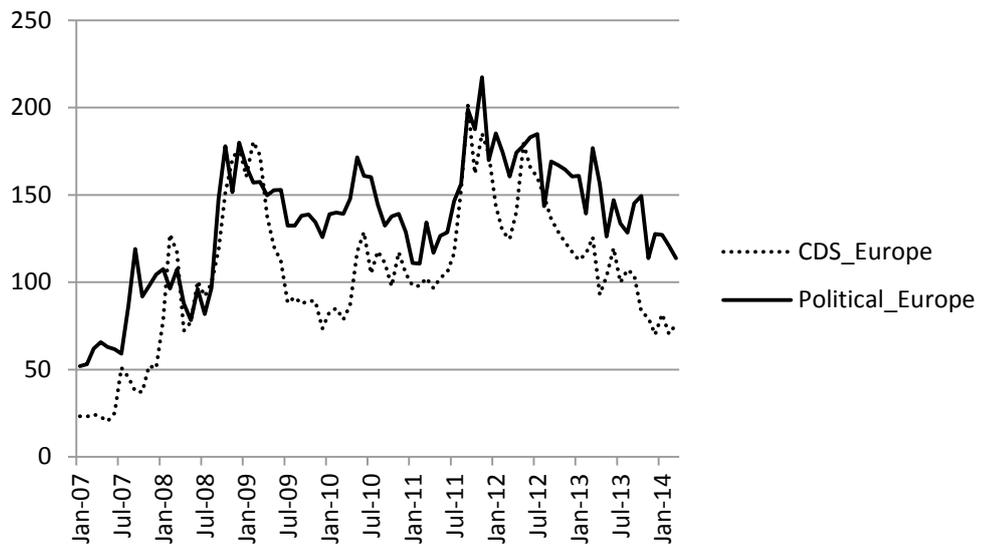
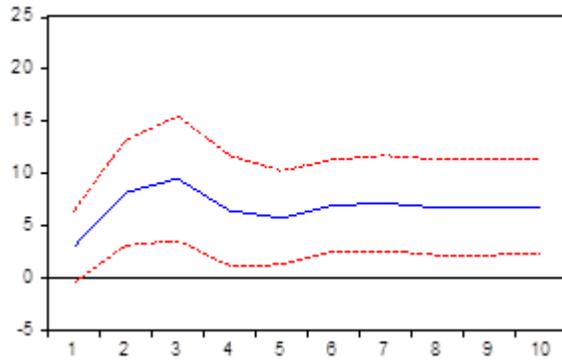


Figure III

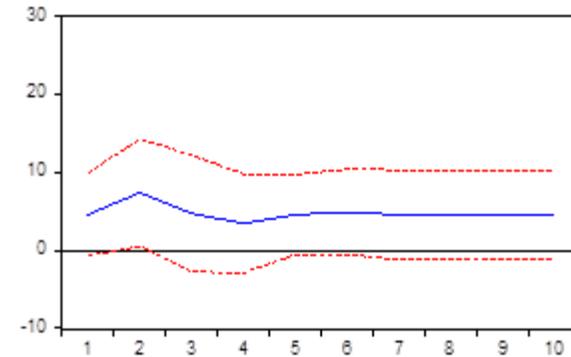
Accumulated Response to Generalized One Standard Deviation Innovations ± 2 Standard Errors for the US Market

Panel A. VAR Model without Exogenous Variables

Accumulated Response of ΔCDS_{US} to $\Delta Political_{US}$

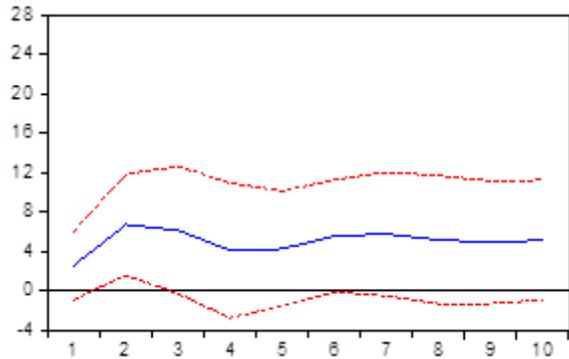


Accumulated Response of $\Delta Political_{US}$ to ΔCDS_{US}

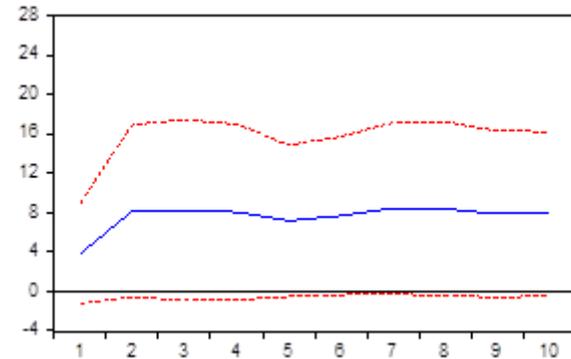


Panel B. VAR Model with Exogenous Variables

Accumulated Response of ΔCDS_{US} to $\Delta Political_{US}$



Accumulated Response of $\Delta Political_{US}$ to ΔCDS_{US}



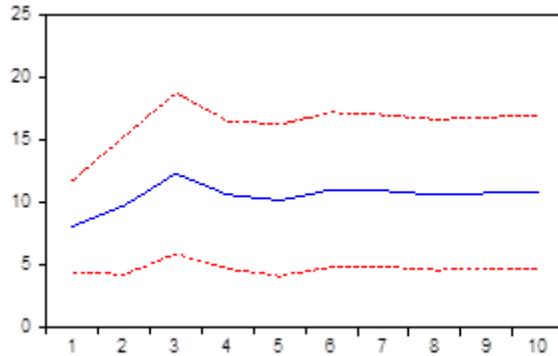
Note: The figures plot accumulated impulse-response functions to generalized one standard deviation innovations. Both models in Panel A and B are based on a VAR with three lags. The dotted lines represent ± 2 standard errors distances from the impulse functions.

Figure IV

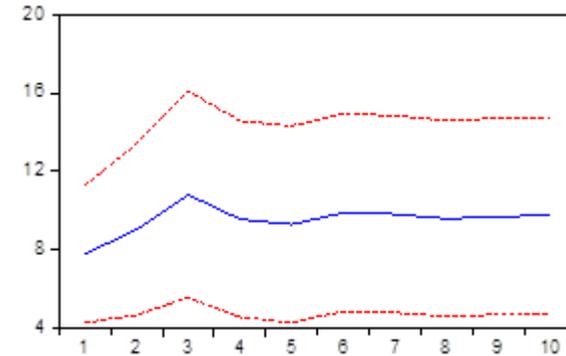
Accumulated Response to Generalized One Standard Deviation Innovations ± 2 Standard Errors for the European Market

Panel A. VAR Model without Exogenous Variables

Accumulated Response of ΔCDS_Europe to $\Delta Political_Europe$

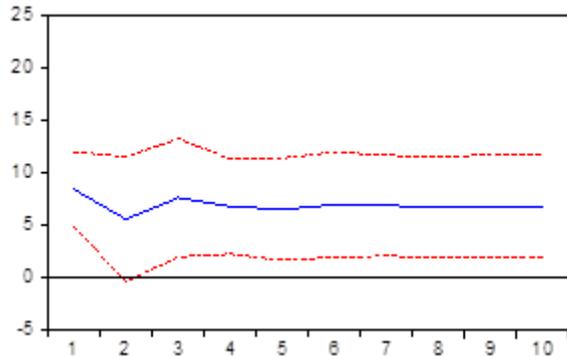


Accumulated Response of $\Delta Political_Europe$ to ΔCDS_Europe

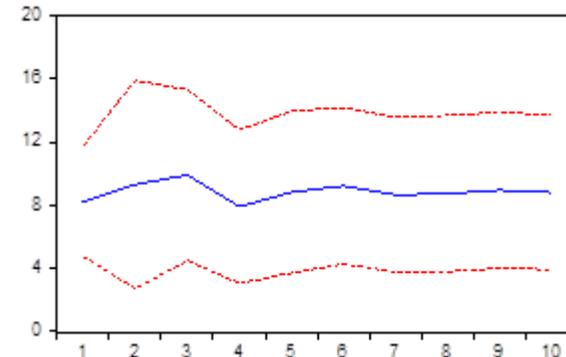


Panel B. VAR Model with Exogenous Variables

Accumulated Response of ΔCDS_Europe to $\Delta Political_Europe$



Accumulated Response of $\Delta Political_Europe$ to ΔCDS_Europe



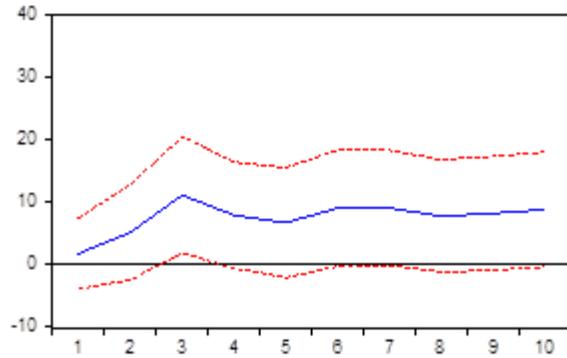
Note: The figures plot accumulated impulse-response functions to generalized one standard deviation innovations. Both models in Panel A and B are based on a VAR with two lags. The dotted lines represent ± 2 standard errors distances from the impulse functions.

Figure V

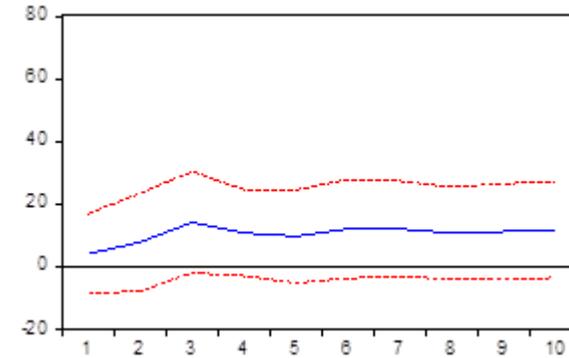
Accumulated Response to Generalized One Standard Deviation Innovations ± 2 Standard Errors for the Chinese and Russian Market

Panel A. VAR Model Based on Chinese Data

Accumulated Response of ΔCDS_China to $\Delta Political_China$

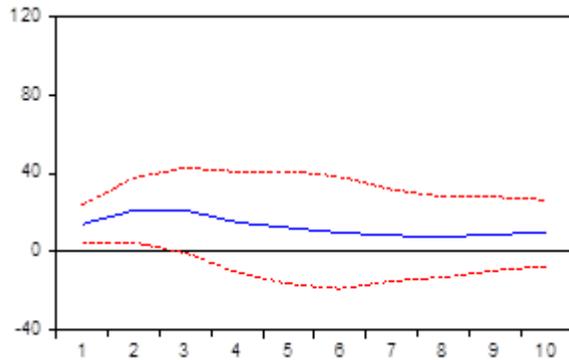


Accumulated Response of $\Delta Political_China$ to ΔCDS_China

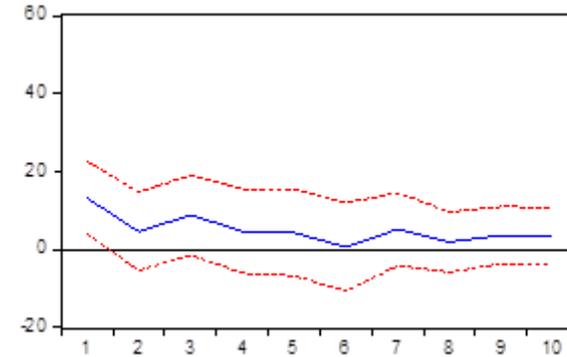


Panel B. VAR Model Based on Russian Data

Accumulated Response of ΔCDS_Russia to $\Delta Political_Russia$



Accumulated Response of $\Delta Political_Russia$ to ΔCDS_Russia



Note: The figures plot accumulated impulse-response functions to generalized one standard deviation innovations. The VAR in Panel A and Panel B has two and five lags, respectively. No exogenous variables are included in the models. The dotted lines represent ± 2 standard errors distances from the impulse functions.

Table I**Definitions of the Economic Policy Uncertainty Indices and their Components**

Variable	Definition
<i>Panel A. US Index and its Constituents</i>	
<i>Political_US</i>	Baker <i>et al.</i> (2013) US Economic Policy Uncertainty Index. The index aggregates newspaper coverage of policy uncertainty, number of federal tax code provisions about to expire and forecasters' disagreement regarding CPI and purchases by federal, state and local governments. Each component was normalized by its standard deviation before the aggregation. A weight of 1/2 was given to the news-based variable and a weight of 1/6 was assigned to the remaining components.
<i>News_US</i>	The news component of the EPU index is a count of articles which include references to economic policy uncertainty across ten large US broadsheets divided by the total number of articles published.
<i>Gov_Purchases_Disagreement_US</i>	Disagreement about forecasted levels of federal, state and local government purchases between the participants of the Federal Reserve Bank of Philadelphia's Survey of Professional Forecasters (SPF). The ratio of the interquartile range of a year-ahead forecast for federal government purchases by the median forecast is multiplied by a 5-year retrospective federal purchases to GDP ratio. A similar calculation is repeated for state and local government purchases and the three measures are subsequently summed.
<i>CPI_Diagreement_US</i>	The interquartile range of one-year ahead CPI inflation forecasts made by participants of the SPF survey.
<i>Tax_Expiration_US</i>	This variable measures a source of fiscal revenue uncertainty related to the fact that the US congress usually makes last-minute decisions on tax code renewals. It is constructed as a discounted value of expiring tax provisions over the following 10 years.
<i>Panel B. European Index and its Constituents</i>	
<i>Political_Europe</i>	Baker <i>et al.</i> (2013) Economic Policy Uncertainty Index for Europe. A weight of 50% in the index is assigned to a count of newspaper articles relating to economic uncertainty in the five largest European economies. The remaining 50% is attributed to forecaster disagreement regarding CPI inflation and the each governments' budget. Components were scaled by their own standard deviations before being aggregated.

News_Europe

This variable draws on articles published in two major broadsheets in each of Europe's five largest economies, namely Germany, Spain, Italy, France and the UK. For each newspaper, the number of articles which contain terms relating to economic uncertainty was normalised by the total number of current articles. Each newspaper time series was subsequently scaled by its own standard deviation and the series were aggregated into one indicator. Article word searches were conducted in the language of each publication.

Gov_Budget_Disagreement

The measure of the interquartile range of individual forecasts on government budget balances contained in Consensus Economics (CE) scaled by each country's GDP.

CPI_Disagreement_Europe

This component gauges the interquartile range of Consumer Price Index forecasts collected on a monthly basis for each country.

Table II

Summary Statistics for the Economic Policy Uncertainty Indices and Their Components

Variable	Mean	Standard Deviation	25 th Percentile	Median	75 th Percentile	ADF Test
<i>Political_US</i>	134.9711	40.0885	106.0495	138.1306	164.4163	-3.7188**
Δ <i>Political_US</i>	1.0371	25.4153	-13.8706	0.5616	15.5450	-5.3705***
$\Delta \ln(\textit{Political_US})$	0.9689%	18.6054%	-11.0882%	0.7209%	14.5759%	-5.1691***
<i>Growth_rate(Political_US)</i>	2.7317%	19.7214%	-10.4955%	0.7244%	15.6923%	-7.4390***
Δ <i>News_US</i>	1.7496	41.7228	-20.5511	0.9517	23.9135	-5.1854***
Δ <i>Gov_Purchases_Disagreement_US</i>	0.3696	10.9010	-0.0532	0.1007	0.6362	-9.4538***
Δ <i>CPI_Disagreement_US</i>	-0.0607	18.1737	0.0000	0.0000	0.0000	-8.7489***
Δ <i>Tax_Expiration_US</i>	-1.2396	160.3610	0.0000	0.0000	0.0000	-9.5705***
<i>Political_Europe</i>	134.6942	35.7377	113.7324	138.9507	160.3780	2.2370
Δ <i>Political_Europe</i>	0.7169	17.8676	-10.5658	0.2987	10.1139	-11.9715***
$\Delta \ln(\textit{Political_Europe})$	0.9089%	13.4943%	-6.5277%	0.1908%	8.1206%	-4.9331***
<i>Growth_rate(Political_Europe)</i>	1.8444%	14.2630%	-6.3192%	0.1910%	8.4594%	-4.8590***
Δ <i>News_Europe</i>	1.1352	38.9681	-21.3416	-0.8076	25.1453	-12.0145***
Δ <i>Gov_Budget_Disagreement</i>	0.2715	24.2127	-13.0526	0.0079	15.4854	-4.1261***
Δ <i>CPI_Disagreement_Europe</i>	0.7663	23.3902	-11.1250	0.3976	10.8801	-8.8924***

Note: The statistics for the US variables have been computed over the Oct 2006 – March 2014 period, while the sample for the European variables runs from Feb 2007 – March 2014. Variables expressed in levels start one month earlier. *Political_US* and *Political_Europe* are the Economic Policy Uncertainty indices compiled by Baker *et al.* (2013). Summary statistics are provided for these indices expressed in levels, first differences, percentage growth rates and continuously compounded growth rates. Δ *News_US*, Δ *Gov_Purchases_Disagreement_US*, Δ *CPI_Disagreement_US* and Δ *Tax_Expiration_US* are the first differenced components of the *Political_US* index, while Δ *News_Europe*, Δ *Gov_Budget_Disagreement* and Δ *CPI_Disagreement_Europe* are the constituents of *Political_Europe*. The ADF stands for Augmented Dickey-Fuller test with a constant and a time trend where the optimal lag length has been chosen using the Akaike Information Criterion. ***, ** denote rejection of the null hypothesis of a unit root at 1% and 5% significance level, respectively.

Table III**Definitions of the Remaining Variables**

Variable	Definition	Source
ΔCDS_{US}	First difference in the Markit CDX North America Investment Grade 5-year index expressed in basis points.	Bloomberg
$\Delta Vola_{US}$	First difference in the CBOE Volatility Index VIX expressed in percentage points.	Thomson Reuters Datastream
$Stock_Ret_{US}$	Continuously compounded return on an equally-weighted stock market index constructed from CDX North America constituents. The index was rebalanced every six months to reflect the CDX roll timeline.	Constituent lists from Bloomberg, stock prices from Thomson Reuters Datastream
ΔInt_Rate_{US}	Change in the US 3-Month Treasury Bill Rate.	Board of Governors of the Federal Reserve System
ΔCDS_{Europe}	First difference in the Markit iTraxx Europe 5-year index expressed in basis points.	Bloomberg
$\Delta Vola_{Europe}$	First difference in the VSTOXX implied volatility index expressed in percentage points.	Thomson Reuters Datastream
$Stock_Ret_{Europe}$	Continuously compounded return on an equally-weighted stock market index constructed from iTraxx Europe constituents. This index was rebalanced six-monthly to account for the changing composition of iTraxx.	Constituent lists from Bloomberg, stock prices from Thomson Reuters Datastream
ΔInt_Rate_{Europe}	Change in the 3-Month Euribor Rate	European Central Bank – Statistical Data Warehouse

Table IV**Summary Statistics for the Remaining Variables Used in the Study**

Variable	Mean	Standard Deviation	25 th Percentile	Median	75 th Percentile	ADF Test
<i>ΔCDS_US</i>	0.3270	17.2366	-7.7800	-1.0150	7.0538	-8.1974***
<i>ΔVola_US</i>	0.0211	5.3428	-2.7900	-0.4050	2.4375	-8.1241***
<i>Stock_Ret_US</i>	0.1281%	6.0253%	-2.6303%	1.1490%	3.3661%	-4.1657***
<i>ΔInt_Rate_US</i>	-0.0529%	0.1895%	-0.0375%	0.0000%	0.0100%	-3.7580**
<i>ΔCDS_Europe</i>	0.6104	17.8770	-9.2763	-0.9325	10.1563	-7.3454***
<i>ΔVola_Europe</i>	0.0202	5.4861	-2.7900	-1.1100	2.5050	-7.6357***
<i>Stock_Ret_Europe</i>	-0.3656%	5.0197%	-3.1698%	0.0155%	2.7335%	-3.8840**
<i>ΔInt_Rate_Europe</i>	-0.0401%	0.2040%	-0.0575%	-0.0033%	0.0611%	-3.8628**

Note: Exact definitions of the variables are given in Table I. The statistics for the US variables have been computed over the Oct 2006 – March 2014 period, while the sample for the European variables runs from Feb 2007 – March 2014. The ADF stands for Augmented Dickey-Fuller test with a constant and a time trend where the optimal lag length has been chosen using the Akaike Information Criterion. ***, ** denote rejection of the null hypothesis of a unit root at 1% and 5% significance level, respectively.

Table V**Pearson and Spearman Rank-Order Correlations between the Key Variables**

	$\Delta Political_US$	$\Delta Political_Europe$	ΔCDS_US	ΔCDS_Europe
$\Delta Political_US$	1.0000	0.4330 ^{***}	0.1063	0.1130
$\Delta Political_Europe$	0.4085 ^{***}	1.0000	0.1891 [*]	0.3603 ^{***}
ΔCDS_US	0.1347	0.2118 [*]	1.0000	0.8593 ^{***}
ΔCDS_Europe	0.0875	0.3445 ^{***}	0.8837 ^{***}	1.0000

Note: This table presents Pearson correlation coefficients (above diagonal) and Spearman rank-order correlation coefficients (below diagonal). Exact definitions of the variables are given in Table I. ^{***}, ^{**}, ^{*} denote statistical significance at 1%, 5% and 10%, respectively.

Table VI**Granger Causality Tests**

	<i>ΔPolitical_US does not Granger cause ΔCDS_US</i>	<i>ΔCDS_US does not Granger cause ΔPolitical_US</i>
<i>F</i> -statistic	3.2959	1.8930
<i>p</i> -value	0.0246	0.1374
	<i>ΔPolitical_Europe does not Granger cause ΔCDS_Europe</i>	<i>ΔCDS_Europe does not Granger cause ΔPolitical_Europe</i>
<i>F</i> -statistic	2.9297	4.0220
<i>p</i> -value	0.0592	0.0217

Note: For definitions of the variables please refer to Table I. Akaike information criterion has been chosen for the optimal lag selection, resulting in three lags in the US model and two lags in the European one. The test statistics for the US have been computed over the Oct 2006 – March 2014 period, while the sample used in the case of Europe was Feb 2007 – March 2014.

Table VII
Variance Decomposition

Panel A. Model for the US						
Period	Variance decomposition of ΔCDS_{US}			Variance decomposition of $\Delta Political_{US}$		
	Standard Error	$\Delta Political_{US}$	ΔCDS_{US}	Standard Error	$\Delta Political_{US}$	ΔCDS_{US}
3	16.9332	8.3975	91.6025	26.2824	95.6454	4.3546
5	17.4932	9.2474	90.7526	27.2967	95.4568	4.5432
10	17.6324	9.8111	90.1889	27.6141	95.3122	4.6878

Panel B. Model for Europe						
Period	Variance decomposition of ΔCDS_{Europe}			Variance decomposition of $\Delta Political_{Europe}$		
	Standard Error	$\Delta Political_{Europe}$	ΔCDS_{Europe}	Standard Error	$\Delta Political_{Europe}$	ΔCDS_{Europe}
3	18.2345	24.9531	75.0469	18.3745	94.4226	5.5774
5	18.3825	24.7766	75.2234	18.6608	91.8494	8.1506
10	18.4280	24.7189	75.2811	18.7000	91.5373	8.4627

Note: Variable definitions can be found in Table I. The US VAR model is based on three lags, while the European equivalent relies on two lags.

Appendix

VAR Lag Order Selection Criteria - Akaike Information Criterion

Lag	US VAR		European VAR	
	Model without Exogenous Variables	Model with Exogenous Variables	Model without Exogenous Variables	Model with Exogenous Variables
0	18.00431	18.04053	17.16908	17.22571
1	17.99709	18.03319	17.11726	17.04490
2	17.87540	17.98013	16.99720*	16.99813*
3	17.82026*	17.90994*	17.05881	17.03532
4	17.87942	17.95811	17.11322	17.05443
5	17.87819	17.95403	17.11633	17.06867
6	17.94861	18.02322	17.11137	17.05105
7	17.93289	17.99926	17.06525	16.99869
8	17.96270	18.02549	17.13032	17.04172
9	18.02872	18.08242	17.20289	17.12328
10	18.07568	18.13918	17.24846	17.19026

This table presents the Akaike Information Criterion for the VAR models presented in the Results section of our paper. * denotes the optimal lag length.