Political Uncertainty, Credit Risk Premium and Default Risk

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Abstract

I empirically decompose sovereign credit spreads into a default-risk component and its associated (credit) risk premium and study the effect of political uncertainty on them. On average, credit risk premia account for 42 percent of the observed spreads in the European sovereign credit market. I find that a 10 percent increase in political uncertainty leads to a 3 percent increase in both components after a month. A regional-level analysis reveals heterogeneity in the response of sovereign risk to variations in political uncertainty. This work enriches the understanding of how macroeconomic forces drive variations in sovereign risk and introduces political uncertainty as a significant factor driving the European credit market.

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Keywords: Political Uncertainty, Credit Risk Premium, Default Risk, Sovereign Debt Crisis

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1 Introduction

Is political uncertainty priced into the European sovereign credit market? We can think of political uncertainty as a combination of *policy-related uncertainty*, (uncertainty about fiscal, monetary and regulatory policy), and *political instability* (propensity of an imminent government change). In this paper I empirically investigate whether policy-related uncertainty (hereafter called political uncertainty) is an important factor priced in the European sovereign credit market. Recent political events concerning bailouts and government changes make Europe an interesting environment for analyzing the implications of political uncertainty on credit markets.[1]

Political uncertainty in any country increases the possibility of domestic instability and thereby causes a decline in sovereign credit quality. Political events can increase the default probability of a country, which will adversely affect financial markets if there is a concurrent change in investors' willingness to bear sovereign credit risk. As changes in investor risk appetite and the probability of default are primarily reflected in credit spread variations, I investigate the relation between political uncertainty and credit risk using sovereign credit default swap (CDS) spreads.

To the best of my knowledge, this paper is the first to investigate the linkage between sovereign credit risk premia, default risk and political uncertainty. While there is an extensive literature on how to measure risk premia from credit spreads[2], a proper measurement of political uncertainty over time still remains elusive. In this paper, I use the monthly index of political uncertainty in Europe proposed by Baker, Bloom, and Davis (2012). The index is a weighted average of disagreement among forecasts' of economic variables and newspaper articles regarding policy uncertainty, which serves as a proxy for political uncertainty.

I explore a cross-section of credit spreads of 19 European countries both inside and outside the European Union (EU) and European Monetary Union (EMU) over the period from December 2007 to January 2013. A cluster analysis performed on pairwise correlations between changes in sovereign credit spreads reveals a geography of credit risk across Europe. Specifically, the results distinguish three main groups of countries: the core economies that includes Austria, Finland,

[1] As an example, Greece was rescued on May 2010 after a long period of hesitation which took about four months, during which both stock and bond markets recorded strong negative performances. In addition to this, political turmoils in Italy and Greece in the Fall 2011 are important examples of government changes.

[2] See Remolona, Scatigna, and Wu (2007), Pan and Singleton (2008), and Longstaff et al. (2011), among others. The literature review will provide a detailed review of these works.

France, Germany, the Netherlands, Sweden and the UK; the Eastern economies that includes Estonia, Romania, Latvia, Lithuania and Poland; and finally, the peripheral economies that includes Italy, Spain, Portugal, Ireland and Belgium. Countries within each of these groups share similar characteristics in terms of economic growth and indebtedness relative to GDP. Outside of the main clusters, Greece and Norway remain in two separate, stand-alone groups, which is not surprising provided the context that Greece was the first country in Europe to default since the creation of the European Union, whereas Norway is deemed to be one of the most efficient economies in Europe. To further investigate the European credit market, I study the commonality in credit spreads by employing a principal component analysis on the correlation matrix of changes in credit spreads. When the entire sample is considered, the first three components explain 84 percent of the variability. The results are even more robust(over 90 percent) when the clusters are examined individually. Univariate regressions show that the variations in the first principal components are significantly related to political uncertainty in addition to European and US financial variables such as stock market implied volatility, world stock market index, liquidity and commodity market measures.

I decompose the credit spread of each country into a default-risk component and its associated (credit) risk premium. The risk premium is the compensation that investors require in exchange for exposure to default risk. Two credit risk premia can be identified: the distress risk premium and the jump-at-event risk premium. The former pertains to the compensation for unexpected variations in the default intensity - in other words, the probability of default - whereas the jump-at-event risk premium is related to the unforeseeable (negative) jump in the price of the security upon default. Although with the methodology used in this paper I can only measure the distress risk premium, this risk premium is very important as it is associated with the real world mark-to-market risk investors face on their positions. Finally, the default-related component emerges as a residual measure (observed credit spread minus risk premium) and captures the sovereign default risk. I find that, on average, credit risk premia account for 42 percent of the observed credit spreads in Europe.

To test and quantify the impact of political uncertainty on the European credit market, I employ panel regressions of changes in both risk premia and default risk on political uncertainty and exogenous controls. I find that a 10 percent increase in political uncertainty respectively leads to a 3.2 and 2.9 percent increase in credit risk premia and default risk over the course of one month. A panel vector autoregressive (VAR) approach confirm this lead-lag relationship, and shows that a political shock is still statistically significant two months after impact on both components of credit spreads. Interestingly, a shock to default risk has a negative impact on political uncertainty for three months after impact. This result implies that when a shock significantly impacts the probability of default rather than the market risk aversion (risk premium), a decrease in political uncertainty results. An example of this effect is the first Greek bailout, where a deal was reached in May 2010 after a four month period of hesitation. The agreement was crucial for the stability of the European Union as it ended a period of high ambiguity in policy decisions.

I further investigate the cross-sectional heterogeneity of European credit markets in responding to variations in political uncertainty. In particular, I estimate the VAR on a regional level where credit risk premia and default risk are aggregated across clusters. I find that political shocks have a significant impact on the risk premia of the peripheral economies for one month after the shock is generated. In contrast, the impact of political shocks on the core economies lasts for three months whereas shocks to credit risk premia last for two.

Literature Review. This work is related to the literature that empirically explains sovereign CDS spreads from a macroeconomic perspective.

This paper is closely related to the work of Pan and Singleton (2008), Longstaff et al. (2011), and Ang and Longstaff (2013). Pan and Singleton (2008) builds a sovereign CDS pricing model that allows for the decomposition of spreads into a market price of risk and a default risk. The findings show that the market price of risk of some emerging markets, such as Turkey, Mexico and Korea, is statistically correlated with some measures of financial market volatility (VIX), global event risk (US credit spread) and macroeconomic policy (currency-implied volatility). Longstaff et al. (2011) find that CDS-implied risk premia are more related to global economic measures than to local variables. Ang and Longstaff (2013) studies the systemic risk of Europe and the US. Ang and Longstaff (2013)'s research mainly finds that the countries of the Eurozone share a systematic credit risk greater than the states of the US, and that credit risk is more affected by financial markets than by macroeconomic fundamentals.

Several works have focused on the sovereign debt situation in the Eurozone. Zoli and Sgherri (2009) empirically analyzes the determinants of the common, time-varying factor implicit in the credit spread of 10 EU economies over the period from January 1999 to April 2009. Zoli and Sgherri (2009) find that this factor is positively correlated with the volatility in stocks, currencies and emerging markets. Dieckmann and Plank (2012) study the determinants of CDS spreads during the mid-2007 financial crisis for 18 developed European economies. They argue that the size and the pre-crisis health of both the world and country's financial market positively affect the CDS spread. Moreover, they also stress the potential role of the private-to-public risk transfer channel (i.e. government guarantees on the financial sector, significant extensions of loans to the banking system, etc.), which allows investors to form expectations about future financial bailouts. Related to this work is Acharya, Drechsler, and Schnabl (2011), who first model, then subsequently tests the two-way feedback effect between sovereign credit risk and financial markets.

Alongside empirical studies on the macro-economic determinants of credit spreads, theoretical and empirical works on the role of political decisions in both the stock and capital markets have recently been written (see, for example, Pastor and Veronesi (2012), Pastor and Veronesi (2013), and Kelly, Pastor, and Veronesi (2014)). The main result is that, when the announcement of a political change includes elements of surprise, stock prices on average drop. In addition, these works find empirical evidence that political uncertainty is state-dependent, as it is higher when worse economic conditions are in play. Similar to the aforementioned research, Ulrich (2013) analyzes the effect of political uncertainty on the bond market through a pricing model that incorporates political uncertainty. The model predicts that government policies which affect the business cycle lead to a positive risk premium for investors.

Structure of the Paper. The remainder of the paper is organized as follows: Section 1 introduces a description of the data, and includes a cluster analysis and principal component analysis. The Pan and Singleton (2008) sovereign CDS pricing model is shown in Section 2, which discusses the method by which the credit risk premium and default risk measures are extracted. In Section 3, I calibrate the model. In Section 4, I discuss the role of political uncertainty in the credit market. Section 5 concludes the analysis.

2 Data

I primarily use two types of data in the model: credit default swap (CDS) spreads and the European policy-related uncertainty index.

A CDS is a financial derivative contract agreed between two parties: the buyer and the seller. The buyer commits to a periodic payment - usually quarterly or semiannual - to the seller, who is compensated given a specific credit event related to an underlying debt obligation such as a bond or a loan. While for a company a credit event may be a bankruptcy or default, for a country, it is not correct to talk about a pure default. The most appropriate definition for a sovereign credit event is provided by the International Swaps and Derivatives Association (ISDA), which references four types of credit events: acceleration, failure to pay, restructuring and repudiation. As pointed out by Pan and Singleton (2008), these events cannot happen simultaneously, and the contract may therefore be executed as soon as one of them occurs.[3] CDS spreads are collected from the Markit database for 19 European countries inside and outside the EU and EMU; they cover the period from December 2007 to January 2013 for the maturities 1, 3, 5 and 7 years. The length of the sample period is dictated by data availability.

The European policy-related economic uncertainty index, provided by Baker, Bloom, and Davis (2012), is a weighted sum of two components: newspaper coverage of policy-related economic uncertainty and disagreement among professional forecasters about Consensus Economic forecasts.. The news coverage is obtained by counting the number of articles that include policy relevant terms such as "policy," "tax," or "deficit," and so on. Disagreement among forecasters is used as a proxy for uncertainty, and it is measure by the standard deviation of point forecasts.. These two components are standardized and added up in order to form a monthly index.[4]

The sample is comprised of Austria, Belgium, Estonia, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain as members of both the EU and EMU. Latvia, Lithuania, Poland, Romania, Sweden and the UK are included as only part of the EU. Finally, Norway, deemed the safest country in all of Europe, is included as an extra-EU/EMU state.

[3]Recent research has focused on CDS spreads instead of bond spreads because they are not affected by both flight-to-quality effect and contractual arrangements, such as seniority, coupon rates, guarantees and embedded options. Therefore, they provide clearer information on default risk

[4]Index source: www.policyuncertainty.com.

Table 1 shows summary statistics of 5-year CDS spreads and the policy-related uncertainty index. Spreads are measured in basis points. Extreme values are those of Greece and Norway. In particular, the protection that a buyer would pay, on average, is 1391 bps per year to hedge against the Greek default. In contrast, investors are willing to pay just 21 bps to protect themselves against the more remote Norwegian default. The largest standard deviation is that of Greece, followed by Ireland and Portugal. Minimum and maximum values show a significant cross-sectional heterogeneity of sovereign risk in Europe. The picture that emerges from this summary indicates that there is a consistent time variation in CDS spreads. The last row reports descriptive statistics for the policy-related uncertainty index.

2.1 The Geography of Credit Risk

Summary statistics show cross-sectional heterogeneity of sovereign risk in Europe. Recent research has shown that credit spreads are driven not only by global factors, but also by economic fundamentals that are country specific (Longstaff et al. (2011) and Remolona, Scatigna, and Wu (2007), among others). Figure 1 plots summary statistics of select economic fundamentals by country over the period from 2007 to 2013, such as the average quarter-on-quarter changes in the unemployment rate and the average year-on-year real GDP growth rate. . Squared brackets report the average debt-to-GDP ratios over the same period.

A combination of these three fundamental economic variables shows an interesting cross-country heterogeneity. Countries can be grouped according to their fundamentals. The Eastern economies such as Estonia, Latvia, Lithuania, Poland and Romania are characterized by average positive growth, negative unemployment rates and low debt-to-GDP ratios. A different situation exists for countries such as Greece, Ireland, Italy, Portugal and Spain that have high debt-to-GDP ratios, positive average changes in unemployment rate and negative growth. The rest of the countries show good performance in terms of unemployment and growth with debt-to-GDP ratios around 60 percent. These groups are depicted in Figure 1, which illustrates structural differences in economic performance across Europe.

I hypothesize that these cross-sectional differences are manifested in the European credit market. To test this hypothesis, I first perform a Cluster Analysis, which groups variables according to their similarities. Specifically, I employ a multivariate cluster analysis according to the "complete" method. Such a method is applied in the hierarchical cluster analysis with the purpose of optimizing an objective function, which is usually a distance between a pair of clusters. Starting with each variable as an initial cluster, a new cluster is formed at each new step such that the variation of the within-group variance (i.e. the distance between cluster centers) is as small as possible, while the between-group variance is as large as possible. The algorithm uses the largest distance between variables in the two clusters. In this case, the distance is Euclidean and measures similarity by computing the square root of the sum of the squared differences in the variables' values.[5]

Next, I use the correlation matrix of daily changes of CDS spreads as a measure of similarity among objects. I then apply the method through an algorithm that attempts to form clusters at each step as indicated above. Such a method requires knowledge of the number of clusters a priori, so I therefore use a rule of thumb and select $N/4$ groups, where N is the number of countries.

Table 2 shows the composition of the clusters over different periods. In line with my hypothesis, some European countries share common credit risk features. Over the full sample (Panel A), the largest cluster contains countries such as Austria, Finland, France, Germany, the Netherlands, Sweden and the UK that I label "core economies." Belgium, Ireland, Italy, Portugal and Spain form a separate cluster that I label "peripheral economies."Estonia, Latvia, Lithuania, Poland and Romania form a cluster of Eastern countries. Finally, Norway and Greece are placed in two separate groups. These two one-item groups confirms the polarity of their own credit risk. Indeed, Norway is deemed the safest European country with a respective average surplus and debt of 13.6 and 41.1 as a percentage of GDP over the period from 2008-2011. In contrast, Greece was the first European country to experience a default after the formation of the currency union and has a respective average deficit and debt of 11.2 and 138.2 as a percentage of GDP over the period from 2008-2011. Thus, I name these two countries as "polar economies".

Concerns about the debt situation in the Euro zone reached a peak in early 2010 when rising government deficits and debt levels led the European Finance Ministers to approve a huge monetary rescue package for Greece. The Greek bailout can be considered as the largest event of the European

[5]The cluster analysis is known to be performed according to several methods (or algorithms) and distances. The choice of the "complete" method and the Euclidean distance is rationally dictated by the "cophenetic correlation". Such a correlation measures the faithfulness of the pairwise distance between the original variables' values. In other words, the higher this correlation, the better the solution's quality.

debt crisis. As a robustness check, I therefore divide the sample into two sub-periods in order to figure out whether this event changed the credit risk composition in the Euro zone. Panel B of Table 2 illustrates the clusters over the period from December 2007 to May 2010when the first rescue package was approved. Panel C illustrates the clusters from the end of May 2010 to March 2012. Eastern countries still form a unique group.. It is interesting to note that the extra-EU country, Norway, always maintains a great distance from the rest of Europe. Greece comes out of the cluster of peripherals primarily due to its orderly default, during which an agreement was reached by the majority of private sovereign bondholders that led to the suspension of trading on Greek CDS contracts on March 9th, 2012 .

In summary, Table 2 highlights how the heterogeneity in sovereign credit risk in Europe can be grouped into clusters of countries that share similar credit risk profiles. I will now use such clusters to investigate the relationship between political uncertainty and credit markets on a regional level.

2.2 Commonality in the European Credit Market

In this section I further study the cross-country heterogeneity in credit risk profiles across Europe. I employ a principal component (PC) analysis on the correlation matrix of monthly log-changes of 5-year CDS spreads. The analysis is performed on a monthly frequency to match that of the political uncertainty index.[6]

Table 3 reports the variance explained by the Principal Components (PCs) across both the whole set of countries and the aforementioned clusters. The table illustrates that over the full sample (Panel A), the first three components explain almost 84 percent of the variability of sovereign CDS spreads changes. This number becomes larger when performed across clusters (Panel B). Indeed, the first three PCs explain 91.2, 91.1 and 96.1 percent of variation for the Peripheral, the Core and the Eastern economies, respectively.

Panel C of Table 3 reports univariate regressions of the first-differences for the first PCs for each cluster and for the whole set of 19 countries (*Europe19*). Interestingly, political uncertainty is positively and significantly related to the first PCs of the three clusters, with a stronger relationship

[6] I pick up the mid most available spread of the month ending up with a monthly time series of 61 observations. The mid observation is chosen such that the sample is not affected by stale observation. Moreover, the log-transformation allows for scaling the very large Greek spreads.

in the core economies. Moreover, the variables are significantly related to the first PCs, with the global market as the strongest relationship. Both the V2X and the iTraxx measures, which are a proxy for financial uncertainty in the European stock market and the creditworthiness of the European industrial sector, are significantly and positively related to the first PCs. Spillover effects from both the US financial market (VIX) and the US industrial sector (IGCDX) are significantly related to the credit risk in Europe. The TED spread is significant for the Eastern European economies.[7]

The whole picture that emerges from this statistical analysis is that CDS spread variations incorporate credit risk features that can be clustered over specific European regions. Moreover, there is a certain correlation structure with political uncertainty and other European and US financial variables that lays the foundation for a deeper analysis.. In the next sections, I test the effect of political uncertainty on the two components of credit risk: the default-related component and its associated risk premium.

3 Credit Risk Premium and Default Risk

This section is a preliminary step for the empirical analysis. In it, I will present the methodology to decompose credit spreads into a default-related component and its associated risk premium. Such a decomposition allows for a deeper understanding of the relationship between political uncertainty and credit markets. The credit risk premium is the compensation demanded by investors for being exposed to sovereign default risk. We can distinguish between two types of *credit* risk premia: a distress risk premium that pertains to the compensation investors demand for being exposed to a higher probability of default, and the jump-at-event risk premium, which is compensation for the sudden negative jump in the price of a security upon default.

The methodology that I present in this section was proposed by Pan and Singleton (2008) and is only suitable for measuring the distress risk premium. This premium pertains to the mark-to-market risk that investors face on their positions, and is thus of crucial importance to this paper. The default-related component emerges as a residual measure and captures the "true" probability

[7]This result is in line with the view that Eastern economies suffer the most liquidity problems since their non-well developed banking systems force them to rely heavily on foreign borrowing, especially from the biggest US banks.

of default.

3.1 Pricing Sovereign Credit Default Swap

Measuring the credit risk premium requires a theoretical model. In this section I present the pricing model of Pan and Singleton (2008) that is suitable for this purpose.

A CDS contract is agreed upon by two parties: the buyer and the seller. The buyer commits to periodic payments - usually quarterly or semiannual - paid to the seller who, upon the realization of the credit event, will compensate the buyer for the amount that he/she does not recover from bankruptcy procedures. Let $CDS_t\left(M\right)$ be the agreed semiannual payment for a notional of \$1 (the CDS spread) with maturity M, the buyer leg is

$$\frac{1}{2}CDS_t\left(M\right)\sum_{j=1}^{2M}E^{\mathbb{Q}}\left[e^{-\int_t^{t+.5j}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right]$$

where the term in brackets captures the risk-neutral survival-dependent nature of the payments. In other words, the payments are discounted with a risk-free interest rate, r_t, plus a risk-neutral default intensity $\lambda_s^{\mathbb{Q}}$. The superscript $\mathbb{Q}$ refers to the expectation under the risk-neutral probability measure, as opposed to the one under the physical measure, $\mathbb{P}$. The present value the seller will pay upon default is equal to

$$L^{\mathbb{Q}}\int_t^{t+M}E^{\mathbb{Q}}\left[\lambda_u^{\mathbb{Q}}e^{-\int_t^{u}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right]du$$

where $L^{\mathbb{Q}}=1-R^{\mathbb{Q}}$ is the loss given default, expressed as the face value minus the recovery rate, $R^{\mathbb{Q}}$.

Similar to plain interest rate swap contracts, a CDS contract is worth zero at inception. Therefore, the spread can be inferred by setting the buyer and the seller legs equal, that is,

$$\frac{1}{2}CDS_t\left(M\right)\sum_{j=1}^{2M}E^{\mathbb{Q}}\left[e^{-\int_t^{t+.5j}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right] = L^{\mathbb{Q}}\int_t^{t+M}E^{\mathbb{Q}}\left[\lambda_u^{\mathbb{Q}}e^{-\int_t^{u}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right]du$$

$$CDS_t\left(M\right)=\frac{2\left(1-R^{\mathbb{Q}}\right)\int_t^{t+M}E^{\mathbb{Q}}\left[\lambda_u^{\mathbb{Q}}e^{-\int_t^{u}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right]du}{\sum_{j=1}^{2M}E^{\mathbb{Q}}\left[e^{-\int_t^{t+.5j}\left(r_s+\lambda_s^{\mathbb{Q}}\right)ds}\right]} \tag{1}$$

Under the assumption of a fractional recovery of face value (RFV), the risk-adjusted discount rate (expectations in equation 1) can be split into a default-free zero coupon bond and a risk-neutral default/survival probability.[8]

Following Pan and Singleton (2008), the risk-neutral default intensity follows a log-normal stochastic process under the physical probability measure, of the form

$$d\ln\lambda_t^{\mathbb{Q}} = k^{\mathbb{P}}\left(\theta^{\mathbb{P}} - \ln\lambda_t^{\mathbb{Q}}\right)dt + \sigma_{\lambda_t^{\mathbb{Q}}}dW_t^{\mathbb{P}}$$

where $k^{\mathbb{P}}$ and $\theta^{\mathbb{P}}$ are the mean reversion spreed and the long-run mean level, respectively. $\sigma_{\lambda_t^{\mathbb{Q}}}$ is the local volatility for local changes in $\ln\lambda_t^{\mathbb{Q}}$. Assuming a market price of risk of the form

$$\eta_t = \delta_0 + \delta_1\ln\lambda_t^{\mathbb{Q}}$$

the risk-neutral intensity, under the risk-neutral measure, has the following dynamics

$$d\ln\lambda_t^{\mathbb{Q}} = k^{\mathbb{Q}}\left(\theta^{\mathbb{Q}} - \ln\lambda_t^{\mathbb{Q}}\right)dt + \sigma_{\lambda_t^{\mathbb{Q}}}dW_t^{\mathbb{Q}}$$

where $k^{\mathbb{Q}} = k^{\mathbb{P}} + \delta_1\sigma_{\lambda_t^{\mathbb{Q}}}$ and $k^{\mathbb{Q}}\theta^{\mathbb{Q}} = k^{\mathbb{P}}\theta^{\mathbb{P}} - \delta_0\sigma_{\lambda_t^{\mathbb{Q}}}$.[9]

The notation may confuse the reader, so a clarification is needed. I am referring to the risk-neutral default intensity, $\lambda_t^{\mathbb{Q}}$, under the two probability measures, $\mathbb{Q}$ and $\mathbb{P}$. Using observed credit spreads alone will only give information about the risk-neutral intensity because sovereign defaults are rare events. Indeed, inferring the "true" default intensity, $\lambda_t^{\mathbb{P}}$ requires knowledge of the detailed financial situation of a country and/or a very long history of defaults for that specific country, which is not observable in reality. Therefore, the methodology herein described will be used to gain information on a pseudo default intensity, or the risk-neutral default intensity under the physical probability measure.[10]

[8] For additional details see Pan and Singleton (2008), Longstaff et al. (2011), and Duffie and Singleton (2012).

[9] A lognormal process has its own advantages. Indeed, a lognormal distribution has fatter tails than the classical noncentral chi-squared distribution of the usually-used CIR process. Even if it preserves the mean reverting feature, is strictly positive and has a distribution skewed to the right, it may suffer the explosion problem. But the main shortcoming is that the outcoming survival probabilities are not available in closed-form. In this paper, I employ the fully implicit numerical method to approximate the partial differential equation of the expectation in equation 1.

[10] Several studies have tried to infer the physical default intensity using historical default probabilities provided by Moody's. Remolona, Scatigna, and Wu (2007) is an example.

3.2 Credit Spread Decomposition

The credit risk premium is priced in the market if the model parameters differ under the two probability measures,$\mathbb{Q}$ and $\mathbb{P}$. To estimate the model, I employ the Quasi-Maximum Likelihood method using the term-structure of CDS spreads for the maturities 1, 3, 5 and 7 years.

The underlying assumption is that a CDS contract over a specific maturity is priced without error. Under such an assumption, one can invert the model and get the latent variable, which is the unobservable default intensity. This is possible thanks to the availability of a term structure of CDS spreads. A widely used empirical trick is to choose the most liquid maturity. I therefore choose the 5-year CDS spread because 5-year trading volumes have always been higher than other maturities (Longstaff et al. (2011)).

The model parameters are estimated according to the distribution of the default intensity that is log-normally distributed with the following discrete mean $m_{\Delta t}$ and variance $v_{\Delta t}$:

$$
\begin{aligned}
m_{\Delta t} &= \ln\left(\lambda_{t-1}^{\mathbb{Q}}\right) e^{-k^{\mathbb{P}}\Delta t} + \frac{\theta^{\mathbb{P}}}{k^{\mathbb{P}}}\left(1 - e^{-k^{\mathbb{P}}\Delta t}\right) \\
v_{\Delta t} &= \frac{\sigma^2_{\lambda_t^{\mathbb{Q}}}}{2k^{\mathbb{P}}}\left(1 - e^{-2k^{\mathbb{P}}\Delta t}\right)
\end{aligned}
$$

Let $CDS_t\left(M\right)$ be the vector of CDS spreads for maturities $M = 1, 3, 7$ and let $\epsilon\left(M\right)$ be normally distributed errors with mean zero and constant variance $\sigma^2\left(M\right)$, I estimate the following model

$$
CDS_t\left(M\right) = h\left(\lambda_t^{\mathbb{Q}}\right) + \epsilon_t\left(M\right)
$$

where $h\left(\cdot\right)$ is the pricing function (equation 1). The joint probability density is

$$
\begin{aligned}
f^{\mathbb{P}}\left(\lambda_t^{\mathbb{Q}}, \epsilon_t\left(T\right)|\mathcal{F}_{t-1}\right) &= f^{\mathbb{P}}\left(\lambda_t^{\mathbb{Q}}|\mathcal{F}_{t-1}\right) \times f^{\mathbb{P}}\left(\epsilon_t\left(T\right)|\lambda_t^{\mathbb{Q}}, \mathcal{F}_{t-1}\right) \\
&= f^{\mathbb{P}}\left(\lambda_t^{\mathbb{Q}}|\lambda_{t-1}^{\mathbb{Q}}\right) \times f^{\mathbb{P}}\left(\epsilon_t\left(T\right)|\lambda_t^{\mathbb{Q}}, \mathcal{F}_{t-1}\right) \qquad (2)
\end{aligned}
$$

where the first term on the RHS comes from the Markov assumption of the stochastic process, and $f^{\mathbb{P}}\left(\epsilon_t\left(T\right)|\lambda_t^{\mathbb{Q}}, \mathcal{F}_{t-1}\right) \sim N\left(0, \Omega\right)$, where $\Omega = diag\left\{\sigma\left(1\right), \sigma\left(3\right), \sigma\left(7\right)\right\}$. The final set of parameters to be estimated consists of $k^{\mathbb{P}}, k^{\mathbb{P}}\theta^{\mathbb{P}}, k^{\mathbb{Q}}, k^{\mathbb{Q}}\theta^{\mathbb{Q}}, \sigma_{\lambda_t^{\mathbb{Q}}}, \sigma\left(1\right), \sigma\left(3\right), \sigma\left(7\right)$.[11]

[11]The daily risk-free discount functions are bootstrapped from constant maturity bonds collected from the H.15

Table 4 reports the estimated parameters with numerical standard errors in parentheses. Small standard deviations signal a good fit of the CDS term structure, with some exceptions in the case of the 1-year CDS contract. This is a feature of the model already reported by Pan and Singleton (2008), where the shorter maturities seem to be priced with slightly greater errors. Moreover, the estimation confirms several other empirical characteristics: the credit environment is worse under the risk-neutral probabilities than under the physical ones, $k^{\mathbb{Q}}\theta^{\mathbb{Q}} > k^{\mathbb{P}}\theta^{\mathbb{P}}$, and more persistent risk-neutral intensities ($k^{\mathbb{Q}} > k^{\mathbb{P}}$) for most of the countries. Finally, the risk-neutral intensity is $\mathbb{P}$-stationary, as shown by $k^{\mathbb{P}} > 0$.

In summary, the difference in parameters under the two probability measures suggests that a risk premium is priced in the market. Therefore, I measure the credit risk premium for maturity M, $CRP_t(M)$, as the difference between the CDS spread under the $\mathbb{Q}$ measure and the pseudo-CDS spread under the $\mathbb{P}$ measure as follows

$$CRP_t(M) = CDS_t^{\mathbb{Q}}(M) - CDS_t^{\mathbb{P}}(M)$$

where $CDS_t^{\mathbb{P}}(M)$ is equation 1 under the physical parameters. The default-related component, $DR_t(M)$, is simply the residual, or, in other words, the risk-neutral spread minus the credit risk premium.

Table 5 reports summary statistics of the estimated credit risk premia and default risk for each country. On average, CRP goes from a minimum of 0.3 bps for UK to a maximum of 303.3 bps for Greece, whereas the default risk ranges from a minimum of 8 bps for Norway to a maximum of 1142 bps for Greece. The default risk is, on average, greater in magnitude than CRPs. This result is not surprising if we think that credit default swap are defaultable securities. In addition to this, the credit risk premium, on average, accounts for 42 per cent of the observed credit spreads in Europe. Figure 2 plots the first principal components of credit risk premia divided into clusters as in Section 2.1. Four interesting patterns emerge from this graph: (1) Eastern countries, which boosted their economies by borrowing from foreign banks, recorded large premia during the financial crisis of

release of the Federal Reserve system. Several methods can be used for getting discount functions from market data, but their effect in pricing CDS contract is negligible, since it enters the pricing function symmetrically. Moreover, as shown by Duffie (1999), under some specific conditions, a CDS contract can be replicated by an arbitrage-free portfolio by buying a default-free floater and shorting a defaultable floater. The sensitivity of these securities to interest rate variations is negligible, endorsing the assumption about the method used to extract the discount function.

2007/09 that were most likely the result of the credit crunch during to the financial crisis; (2) the group of peripheral economies, which are highly indebted governments such as in Ireland or Spain that had to issue new debt to rescue their banking systems, experienced very high risk premia during the European debt crisis; (3) the risk premia of the core economies experienced low levels relative to the rest of Europe; and (4) the Greek risk premium was dramatically high and reflects the high risk aversion of the market toward the default.

4 The Empirical Analysis

In this section I present how I study the relation between credit risk premium, default risk and political uncertainty.

I run a set of panel regressions where both components of the credit spread are regressed on contemporaneous and lagged political uncertainty with a set of controls and country fixed-effects. The benchmark regression is the one with only the political uncertainty index. Controls are then added step-by-step. The role of the controls is twofold: (1) they make the analysis more robust in the event of a significant relationship between credit markets and political uncertainty, and (2) they can dampen the main critique of the policy-related uncertainty index, which is that the way the index is built can accounts for economic and financial uncertainty in addition to policy-related uncertainty. In fact, including stock, credit and commodity markets in the analysis enables me to purify the political index from financial and economic information, leaving out only the political part. This is possible because the above mentioned markets are known to be very liquid, thus, they incorporate market information very quickly.

To this end, I include control variables, such as the domestic stock market index, as a proxy for the state of local economies[12]. This includes: the Eurostoxx50 and S&P500 implied volatilities (V2X and VIX) to proxy for the European and US stock market uncertainty; the iTraxx Euro CDX and the IG US CDX to proxy for the creditworthiness of the European and US industrial sectors; the price-earning ratio of the Dax and Eurostoxx50 indices to proxy for investors' expectation on

[12] I consider the following local stock markets: ATX (Austria), BEL 20 (Belgium), TALSE (Estonia), OMXH25EX (Finland), CAC 40 (France), DAX (Germany), ASE (Greece), ISEQ (Ireland), FTSE MIB (Italy), RIGSE (Latvia), VILSE (Lithuania), AEX (Netherlands), OSEBX (Norway), WIG (Poland), PSI 20 (Portugal), BET (Romania), IBEX (Spain), OMX (Sweden) and UKX (UK).

the growth in Europe; the TED spread for catching liquidity issues; and the price of gold, as gold is deemed the safe-heaven asset during distress periods. Such variables are chosen so that I can control for Europe-specific variables in addition to spillover effects from the US market.

Tables 6 and 7 report the panel regressions of credit risk premia and default risk. The first column reports the benchmark regression where only the credit components are regressed on the political index. In both cases, political uncertainty has a 1 percent significant and positive effect. Specifically, a 10 percent increase in political uncertainty leads to an increase in both the credit risk premium and the default risk of 7.9 and 7.3 per cent after a month. The effect remains significant at 10 per cent level, but lower in magnitude when controlling for the domestic stock markets, the V2X and the iTraxx Euro CDX. Including the price-earning ratios does not significantly alter the impact of lagged political uncertainty. In column 6, I control for possible spillover effects. The world stock market index is strongly significant and very large in magnitude. When both European and spillover control variables are included together, political uncertainty is still significant for the credit market. In fact, a 10 percent increase in the degree of political uncertainty brings about an increase in the premium and default risk of 3.2 and 2.9 percent, respectively. The negative coefficient of the VIX Index highlights a flight-to-quality toward the US economy in line with what Ang and Longstaff (2013) finds. The picture that emerges from Tables 6 and 7 illustrates the significant influence of political uncertainty on the European credit market, where the effect is stronger in magnitude on the credit risk premium than on the default risk. Interestingly, the set of variables is able to explain 6 percent more of the variation in the default risk than in the credit risk premium (R^2 of 46.9 against 40.8 percent).

4.1 A different perspective: the VAR approach

So far I have found a significant effect of political uncertainty on the European credit market. This unexplored relationship may be bidirectional. In other words, there could be a case where the market places pressure on governments, and makes them unable to implement certain contingent measures. . This case may be partially due to the view, commonly held by policy makers, that financial speculators prevent governments from setting adequate measures through huge bearish bets, which thereby worsens crises. To this end, I employee a panel vector autoregressive approach, which is highly recommended when the goal is to study a phenomenon without any strong prior about the direction of causality.[13]

I estimate the following panel VAR

$$\begin{aligned}\Delta CRP_t(5) &= \sum_{p=1}^{3} \Delta CRP_{t-p}(5) + \alpha_i + u_{i,t} \\ \Delta DR_t(5) &= \sum_{p=1}^{3} \Delta DR_{t-p}(5) + \alpha_i + u_{i,t}\end{aligned}$$

where α_i captures country fixed effects. Controls are not added since lagged values may contain enough market information.

Table 8 reports the estimation. There is no evidence of the credit market Granger-causing political uncertainty. The panel results in the previous section are thereby confirmed. In fact, political uncertainty shows a more persistent and larger effect in magnitude on the credit risk premium than on the default risk. Cumulative impulse response functions (IRFs) will give a clearer interpretation of these results. When dealing with IRFs, the main issue is to choose the best Cholesky ordering, or the order of variables within the model, because the first variable responds contemporaneously to the shock whereas the second one reacts with a lag. In other words, there is a hierarchy in the way shocks hit the variables. Moreover, these functions require that a shock occurs only in one variable at a time.It is thus a reasonable assumption to have independent shocks. Orthogonalizing the covariance matrix of the residuals with the Cholesky decomposition will give independent shocks. I therefore put political uncertainty as the first variable because my goal is to study the evolution and propagation of political shocks to the credit market. Figure 3 plots the cumulative IRFs for both systems.

From the figure, it is clear that political shocks impact both credit risk premia and default risk, with a more persistent shock to the former. On impact, political shocks to risk premia are

[13]There are several empirical studies that have already used the VAR approach and the vector error correction model (VECM) in analyzing CDS markets. This is concerned with that part of the literature which has been dealing with understanding better whether the CDS market is more efficient than the underlying sovereign bond market. Arce, Mayordomo, and Peña (2013) address the point at what market, CDS or bond, leads the price discovery process and find that the latter is state-dependent, that is, both markets alternated the supremacy over some specific events, such as the Lehman Brothers' default and the Bear Stearns' collapse. Similar findings are shown by Coudert and Gex (2010) who state that the bond market has its own supremacy over developed European economies, while the CDS market over emerging economies.

significantly positive and persist for three months, whereas shocks to the default risk are significant in the two successive months after impact.

4.2 Exploring the Heterogeneity in Sovereign Risk in Europe

In Section 2.1 I showed that the European credit market masks specific credit risk profiles that can be clustered. In this section, I investigate the relationship between political uncertainty and the credit market on a regional level. In particular, I build regional credit risk premia and default risk measures by taking the median value for each cluster.[14] The econometric model is still a bivariate $VAR(3)$, where regional risk premia and default risk are regressed on political uncertainty and a set of control variables.

Table 9 reports the results for the credit risk premia. Political uncertainty significantly impacts both the peripheral and Eastern economies. In particular, a 10 percent increase in political uncertainty leads to an increase of about 3.5 percent in the risk premia of peripheral economies. Conversely, a 10 percent increase in the credit risk premia of the core economies leads to an increase in political uncertainty of about 1.7 percent. Interestingly, contemporaneous regional risk premia ($CRP_t^{Core}, CRP_t^{Periph}, CRP_t^{East}$) show significant spillover across regions. Even if it is a hard task to draw conclusions on causality directions, the scenario depicted in Table 9 shows an interesting pattern: credit risk premia of core economies significantly impact political uncertainty and the risk premia of both peripheral and Eastern economies. Credit spillover highlights that political shocks are contemporaneously propagated across regions.

The scenario on the regional default risk depicted in Table 10 is slightly different. Political uncertainty impacts positively and significantly the default risk of the core and peripheral economies; however, default risk spillover across regions signals that potential political shocks can quickly spread to Eastern countries. The negative and significant impact of the default risk of peripheral countries on political uncertainty depicts an interesting scenario, as whenever there is a shock that primarily affects troubled economy default risk (rather than risk premia), political uncertainty decreases.

To better understand the relation between political uncertainty and regional credit risk, I plot

[14] The median gives a more robust aggregation of spreads, since the Greek spread is extremely high during the European debt crisis. Given that Greece is a small country, the median will give less weight to its large variations.

the impulse response functions for credit risk premia in Figures 4. In line with the results shown in the tables, a political shock has a significant lagged impact on the credit risk premia of core and peripheral economies. Shocks to the risk premia of core economies have a positive impact on political uncertainty after 2 months. Figure 5 plots slightly different results for the default risk. A political shock has a positive lagged impact on the default risk of core economies. Instead, a shock to the default risk of peripheral economies reduces political uncertainty one month after the impact. Finally, cumulative IRFs, that are not reported here, do not show any significant persistence of political and credit shocks.

5 Conclusion

In this work I investigate the role of political uncertainty in the European credit market, using a time-varying proxy for policy-related uncertainty.

I decompose sovereign credit spreads into a default-related component and its associated risk premia. I show that, on average, political uncertainty has a significant and persistent impact on both components. Such a result is robust to the inclusion of variables that capture financial and economic uncertainty.

I rely on a particular proxy for time-varying political uncertainty. To the best of my knowledge, there is no alternative proxy for variations in political uncertainty over time and on a monthly frequency. Therefore, future research may consider an event study analysis where credit spreads are studied around important political events. Further analysis is needed for a deeper understanding of this topic.

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Table 1: European Sovereign Credit Market: Summary Stats

The table reports summary statistics of 5-year credit default swap spreads of 19 European countries over the daily period from December 2007 to January 2013. The statistics are the sample average (Mean), median (Median), standard deviation (Std Dev) and the minimum (Min) and maximum (Max) value. All the spreads are in basis points. The last row reports summary statistics of the monthly policy-related uncertainty index.

	Mean	*Median*	*Std Dev*	*Min*	*Max*
Austria	71.6	68	46.3	4	269
Belgium	95.0	82.5	65.6	8	339
Estonia	178.8	114.5	152.5	45	736
Finland	35.8	30	21.9	4	92
France	58.9	53	38.2	5	199
German	32.3	31	17.7	4	91
Greece	1391.3	291	2742.1	14	23572
Ireland	335.7	224	267.5	11	1263
Italy	172.9	137	121.4	15	502
Latvia	364.2	269	225.7	87	1161
Lithuania	275.5	239	153.0	48	849
Netherlands	43.0	37	27.0	4	130
Norway	21.0	18	11.5	3	64
Poland	145.7	134	71.1	20	419
Portugal	389.2	278	387.1	13	1554
Romania	304.6	277	131.4	68	771
Spain	176.1	165.5	114.1	13	504
Sweden	39.8	36.5	28.9	5	158
UK	62.4	65	30.3	5	165
Average	220.7	134.2	244.9	19.8	213.5
Pol Index	143.7	145.4	28.7	78.8	213.5

Table 2: European Sovereign Credit Market: Cluster Analysis

The table reports the outcome of the cluster analysis applied on the correlation matrix of daily changes of 5-year CDS spreads over the full sample (Panel A) and two sub samples (Panel B and C). The method (complete) and the distance (Euclidean) are selected to the extent that the cophenetic correlation is the highest. On average, this correlations across panels is around 90 percent. The daily sample period covers December 2007 to January 2013.

Panel A: Full Sample			
Italy Spain Belgium	Portugal Ireland	Greece	Norway
Finland Austria France Netherlands	Germany UK Sweden	Estonia Latvia Lithuania	Poland Romania

Panel B: Before May 2010			
Finland Netherlands France Germany	Austria Sweden	Ireland Belgium Greece Portugal	Italy Spain
Norway	UK	Estonia Latvia Lithuania	Poland Romania

Panel C: End of May 2010			
Italy Spain Portugal Ireland		Greece	Norway
Austria UK France Belgium	Germany Netherlands Sweden Finland	Estonia Latvia Lithuania	Poland Romania

Table 3: European Sovereign Credit Market: Principal Component Analysis

The table reports the outcome of the principal component analysis performed on the correlation matrix of monthly log-changes of 5-year CDS spread for the whole set of countries (*Europe19*) and for the "core economies" (Austria, Finland, France, Germany, Netherlands, Norway, Sweden, UK), the "peripheral economies" (Belgium, Greece, Ireland, Italy, Portugal, Spain) and the Eastern economies (Estonia, Latvia, Lithuania, Poland, Romania) over the period December 2007 to January 2013. The sub-table in the bottom reports the univariate regressions (with a constant) of the first-differences of the first PCs for each cluster on the Policy-related uncertainty index (*PolIndex*}, the MSCI Global Equity Index (*MSCI*), the Eurostoxx50 implied volatility (*V2X*), the iTraxx Euro CDX (*iTraxx*), the PE ratio of the Dax Index (*P/E*), the *VIX*, the *IG-CDX*, the TED spread and the Gold price. First PCs are in first differences whereas the variables are in log-differences. t-Stats in brackets. Level of significance: 1***, 5** and 10* per cent

	Panel A All Countries		*Panel B* Peripheral Economies		Core Economies		Eastern Economies	
	% of Var	Total	% of Var	Total	% of Var	Total	% of Var	Total
First	72.54	72.54	76.37	76.37	81.79	81.79	88.93	88.94
Second	6.79	79.34	8.69	85.07	5.10	86.90	4.16	93.11
Third	4.67	84.01	6.15	91.22	4.20	91.10	2.99	96.10
Fourth	2.64	86.65	4.74	95.97	2.86	93.96	2.81	98.92
Fifth	2.38	89.04	2.24	98.21	2.07	96.03	1.08	100

Panel C

	PolIndex	*MSCI*	*V2X*	*iTraxx*	*P/E*	*VIX*	*IG-CDX*	*TED*	*Gold*
Europe 19	3.4**	-11.3***	2.20***	4.3***	-2.10**	2.2***	4.7***	1.08**	4.74
	[2.34]	[-7.14]	[3.04]	[4.80]	[-2.35]	[3.01]	[4.71]	[2.01]	[1.61]
Peripheral	1.0*	-2.79***	0.62**	1.4***	-0.53	0.39	1.3***	0.33	0.717
	[1.69]	[-3.46]	[2.02]	[3.69]	[-1.41]	[1.24]	[3.05]	[1.50]	[0.58]
Core	2.6**	-8.77***	1.63***	3.2***	-1.74**	1.6***	3.5***	0.71	3.64
	[2.25]	[-6.68]	[2.76]	[4.35]	[-2.44]	[2.72]	[4.30]	[1.62]	[1.54]
Eastern	1.9**	-7.3***	1.4***	2.5***	-1.09*	1.7***	3.0***	0.87**	3.4*
	[2.13]	[-7.60]	[3.20]	[4.39]	[-1.92]	[3.92]	[4.87]	[2.64]	[1.89]

Table 4: Parameter Estimation

The table reports the parameters estimated for each country with quasi maximum likelihood method (Q-MLE). Numerical standard errors in parenthesis and average log-likelihoods (avg llk). The estimation is performed on the term-structure of 1-, 3-, 5- and 7-year CDS spreads, covering the daily period December 3, 2007 to January 22, 2013.

	$\sigma_{\lambda_t^{\mathbb{Q}}}$	$k^{\mathbb{Q}}\theta^{\mathbb{Q}}$	$k^{\mathbb{Q}}$	$\theta^{\mathbb{P}}$	$k^{\mathbb{P}}$	σ (1)	σ (3)	σ (7)	avg llk
Austria	0.99	5.96	-0.76	-2.42	0.23	0.04366	0.00004	0.00004	9.25
	(0.004)	(0.0081)	(0.0004)	(0.0044)	(0.0004)	(0.0002)	(0.000001)	(0.000001)	
Belgium	1.21	1.29	-0.94	-3.24	0.11	0.07236	0.00031	0.00054	6.91
	(0.0171)	(0.0122)	(0.0024)	(0.0072)	(0.0013)	(0.0001)	(0.000006)	(0.000014)	
Estonia	0.5	-0.38	-1.02	-4.68	0.3	0.00367	0.00067	0.00096	6.74
	(0.009)	(0.0245)	(0.0075)	(0.011)	(0.0022)	(0.000079)	(0.000015)	(0.000022)	
Finland	0.72	5.08	-0.47	-2.57	0.28	0.00002	0.00003	0.00007	10.89
	(0.0037)	(0.0054)	(0.0004)	(0.0056)	(0.0005)	(0.000519)	(0.000002)	(0.00009)	
France	0.5	5.88	-0.67	-2.15	0.2	0.0639	0.00004	0.00007	9.22
	(0.0035)	(0.0096)	(0.0003)	(0.0073)	(0.0007)	(0.000082)	(0.000001)	(0.000003)	
Germ	0.64	5.51	-0.56	-2.39	0.23	0.0515	0.00002	0.00002	9.87
	(0.0023)	(0.0052)	(0.0002)	(0.0055)	(0.0005)	(0.000042)	(0.000521)	(0.000001)	
Greece	1.03	-2.96	0.07	-3.13	0.07	0.00333	0.00014	0.00083	7.92
	(0.0157)	(0.0015)	(0.0004)	(0.0017)	(0.0004)	(0.000092)	(0.000004)	(0.001032)	
Ireland	0.84	-0.69	-0.1	-6.91	0.71	0.00027	0.00017	0.00014	9
	(0.0144)	(0.0093)	(0.0015)	(0.0083)	(0.001)	(0.000006)	(0.000004)	(0.000003)	
Italy	1.09	5.56	-0.64	-2.13	0.25	0.00015	0.00017	0.00015	9.08
	(0.0029)	(0.0076)	(0.0008)	(0.0043)	(0.0005)	(0.000003)	(0.000006)	(0.000006)	
Latvia	0.36	4.04	-0.95	-2.34	0.11	0.0007	0.001	0.0001	8.65
	(0.0059)	(0.0133)	(0.0023)	(0.0055)	(0.0007)	(0.000014)	(0.000002)	(0.000003)	
Lithuan	0.42	5.23	-1.05	-2.44	0.13	0.15222	0.00011	0.00008	8.28
	(0.0053)	(0.0119)	(0.0015)	(0.0054)	(0.0007)	(0.000018)	(0.000003)	(0.000002)	
Nether	0.52	5.74	-0.57	-2.06	0.22	0.03743	0.00003	0.00003	9.69
	(0.0012)	(0.0051)	(0.0004)	(0.0046)	(0.0004)	(0.000038)	(0.000001)	(0.000001)	
Norway	0.41	4.96	-0.55	-1.82	0.24	0.04472	0.0001	0.00013	8.35
	(0.0027)	(0.0063)	(0.0004)	(0.0034)	(0.0003)	(0.000003)	(0.000003)	(0.000003)	
Poland	0.26	5.63	-0.87	-2.53	0.36	0.03299	0.00075	0.00071	6.55
	(0.0025)	(0.0114)	(0.0012)	(0.0052)	(0.0007)	(0.000423)	(0.000017)	(0.000015)	
Portugal	0.79	-2.67	0.01	-2.86	0.03	0.00084	0.00039	0.00001	9.61
	(0.0046)	(0.0009)	(0.0002)	(0.001)	(0.0002)	(0.000018)	(0.000417)	(0.000265)	
Romania	1.16	-0.1	-0.27	-2.29	0.04	0.00044	0.00005	0.00013	8.91
	(0.008)	(0.0036)	(0.0007)	(0.0033)	(0.0004)	(0.000011)	(0.000001)	(0.000005)	
Spain	0.64	-0.21	0.01	-0.26	0.02	0.00063	0.00013	0.00003	8.26
	(0.0008)	(0.0001)	(0.00002)	(0.0001)	(0.00002)	(0.000112)	(0.000003)	(0.000001)	
Sweden	0.54	6.18	-0.64	-2.28	0.22	0.04432	0.00002	0.00003	9.69
	(0.0013)	(0.0042)	(0.0004)	(0.0067)	(0.0006)	(0.000006)	(0.000001)	(0.000001)	
UK	0.67	-1.61	0.23	-1.71	0.24	0.0001	0.00006	0.00004	9.54
	(0.0025)	(0.0005)	(0.0006)	(0.0005)	(0.0000)	(0.000003)	(0.000002)	(0.000001)	

Table 5: Credit Risk Premium and Default Risk

The table reports descriptive statistics of the 5-year credit risk premium and default risk (Panel A). Mean, Std Dev and Median are the sample average, standard deviation and median, respectively. Panel B report the credit risk premium as a percentage of the observed 5-year CDS spread. Numbers are in basis points and cover the daily period December 2007 to January 2013.

Panel A							Panel B		
Credit Risk Premium			Default Risk				Credit Risk Premium (%)		
Mean	Std Dev	Median	Mean	Std Dev	Median		Mean	Std Dev	Median
34.1	22.8	32.1	37.5	23.5	36.1	Austria	47.1	1.0	47.0
41.5	28.4	35.9	53.5	37.2	46.2	Belgium	44.2	1.3	43.8
66.1	49.5	45.6	112.8	103.0	69.2	Estonia	38.9	2.5	39.6
18.4	11.8	15.2	17.4	10.1	15.0	Finland	50.4	1.9	50.6
28.3	17.8	25.9	30.7	20.3	27.4	France	48.6	1.1	48.5
10.6	6.4	9.7	21.7	11.3	21.1	Germany	31.6	2.1	31.6
257.3	577.8	55.0	1142.1	2193.5	236.6	Greece	19.0	1.5	18.9
303.3	251.4	196.2	32.4	16.3	27.7	Ireland	83.9	11.7	87.6
60.4	46.3	45.9	112.5	75.1	91.0	Italy	33.0	3.1	33.5
110.5	68.0	83.2	253.7	158.0	186.6	Latvia	30.4	1.4	30.3
103.7	53.6	91.8	171.9	99.5	147.1	Lithuania	38.3	1.5	38.4
8.5	9.7	4.8	34.5	17.8	32.3	Netherlands	14.4	9.0	12.8
13.0	7.2	11.1	8.0	4.3	6.9	Norway	61.5	0.6	61.7
65.0	32.6	59.5	80.7	38.6	75.0	Poland	44.3	1.0	44.4
99.7	93.3	75.1	289.5	293.8	201.5	Portugal	28.8	3.9	27.3
125.5	49.4	116.0	179.1	82.1	161.2	Romania	41.7	1.3	41.8
68.5	44.2	63.8	107.6	69.9	101.6	Spain	39.1	0.7	39.0
19.3	13.4	17.9	20.6	15.5	18.6	Sweden	49.4	1.6	49.2
0.3	0.2	0.3	29.2	14.3	30.3	UK	53.2	0.5	53.2
75.5	72.8	51.8	144.0	172.9	80.6	mean	42.0	2.5	42.0

Table 6: Political Uncertainty and Credit Risk Premium

The table reports panel regressions of credit risk premia, CRP (5), on the policy-related uncertainty index ($PolIndex$), the domestic stock markets ($LocalStock$), the Eurostoxx50 and S&P500 implied volatility ($V2X$ and VIX), the iTraxx Euro CDX and IG US CDX ($iTraxx$ and $IGCDX$), the price-earning ratio of Eurostoxx50 and Dax Indices ($P/E_t^{Eurostoxx50}$ and P/E_t^{Dax}), the MSCI Global Equity Index ($MSCI_t^{world}$), the TED spread (TED) and the gold price ($Gold$). The variables are in log-differences. Country fixed effect included. Monthly sample period December 3, 2007 to January 22, 2013. t-Stats in brackets, and errors clustered across time. Level of significance: 1***, 5** and 10* percent.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ΔCRP_t	ΔCRP_t	ΔCRP_t	ΔCRP_t	ΔCRP_t	ΔCRP_t	ΔCRP_t
$\Delta PolIndex_t$	0.740***	0.432**	0.320*	0.304*	0.279	0.513***	0.452**
	[3.65]	[2.48]	[1.77]	[1.71]	[1.58]	[2.77]	[2.38]
$\Delta PolIndex_{t-1}$	0.791***	0.367**	0.321*	0.320*	0.336*	0.268	0.318*
	[3.79]	[2.38]	[1.93]	[1.91]	[2.00]	[1.47]	[1.84]
$\Delta LocalStock_t$		-1.241***	-0.950***	-0.939***	-0.946***		-0.504**
		[-5.50]	[-3.64]	[-3.70]	[-3.69]		[-2.15]
$\Delta V2X_t$		0.0843	-0.0115	-0.0131	-0.00679		0.265
		[0.91]	[-0.12]	[-0.13]	[-0.07]		[1.57]
$\Delta iTraxx_t$			0.437***	0.415**	0.399**		0.317
			[2.75]	[2.55]	[2.47]		[0.95]
$\Delta P/E_t^{Eurostoxx50}$				-0.0882			
				[-0.84]			
$\Delta P/E_t^{Dax}$					-0.151***		-0.119***
					[-2.72]		[-3.08]
$\Delta MSCI_t^{world}$						-1.453***	-1.132***
						[-5.79]	[-4.22]
ΔVIX_t						-0.201	-0.477**
						[-1.50]	[-2.29]
$\Delta IGCDX_t$						0.246	-0.0981
						[1.60]	[-0.28]
ΔTED_t						0.0663	0.0401
						[1.07]	[0.64]
$\Delta Gold_t$						0.247	0.369
						[0.82]	[1.19]
$cons$	0.00536	0.000688	0.000231	0.000969	0.000754	-0.00246	-0.00987
	[0.16]	[0.02]	[0.01]	[0.04]	[0.03]	[-0.09]	[-0.37]
N	1129	1129	1129	1129	1129	1129	1129
R^2	0.193	0.307	0.350	0.352	0.361	0.379	0.408

Table 7: Political Uncertainty and Default Risk

The table reports panel regressions of Default Risk (DR) on the policy-related uncertainty index ($PolIndex$), the domestic stock markets ($LocalStock$), the Eurostoxx50 and S&P500 implied volatility ($V2X$ and VIX), the iTraxx Euro CDX and IG US CDX ($iTraxx$ and $IGCDX$), the price-earning ratio of Eurostoxx50 and Dax Indices ($P/E_t^{Eurostoxx50}$ and P/E_t^{Dax}), the MSCI Global Equity Index ($MSCI_t^{world}$), the TED spread (TED) and the gold price ($Gold$). The variables are in log-differences. Country fixed effect included. Monthly sample period December 3, 2007 to January 22, 2013. t-Stats in brackets, and errors clustered across time. Level of significance: 1***, 5** and 10* percent.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ΔDR_t	ΔDR_t	ΔDR_t	ΔDR_t	ΔDR_t	ΔDR_t	ΔDR_t
$\Delta PolIndex_t$	0.682***	0.418***	0.307*	0.291*	0.268*	0.465***	0.404**
	[3.79]	[2.75]	[1.95]	[1.90]	[1.76]	[3.01]	[2.48]
$\Delta PolIndex_{t-1}$	0.730***	0.355**	0.310**	0.309*	0.324**	0.253	0.294*
	[3.99]	[2.51]	[2.01]	[1.98]	[2.07]	[1.54]	[1.83]
$\Delta LocalStock_t$		-1.130***	-0.844***	-0.833***	-0.840***		-0.428**
		[-5.73]	[-3.99]	[-4.09]	[-4.08]		[-2.66]
$\Delta V2X_t$		0.0610	-0.0335	-0.0351	-0.0289		0.167
		[0.75]	[-0.39]	[-0.40]	[-0.33]		[1.13]
$\Delta iTraxx_t$			0.431***	0.409***	0.394***		0.300
			[3.06]	[2.83]	[2.76]		[0.99]
$\Delta P/E_t^{Eurostoxx50}$				-0.0870			
				[-0.87]			
$\Delta P/E_t^{Dax}$					-0.146***		-0.117***
					[-2.83]		[-3.44]
$\Delta MSCI_t^{world}$						-1.280***	-1.002***
						[-5.59]	[-4.26]
ΔVIX_t						-0.184	-0.360**
						[-1.63]	[-2.04]
$\Delta IGCDX_t$						0.260*	-0.0676
						[1.92]	[-0.21]
ΔTED_t						0.0631	0.0362
						[1.13]	[0.62]
$\Delta Gold_t$						0.229	0.327
						[0.87]	[1.19]
$cons$	0.00527	0.000729	0.000278	0.00101	0.000783	-0.00140	-0.00775
	[0.16]	[0.03]	[0.01]	[0.04]	[0.03]	[-0.05]	[-0.29]
N	1129	1129	1129	1129	1129	1129	1129
R^2	0.227	0.351	0.408	0.411	0.422	0.442	0.469

Table 8: Panel Vector Autoregressive

The table reports the estimated panel vector autoregressive for credit risk premia (Panel A) and default risk (Panel B). The variables are in log-differences. Country fixed effect included. Monthly sample period December 2007 to January 2013. t-Stats in brackets. Level of significance: 1***, 5** and 10* percent.

Panel A: Credit Risk Premium						
	$\Delta PolIndex_{t-1}$	$\Delta PolIndex_{t-2}$	$\Delta PolIndex_{t-3}$	ΔCRP_{t-1}	ΔCRP_{t-2}	ΔCRP_{t-3}
ΔCRP_t	0.827***	0.752**	0.836	-0.06	-0.00	-0.34
	[5.865]	[2.375]	[0.691]	[-0.49]	[-0.00]	[-0.88]
$\Delta PolIndex_t$	-0.15**	0.102	0.472	-0.06	0.047	-0.11
	[-2.49]	[0.843]	[0.997]	[-1.42]	[0.933]	[-0.78]

Panel A: Credit Risk Premium						
	$\Delta PolIndex_{t-1}$	$\Delta PolIndex_{t-2}$	$\Delta PolIndex_{t-3}$	ΔDR_{t-1}	ΔDR_{t-2}	ΔDR_{t-3}
ΔDR_t	0.759***	0.433	-0.88	-0.13	0.157	0.274
	[7.21]	[1.56]	[-1.07]	[-1.05]	[0.85]	[1.23]
$\Delta PolIndex_t$	-0.17***	0.100	0.446	-0.04	0.022	-0.10
	[-3.27]	[0.99]	[1.33]	[-1.10]	[0.42]	[-1.07]

Table 9: Regional Credit Risk Premia and Political Uncertainty

The table reports the estimated vector autoregressive model for regional credit risk premia. The variables are in log-differences and include the policy-related uncertainty index ($PolIndex$), the Dax Index (Dax), the Eurostoxx50 and S&P500 implied volatility ($V2X$ and VIX), the iTraxx Euro CDX and IG US CDX ($iTraxx$ and $IGCDX$), the price-earning ratio of Dax Indices (P/E_t^{Dax}), the MSCI Global Equity Index ($MSCI_t^{world}$), the TED spread (TED) and the gold price ($Gold$). Monthly sample period December 2007 to January 2013. t-Stats in brackets. Level of significance: 1***, 5** and 10* percent.

	Core Economies		Peripheral Economies		Eastern Economies	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	ΔCRP_t^{Core}	$\Delta PolIndex_t$	ΔCRP_t^{Periph}	$\Delta PolIndex_t$	ΔCRP_t^{East}	$\Delta PolIndex_t$
ΔCRP_{t-1}^{Core}	0.260***	-0.101				
ΔCRP_{t-2}^{Core}	-0.101	0.171***				
ΔCRP_{t-3}^{Core}	-0.0152	0.0532				
$\Delta CRP_{t-1}^{Periph}$			-0.194**	-0.119*		
$\Delta CRP_{t-2}^{Periph}$			0.000276	0.0627		
$\Delta CRP_{t-3}^{Periph}$			-0.0429	0.0692		
ΔCRP_{t-1}^{East}					-0.108	0.0860
ΔCRP_{t-2}^{East}					-0.0681	0.0712
ΔCRP_{t-3}^{East}					-0.0723	0.0915
$\Delta PolIndex_{t-1}$	-0.200	-0.357***	0.352**	-0.342***	0.0692	-0.456***
$\Delta PolIndex_{t-2}$	0.0631	-0.0227	0.0349	0.0591	0.272**	-0.0425
$\Delta PolIndex_{t-3}$	0.163	-0.112	-0.0986	-0.0320	0.194	-0.0974
ΔCRP_t^{Core}			0.627***	0.136	0.436***	0.0593
ΔCRP_t^{Periph}	0.524***	0.134*			0.0146	0.150
ΔCRP_t^{East}	0.505***	0.109	0.00852	0.112		
ΔDax_t	-0.800*	-0.570	1.601***	-0.155	-0.349	-0.438
$\Delta MSCI_t^{world}$	0.320	0.767***	-0.990***	0.666**	-0.340	0.950***
$\Delta V2X_t$	0.0869	-0.161	0.228	-0.144	-0.0193	-0.168
$\Delta iTraxx_t$	-0.266	0.483**	0.220	0.396**	0.132	0.365*
$\Delta P/E_t^{Dax}$	-0.159**	-0.00994	-0.0783	-0.00524	0.157**	-0.0204
ΔVIX	-0.0640	0.432***	-0.348**	0.382***	0.0876	0.457***
$\Delta IGCDX_t$	0.190	-0.373*	0.101	-0.217	-0.176	-0.183
ΔTED_t	0.0144	0.0244	-0.00498	0.0295	0.0796	0.0300
$\Delta Gold_t$	0.222	-0.284	0.217	-0.173	0.0766	-0.135
$cons$	-0.00140	0.0183*	0.0221	0.0188	-0.0207*	0.0203*
N	58	58	58	58	58	58
R^2	0.865	0.645	0.776	0.585	0.774	0.578

Table 10: Regional Default Risk and Political Uncertainty

The table reports the estimated vector autoregressive model for regional default risk. The variables are in log-differences and include the policy-related uncertainty index ($PolIndex$), the Dax Index (Dax), the Eurostoxx50 and S&P500 implied volatility ($V2X$ and VIX), the iTraxx Euro CDX and IG US CDX ($iTraxx$ and $IGCDX$), the price-earning ratio of Dax Indices (P/E_t^{Dax}), the MSCI Global Equity Index ($MSCI_t^{world}$), the TED spread (TED) and the gold price ($Gold$). Monthly sample period December 2007 to January 2013. t-Stats in brackets. Level of significance: 1***, 5** and 10* percent.

	Core Economies		Peripheral Economies		Eastern Economies	
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
	ΔDR_t^{Core}	$\Delta PolIndex_t$	ΔDR_t^{Periph}	$\Delta PolIndex_t$	ΔDR_t^{East}	$\Delta PolIndex_t$
ΔDR_{t-1}^{Core}	0.142	-0.0323				
ΔDR_{t-2}^{Core}	-0.188**	0.0968*				
ΔDR_{t-3}^{Core}	0.0282	0.0836*				
ΔDR_{t-1}^{Periph}			-0.211**	-0.178***		
ΔDR_{t-2}^{Periph}			-0.0644	0.0745		
ΔDR_{t-3}^{Periph}			-0.148**	0.0922*		
ΔDR_{t-1}^{East}					-0.0666	0.0871
ΔDR_{t-2}^{East}					0.104	0.0457
ΔDR_{t-3}^{East}					-0.0515	0.109*
$\Delta PolIndex_{t-1}$	0.0407	-0.387***	0.329**	-0.349***	-0.0679	-0.448***
$\Delta PolIndex_{t-2}$	0.186	0.0483	0.147	0.124	0.0578	-0.0214
$\Delta PolIndex_{t-3}$	0.504***	-0.0943	-0.0664	-0.0801	-0.0150	-0.0759
ΔDR_t^{Core}			0.380***	0.0847	0.294***	-0.00158
ΔDR_t^{Periph}	0.600***	0.135			0.178	0.198**
ΔDR_t^{East}	0.454***	0.0381	0.254**	0.0617		
ΔDax_t	-0.141	-0.452	-0.211	-0.563	-0.140	-0.388
$\Delta MSCI_t^{world}$	0.0562	0.817***	-0.439	0.578**	-0.431	0.939***
$\Delta V2X_t$	0.274	-0.128	0.133	-0.156	-0.180	-0.143
$\Delta iTraxx_t$	-0.523	0.425**	0.689***	0.600***	0.00790	0.325
$\Delta P/E_t^{Dax}$	-0.0725	-0.00714	-0.202***	-0.0164	0.131*	-0.0231
ΔVIX	-0.278	0.395***	-0.368**	0.323**	0.357**	0.417***
$\Delta IGCDX_t$	0.493	-0.217	-0.620**	-0.376*	-0.0213	-0.0927
ΔTED_t	0.0250	0.0313	-0.0565	0.0369	0.132**	0.0412
$\Delta Gold_t$	0.111	-0.159	0.433*	-0.162	-0.193	-0.147
$cons$	0.00135	0.0171	0.0229	0.0174	-0.0158	0.0198*
N	58	58	58	58	58	58
R^2	0.78	0.6	0.76	0.61	0.74	0.57

Figure 1: Economic Fundamentals by Country

The figure plots the economic fundamentals of 19 European economies in terms of unemployment rate and real-GDP growth over the period 2007 to 2013. $\Delta Unemp$ is the average of quarter-on-quarter change in the unemployment rate from the last quarter of 2007 to the second quarter of 2012. *Real GDP Growth* is the averaged of year-on-year real GDP growth rate over the period 2007 to 2013. Squared brackets report average debt-to-GDP ratios. Numbers are in percentage points.

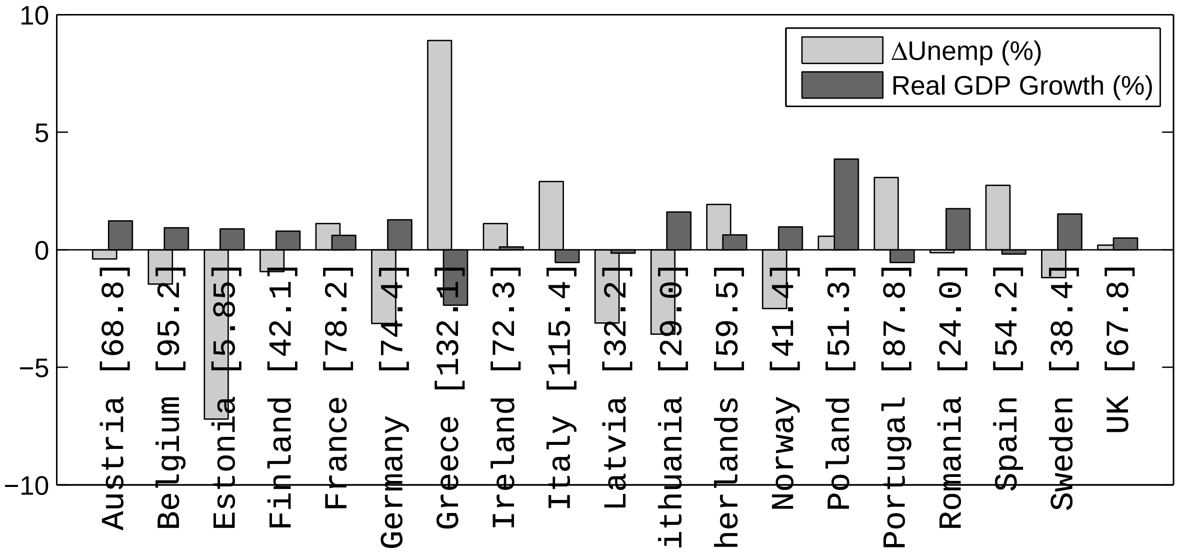

Figure 2: Economic Fundamentals by Country

The figure plots the first principal components of credit risk premia of the three clusters as in section 2. The group of "core economies" is comprised of Austria, Finland, France, Germany, Netherlands, Norway, Sweden, UK, the group of "peripheral economies" is comprised of Belgium, Ireland, Italy, Portugal, Spain and the Eastern economies are Estonia, Latvia, Lithuania, Poland, Romania. Greece and Norway are the two stand-alone group. The graph is cut at 800 bps for graphical reasons. Numbers are in basis points and cover the period December 2007 to January 2013

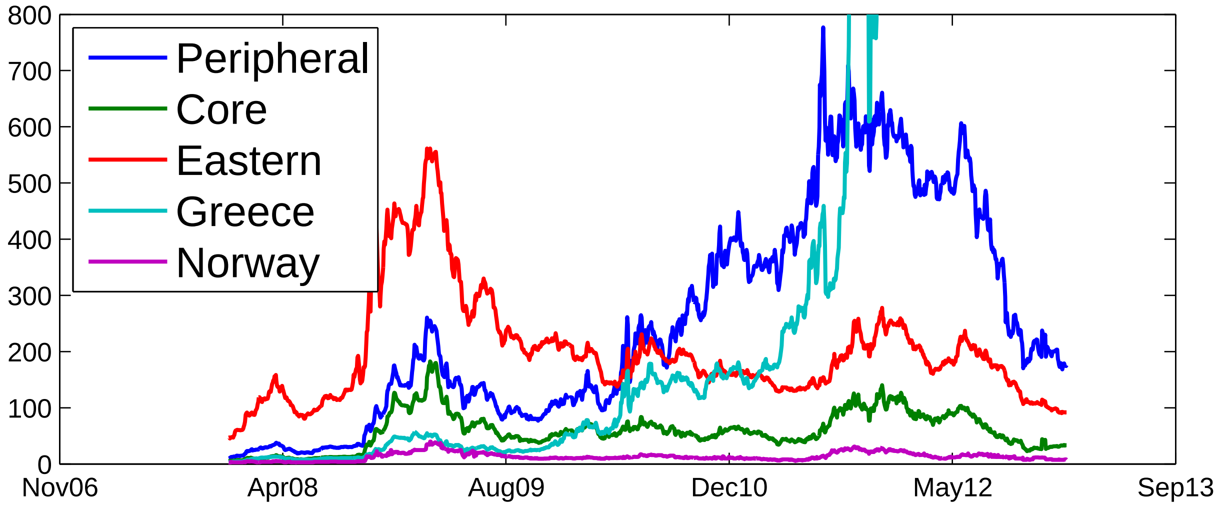

Figure 3: Cumulative Impulse Response Functions

The figure plots the cumulative impulse response functions estimated from the panel VAR for the credit risk premia and default risk. The impulse is a Cholesky one-standard deviation. PU stands for political uncertainty. Red dotted lines indicate the 95 percent confidence intervals, generated by 500 Monte Carlo simulations. Monthly sample period from December 2007 to January 2013.

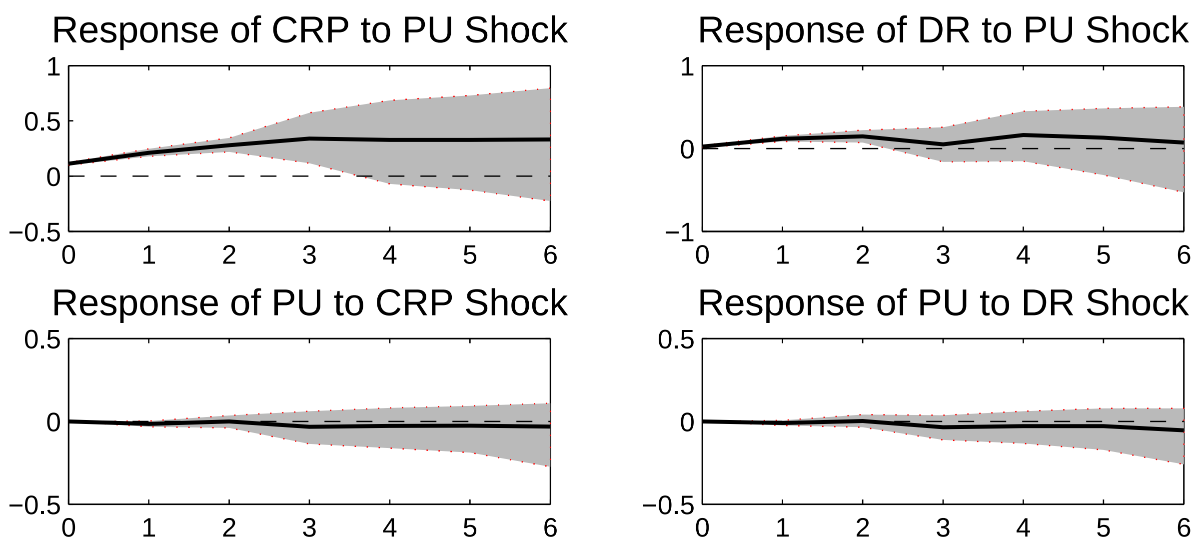

Figure 4: Impulse Response Functions: Credit Risk Premia

The figure plots the impulse response functions estimated from the VAR estimated in Table 9. The impulse is a Cholesky one-standard deviation. PU stands for political uncertainty. Red dotted lines indicate the 95 percent confidence intervals, generated by 500 Monte Carlo simulations. Monthly sample period from December 2007 to January 2013.

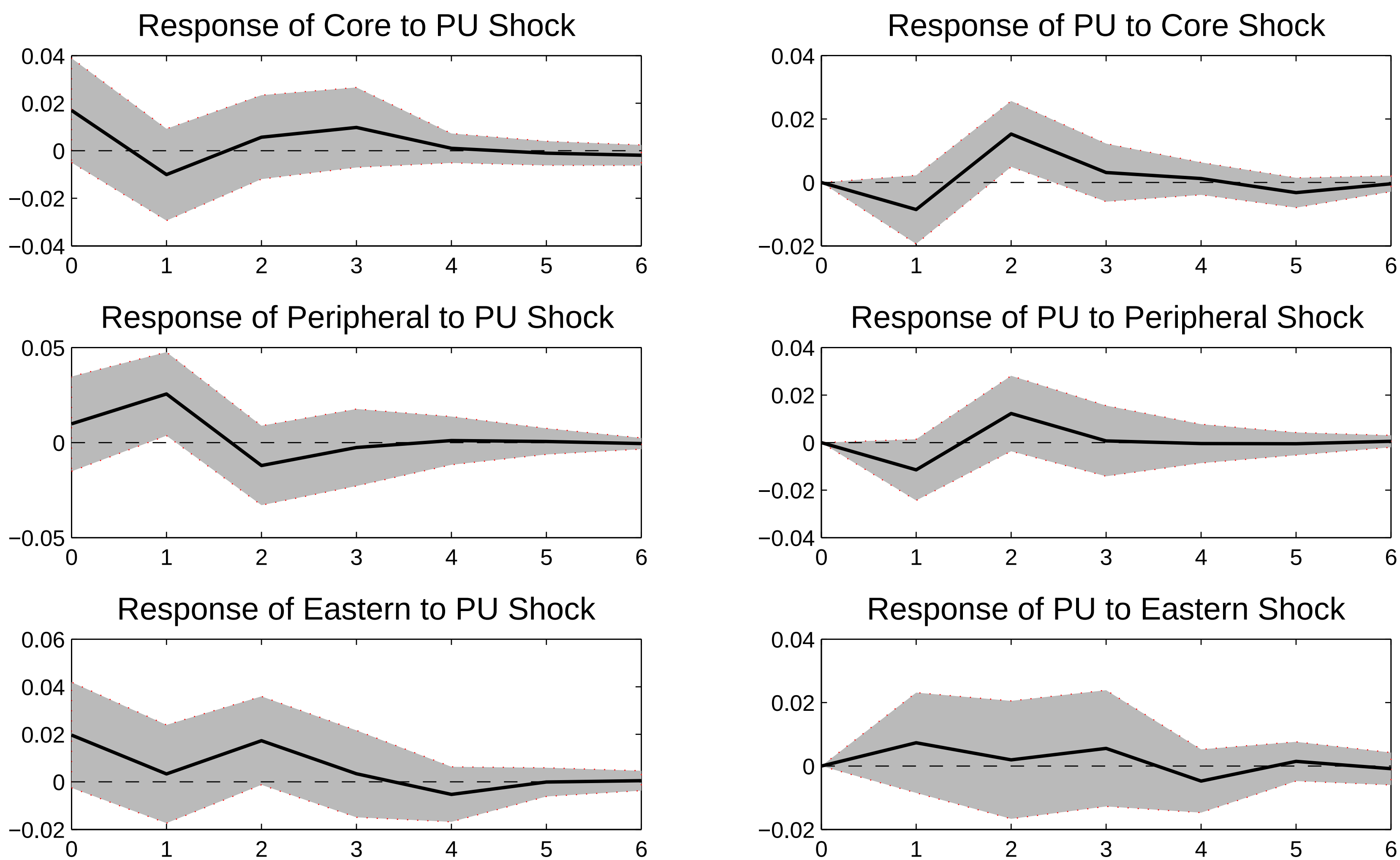

Figure 5: Impulse Response Functions: Default Risk

The figure plots the impulse response functions estimated from the VAR estimated in Table 10. The impulse is a Cholesky one-standard deviation. PU stands for political uncertainty. Red dotted lines indicate the 95 percent confidence intervals, generated by 500 Monte Carlo simulations. Monthly sample period from December 2007 to January 2013.