ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Dockner, Engelbert J.; Mayer, Manuel; Zechner, Josef

Working Paper

Sovereign bond risk premiums

CFS Working Paper, No. 2013/28

Provided in Cooperation with:
Center for Financial Studies (CFS), Goethe University Frankfurt

Suggested Citation: Dockner, Engelbert J.; Mayer, Manuel; Zechner, Josef (2013) : Sovereign bond risk premiums, CFS Working Paper, No. 2013/28, Goethe University Frankfurt, Center for Financial Studies (CFS), Frankfurt a. M.,
https://nbn-resolving.de/urn:nbn:de:hebis:30:3-325051

This Version is available at:
https://hdl.handle.net/10419/88434

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

CFS WORKING PAPER

No. 2013/28

Sovereign Bond Risk Premiums

Engelbert J. Dockner, Manuel Mayer, Josef Zechner

Center for Financial Studies
Goethe University ■ House of Finance
Grüneburgplatz 1 ■ 60323 Frankfurt am Main

Tel: +49 69 798-30050
Fax: +49 69 798-30077
www.ifk-cfs.de ■ info@ifk-cfs.de

CFS Working Paper Series

The *Center for Financial Studies*, located in Goethe University's House of Finance in Frankfurt, is an independent non-profit research center, funded by the non-profit-making organisation Gesellschaft für Kapitalmarktforschung e.V. (GfK). The CFS is financed by donations and by contributions of the GfK members, as well as by national and international research grants. The GfK members comprise major players in Germany's financial industry. Established in 1967 and closely affiliated with the University of Frankfurt, it provides a strong link between the financial community and academia. CFS is also a contributor to policy debates and policy analyses, building upon relevant findings in its research areas.

The CFS Working Paper Series presents the result of scientific research on selected topics in the field of money, banking and finance. The authors were either participants in the Center´s Research Fellow Program or members of one of the Center´s Research Projects.

If you would like to know more about the Center for Financial Studies, please let us know of your interest.

Prof. Michalis Haliassos, Ph.D. | Prof. Dr. Jan Pieter Krahnen | Prof. Dr. Uwe Walz

Center for Financial Studies
Goethe University ■ House of Finance
Grüneburgplatz 1 ■ 60323 Frankfurt am Main

Tel: +49 69 798-30050
Fax: +49 69 798-30077
www.ifk-cfs.de ■ info@ifk-cfs.de

Sovereign Bond Risk Premiums

Engelbert J. Dockner, Manuel Mayer, and Josef Zechner[1]

May 2013

Abstract

Credit risk has become an important factor driving government bond returns. We therefore introduce an asset pricing model which exploits information contained in both forward interest rates and forward CDS spreads. Our empirical analysis covers euro-zone countries with German government bonds as credit risk-free assets. We construct a market factor from the first three principal components of the German forward curve as well as a common and a country-specific credit factor from the principal components of the forward CDS curves. We find that predictability of risk premiums of sovereign euro-zone bonds improves substantially if the market factor is augmented by a common and an orthogonal country-specific credit factor. While the common credit factor is significant for most countries in the sample, the country-specific factor is significant mainly for peripheral euro-zone countries. Finally, we find that during the current crisis period, market and credit risk premiums of government bonds are negative over long subintervals, a finding that we attribute to the presence of financial repression in euro-zone countries.

Keywords: Sovereign bond risk premiums, market and credit risk factors, financial repression.

[1]Contact: Engelbert J. Dockner: **WU** Vienna University of Economics and Business (email: engelbert.dockner@wu.ac.at), Manuel Mayer: **VGSF** Vienna Graduate School of Finance (email: manuel.mayer@vgsf.ac.at), Josef Zechner: **WU** Vienna University of Economics and Business (CEPR and ECGI) (email: josef.zechner@wu.ac.at).

1 Introduction

Risk premiums of sovereign bonds vary substantially over time. This has been documented in several seminal studies such as Fama & Bliss (1987) and Campbell & Shiller (1991) or, more recently, by Cochrane & Piazzesi (2005) and Duffee (2011).[2] Cochrane & Piazzesi (2005), for example, find that risk premiums for U.S. government bonds can be predicted by a linear combination of one-year forward rates with an R^2 as high as 44%. These findings confirm that forward interest rates contain important information about time-varying sovereign risk premiums. A central feature in Cochrane & Piazzesi (2005) is that government bond risk premiums are explained exclusively via the cross section of essentially default-free yields. While this is an approach consistent with the majority of existing term structure models, recent sovereign debt crises have demonstrated forcefully that government bond yields can no longer be considered to be without credit risk. In past years even most developed countries' term structures of government bond yields have been driven by two factors: the term structure of default-free spot rates and the term structure of sovereign credit spreads.

In this paper we make use of data for sovereign credit default swap (CDS) contracts of ten euro-zone countries and for the German term structure of interest rates to construct separate yield and credit factors. On a weekly basis we calculate one-year forward interest rates starting in one, three, five and seven years implicit in the German term structure. As these forward rates are highly correlated, we extract the first three principal components (PCs) and use these to represent the riskless term-structure factor. For simplicity, we will refer to this factor as the market factor. It is assumed to be identical for all euro-zone countries. In addition, we calculate one-year forward CDS spreads starting in one, three, five and seven years to construct credit factors for each country, except for Germany. These credit factors are calculated in a three-step approach. First, we extract the first three principal components from each country's CDS forward curve. We find that the first three PCs explain more than 99% of the variation in CDS forward spreads. In a second step, we calculate the first principal component from the country-specific first principal components. This provides us with a credit factor that captures common euro-zone credit risk. In a third step, we regress the country-specific PCs on the Europe factor to isolate the orthogonal component, i.e. the error term of this regression. This error term is then used as the country-specific credit factor.

[2] Additional references studying the time variation of bond risk premiums include Ferson & Harvey (1991), Ilmanen (1995) and Dahlquist & Hasseltoft (2011).

Using this approach to construct market and credit factors, we find that the inclusion of a credit factor improves predictability of excess bond returns substantially, measured by an increase in R^2 from 0.20 to 0.52. While the common credit factor is significant for most countries in our sample, the country-specific credit factor has explanatory power mainly for countries from the periphery. This implies that for several euro-zone sovereign bond markets, risk premiums are not driven by country-specific macro-conditions but only by a common euro-zone credit factor. Only in those countries with severe debt problems are bond risk premiums dependent on local macroeconomic conditions, as reflected in their CDS term structure. Additionally, we are able to calculate in-sample market and credit risk premiums based on the risk factors and find that during the sample period from January 2006 to February 2012 they were negative for long subintervals. While negative risk premiums are inconsistent with an equilibrium with risk-averse investors, a possible interpretation for their occurrence is financial repression, where political or regulatory pressure is put on banks and/or central banks to purchase sovereign bonds during intensifying sovereign risk episodes. Sovereign bond investors in Europe are to a large extent either institutional investors or representatives from the financial services industry. Both types of investors are heavily exposed to regulatory constraints that can impose incentives to invest in government bonds even when expected risk premiums are negative. Finally, we derive average expected risk premiums out-of-sample and find that they are strictly positive for the core and negative for a set of peripheral countries (Greece, Ireland, Portugal, and Slovakia). This result again strongly supports the financial repression argument discussed above.

The analysis of risk premiums for sovereign bonds is a very active area of research and our paper relates to several existing empirical studies. Cochrane & Piazzesi (2005) analyze the time variation of expected excess bond returns and find that a tent-shaped lagged linear factor of one-year forward interest rates contains information about future excess bond returns. This factor predicts excess bond returns with differing maturities remarkably well. It is shown to be counter-cyclical and to have predictive power also for stock returns. Duffee (2011) challenges this approach and argues that yields as factors are neither theoretically necessary nor empirically supported. He shows that almost half of the variation in bond risk premiums cannot be detected using the cross-section of yields as in Cochrane & Piazzesi (2005). Instead, he identifies a factor that goes beyond the cross section of yields and refers to this as the hidden factor. He finds that fluctuations in this hidden component have strong forecasting power for both future short-term interest rates and excess bond returns. Our paper is consistent with these findings. In our framework the credit factor takes the role of the hidden factor used in Duffee (2011). Dahlquist & Hasseltoft (2011) study international bond risk premiums and identify local and global factors that are not spanned by the cross section of yields but have strong forecasting power. It turns out that the global factor is closely related to the international business cycle and the US bond risk premium. Ludvigson & Ng (2009) also do not rely on the cross section of yields when forecasting government bond risk premiums but identify macroeconomic factors, instead. They find that real and inflation factors have important forecasting power for future excess returns on US government bonds, above and beyond the predictive power contained in forward rates and yield spreads. As a consequence, risk premiums in their model have a marked countercyclical component, which is consistent with existing theories that investors get compensated for the risk associated with macro-economic fluctuations. Cieslak & Povala (2011) decompose yields into long-horizon expected inflation and maturity-related cycles and study the predictability of bond excess returns. The maturity related cycles are used to construct a forecasting factor that explains up to and above 50% of the in-sample and 30% of the out-of-sample variation of yearly excess bond returns. In contrast to our paper, none of the papers discussed above utilizes credit factors to explain government bond risk premiums.

In a recent paper, Longstaff et al. (2011) study sovereign credit risk using CDS data. They find that a large fraction of sovereign credit risk can be attributed to global factors. Up to 64% of the variation of CDS spreads is accounted for by the first principal component of CDS spreads. This component is correlated to US stock and high-yield markets but not to local macroeconomic measures. As credit spreads are driven by global factors, Longstaff et al. (2011) analyze whether these factors are priced and find that a third of the CDS spread can be attributed to a global CDS risk premium. Our paper differs from Longstaff et al. (2011) by focussing on government bond risk premiums as a function of the riskless term structure of interest rates and a common European, and a country-specific credit factor. Caceres et al. (2010) also study sovereign credit spreads and explore how much of their movements are due to a shift in global risk aversion or due to country-specific risks, arising from worsening fundamentals or from spillovers originating in other sovereigns. They find that, while at the beginning of the crisis shifts in risk aversion contributed a major share to increased credit spreads, later in the crisis, country-specific factors have started to play a more important role. Bernoth et al. (2012) study bond yield differentials among EU government bonds. They show that government spreads contain a risk premium that increases with fiscal imbalances and depends negatively on the size of the issuer's bond market. Finally, Haugh et al. (2009) analyze large recently observed movements in yield spreads for sovereign bonds in the euro zone. While the increase in average risk aversion is an important factor that explains the levels of CDS spreads, it is found that fiscal performance plays an important role, too. Haugh et al. (2009) present evidence that incremental deteriorations in fiscal performance lead to larger increases in the spread, with the consequence that financial market reactions could become an increasingly important constraint on fiscal policy for some countries.

Overall, our results integrate well with the existing empirical literature discussed above. As in Cochrane & Piazzesi (2005), we construct a factor that is based on the cross section of risk-free yields that we identify with the German term structure. We then augment this factor with a common and a country-specific credit factor, which we derive from the forward curve of sovereign CDS spreads. As the CDS market is driven by credit fundamentals of a country, it is clear that these factors cover fundamentals that cannot be captured by the cross section of the riskless German term structure. Hence, in this way our analysis complements the results found in Duffee (2011), Ludvigson & Ng (2009), and on an international level, in Dahlquist & Hasseltoft (2011). Our empirical results are also consistent with the findings of Longstaff et al. (2011). They show that CDS spreads are driven by a common credit factor that is highly correlated to the US stock and high-yield markets. Our common European credit factor supports these empirical findings. It turns out, however, that a country-specific credit factor is significant for peripheral countries as well.

Our paper is organized as follows. In the next section we present a description of the empirical model. In section (3) we present the dataset and report our main findings of the paper. We summarize our regression results and the predictive power of our factors and then quantify the expected risk premiums associated with our factors and provide an economic interpretation of our findings. In section (4) we redo the empirical analysis by using different measures for the credit and market factors. Section (5) concludes.

2 Model Specification

This section introduces the empirical model of sovereign bond excess returns. Our approach builds on existing findings that forward prices contain valuable information to explain and predict risk premiums. This has been documented for government bond markets by Cochrane & Piazzesi (2005) and for currency markets by Fama

& Bliss (1987). As our focus is on decomposing sovereign bond risk premiums into market and credit factors, we start with a single term structure of riskless spot rates as well as country-specific term structures of CDS spreads for each country in the euro zone. We identify the German term structure of spot rates as riskless interest rates. To construct the single market factor we derive one-year forward rates from the term structure of riskless spot rates. We denote the one-year riskless forward interest rate between dates $t+n-1$ and $t+n$ by:

$$f_t^{(n)} = \frac{P_t^{(n-1,DE)} - P_t^{(n,DE)}}{P_t^{(n,DE)}}. \tag{1}$$

The construction of the market factor is not done by employing the forward rates directly but by making use of their first three principal components, instead. To be consistent with the construction of our credit factors, we utilize one-year forward rates starting in one, three, five, and seven years, i.e. $n \in \{2,4,6,8\}$, to calculate the principal components denoted by:

$$\boldsymbol{MF}_t' = \begin{bmatrix} PC_t^{DE(1)} & PC_t^{DE(2)} & PC_t^{DE(3)} \end{bmatrix}. \tag{2}$$

A linear combination of these PCs defines the market factor, which is identical for each country in the euro zone. The credit factors are obtained in the following way. First, we use the most liquid spot CDS maturities of one, three, five, seven, and ten years to derive the spreads of forward CDS contracts starting in one, three, five and, seven years with a maturity of one year, respectively. The forward CDS rates are denoted by:

$$cf_t^{(n)} = cf_t^{(n-1)\times 1}, \tag{3}$$

where $n \in \{2,4,6,8\}$. From the time series of these forward CDS rates the first PCs are calculated for each country i, denoted by PC_t^i. Using these PCs we perform a second principal component analysis to extract the euro-zone credit factor, $CF_t^{(Euro)}$. Hence, the common euro-zone credit factor is the first PC of the individual countries' first PCs. Finally, we regress each country's first PC on the euro-zone credit factor:

$$PC_t^i = \beta^i \, CF_t^{(Euro)} + \epsilon_t^i, \tag{4}$$

and define the orthogonal error term as the country-specific credit factor $CF_t^{Country,i} \equiv \epsilon_t^i$. This procedure results in a common credit factor among euro-zone countries and orthogonal country-specific credit factors for all countries except Germany. Following the approach of Cochrane & Piazzesi (2005), excess bond returns are regressed on market and credit factors. We use $P_t^{(n)}$ for the n-year zero-coupon bond price of a sovereign and define holding period returns as:[3]

$$r_{t+1}^{(n)} = \frac{P_{t+1}^{(n)} - P_t^{(n)}}{P_t^{(n)}}. \tag{5}$$

As we make use of weekly data and a holding period return of one quarter, we deviate slightly from the approach used, for example, in Cochrane & Piazzesi (2005). Excess holding period returns for maturity n over the period $(t, t+1)$ are calculated as:

$$rx_{t+1}^{(n)} = r_{t+1}^{(n)} - r_{t+1}^{(n,DE)}, \tag{6}$$

with $r_{t+1}^{(n,DE)}$ being the return of a German zero bond with maturity n-years and a holding period from t to $t+1$. Having specified the excess returns for different maturities we next define the average excess return as the mean between maturities of 1 to 8 years:

$$\overline{rx}_{t+1} = \frac{1}{8}[rx_{t+1}^{(1)} + rx_{t+1}^{(2)} + rx_{t+1}^{(3)} + rx_{t+1}^{(4)} + rx_{t+1}^{(5)} + rx_{t+1}^{(6)} + rx_{t+1}^{(7)} + rx_{t+1}^{(8)}]. \tag{7}$$

In the unrestricted version of the model, holding period returns of different maturities n are regressed on market and credit principal components:

$$rx_{t+1}^{(n,i)} = \delta_0^{(n,i)} + \boldsymbol{\gamma}'^{(n)}\boldsymbol{MF}_t + \delta_1^{(n,i)} CF_t^{(Country,i)} + \delta_2^{(n,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(n,i)}, \tag{8}$$

where ε_{t+1}^i represents the error term for country i and $\boldsymbol{\gamma}'^{(n)} = \begin{bmatrix} \gamma_1^{(n)} & \gamma_2^{(n)} & \gamma_3^{(n)} \end{bmatrix}$ is a vector of exposures of average excess bond returns to the market factors. Note that the vector of weights for the yield factor $\boldsymbol{\gamma}'^{(n)}$ is assumed to be identical among all countries, implying that there is a single market risk premium across euro-zone countries. Equation (8) additionally documents our modeling of a common and a country-specific credit factor.

[3] It is important to point out that the standard approach for calculating holding period returns is to use the price of a n-year zero bond at time t and relate it to the $n-1$-year zero bond at time $t+1$ to arrive at the one-year holding period return. Our approach used here differs slightly as we do not calculate one-year holding period returns but use a higher frequency.

In the restricted version of the model, following Cochrane & Piazzesi (2005), we use a two-stage approach. First, average holding period returns are regressed on market and credit principal components:

$$\overline{rx}_{t+1}^{(i)} = \delta_0^{(i)} + \boldsymbol{\gamma}' \boldsymbol{MF}_t + \delta_1^{(i)} CF_t^{(Country,i)} + \delta_2^{(i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(i)}. \tag{9}$$

In a second step, holding period returns of individual maturities are regressed on these factors and their risk premiums:

$$\begin{aligned} rx_{t+1}^{(i,n)} &= b_1^{(i,n)} + b_2^{(i,n)}(\hat{\boldsymbol{\gamma}}' \boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)} CF_t^{(Country,i)}) \\ &+ b_4^{(i,n)}(\hat{\delta}_2^{(i)} CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}. \end{aligned} \tag{10}$$

3 Bond Risk Premiums

3.1 Dataset

We use weekly CDS spreads of USD-denominated contracts for 10 euro-zone countries. Countries included are Austria, Belgium, France, Greece, Ireland, Italy, Netherlands, Portugal, Slovakia, and Spain. The eleventh country is Germany with its term structure being assumed to represent the risk-free curve. Out of the ten euro-zone countries included we have all peripheral states as well as core countries such as Austria, Belgium, France, and the Netherlands. Our data sources are Bloomberg and Datastream, with the sample period ranging from January 6, 2006 to February 10, 2012. The sample period covers about two and a half years of pre-crisis data as well as the entire crisis period. We include CDS maturities of 1, 3, 5, 7, and 10 years since these represent the most frequently traded tenors. In total, our data set yields 16,050 observations of the CDS term structure for 10 sovereigns. The restriction to euro-zone countries implies that we need not deal with exchange-rate risk and can identify the term structure of a single country, Germany, as risk-free interest rates.

For our same sample period, we collect weekly zero-coupon yields from Bloomberg. We obtain this data for maturities of 1, 2, 3, 4, 5, 6, 7, and 8 years so that our data set comprises 28,072 observations of zero yields.

3.2 Principal Components as Risk Factors

The German term structure as well as the country-specific CDS curves are the basis for the construction of our market and credit factors. In the appendix we discuss the procedure that we apply to calculate implied forward CDS spreads. As outlined in Section (2), in the basic model, we do not use the forward rates directly to measure the factors but extract principal components that are used throughout the empirical analysis in this section. In Section (4) we take an alternative approach and use forward rates directly to construct our market and credit factors. Table (1) reports the first three PCs for the German spot rates. The results confirm traditional findings. The first three PCs explain almost all variations contained in the spot rates, with the first factor being a level, the second a slope and the third a curvature factor (see Litterman & Scheinkman (1991)).

In the next step we extract PCs from the term structure of forward CDS spreads for each country separately. Tables (2) to (11) present the corresponding results for each country. It turns out that all CDS forward curves are driven by a single factor that explains at least 95% of the individual country's variation in CDS spreads. Looking at the factor loadings we find strong similarities across countries. The first PC clearly represents a level factor, with loadings across countries and across maturities being close to 0.5. The second PC represents a slope and the third a curvature factor. This applies across all ten countries. Looking at the PC analysis in more detail reveals that the loadings across countries are quantitatively very similar and that they share identical patterns. Similar to Longstaff et al. (2011), who find that CDS spreads are driven to a large part by a global factor, we investigate whether the country-specific PCs are driven by a common underlying factor. To extract this common global factor we apply a principal components analysis to the first PCs of each country. The result of this approach is presented in table (12). The common credit factor explains 88% of the variation of country-specific CDS forward spreads. The loadings of the common factor for all euro-zone countries range from 0.2914 (Austria) to 0.3330 (Belgium). This is quantitatively a small difference so that it is justified to identify the common European credit factor as a level factor. Using a simple linear regression that uses the first principal component for each country as the dependent and the common European factor as the independent variable, we can construct an orthogonal country-specific credit factor that we identify with the residual of the linear regression specified in equation (4). To summarize, the market factor is based on the first three PCs of the German forward curve, while the common credit factor is constructed from the first PCs of each country's CDS forward spreads with the country-specific credit factor being orthogonal to this factor.

3.3 Excess Bond Return Regressions

As discussed in section (2), we follow Cochrane & Piazzesi (2005) in estimating two versions of the model. We start with estimating the restricted model as given by equations (9) and (10). The estimation is done under the assumption that the market factor, capturing variations in the risk-free rate, is identical for each single euro-zone country. Without this assumption we would have different market factors for each country, contradicting the fact that there is a single risk-free asset across the euro zone. First, we estimate the baseline regression as given by equation (9). Next, we use the estimated coefficients from this regression to estimate equation (10).

Table (13) reports results for the baseline regression as given by equation (9). Three important observations need to be highlighted. First, the model is estimated twice, with the market factor and the credit factors in combination and without the credit factors. We report the R^2 for these two estimations. Without the common and country-specific credit factors R_F^2 amounts to 0.20. Including credit factors more than doubles R^2 to 0.52. The result that augmenting the market factor with credit factors substantially improves predictability is strongly related to the findings of Duffee (2011). Second, we find that the common euro-zone credit factor is significant for most countries in the sample.[4] Hence, we can argue that credit risk of sovereigns within the euro zone is not necessarily sovereign but instead driven by a euro-zone factor. Finally, the results document that the country-specific factor significantly predicts excess returns for all the peripheral countries, including Greece, Ireland, Italy, Portugal, Slovakia, and Spain. There are several conclusions that can be drawn from these results. First, one of the driving forces behind risk premiums is common credit risk captured by the common euro-zone factor. A common euro-zone factor implies that risk associated with it cannot be diversified away, so that the attractiveness of an investment in a portfolio of euro-zone sovereigns is tight to the risk premium this risk earns. The dynamics of the common euro-zone credit risk premium will be discussed below. Second, the role of the country-specific credit factor is diverse across euro-zone countries. While it is statistically insignificant for core countries, it is a dominating factor for the periphery. The pronounced role of peripheral countries is closely related to the latest debt and banking crisis and hence

[4]Exceptions are Ireland and the Netherlands.

reflects local macroeconomic conditions.

Figures (1), (2), and (3) portray the time series of the market risk premium, the European credit risk premium as well as the country-specific local credit risk premium for each single country.[5] It should be noted that all risk premiums plotted in the figures are estimated in-sample. Out-of-sample expected risk premiums are reported in Section (3.4).

Estimated risk premiums are negative over long subintervals of the sample period. This is surprising, as one might expect that investors demand a significant compensation for the non-diversifiable risks such as market and common European credit risk. A possible explanation for the negative risk premiums is financial repression across euro-zone countries. Government bonds are mainly held by large investors in the financial services industry and other institutional investors such as pension funds. These investors are strongly exposed to national regulatory constraints that are driven by incentives to hold local sovereign bonds, even though they earn negative returns. We will explore the issue of negative risk premiums in more detail in section (3.4), when we conduct an out-of-sample analysis of equation (9).

Tables (14) to (18) report the results for the restricted regressions as given by equation (10). In these regressions, historical excess returns for individual maturities ranging from 1 to 8 years are regressed on market and credit factors. In detail the table presents estimated loadings for the market, the common credit, and the country-specific risk factors, p-values in parenthesis, and R^2. Loadings for both the market and the common euro-zone factor mostly increase with maturity across the country sample, implying higher risk premiums. Loadings for the country-specific factors are quite distinct across countries and maturities. While they are positive and increasing in maturity for Austria, Belgium, Italy, Portugal, Slovakia and Spain, they are negative for France and the Netherlands, with no pattern across maturities and loadings for Greece and Ireland. R^2 varies substantially across countries and maturities and range from 0.00 (Ireland for a two year maturity) to 0.72 (Greece for a three year maturity). In general it turns out that R^2 does not vary a lot for different maturities, but does vary substantially for different countries. They are close to zero for Ireland, and Spain, at intermediate values from 0.15 to 0.40 in Austria, Belgium, France, Italy, the Netherlands, and Slovakia, and at high values beyond 0.40 in Greece and Portugal. Except for Ireland and Spain, R^2 is comparable or higher than those reported in Cochrane & Piazzesi (2005).

[5] In these figures the constant term in equation (9), δ_0^i, was added to the European credit risk premium.

Figures (1), (2), and (3) document that risk premiums vary substantially over the sample period, as do the excess holding period returns. The standard deviation of the excess returns together with the standard deviations of the market, the common euro-zone, and the country-specific risk premiums can be used to measure the relative contributions of risk factors and corresponding risk premiums towards the overall model's ability to predict excess returns of sovereigns. Table (35) reports the standard deviations of the excess bond returns for a maturity of five years in different countries, as well as the standard deviations of the market, the common credit, and the country-specific risk premiums. From this table we can infer that, except for Ireland and the Netherlands, the common euro-zone credit factor contributes most to the predictability of excess returns, the market factor for most of the countries comes in second, and the country-specific credit factor third.

Tables (19) to (26) report the results of estimating the unrestricted regressions as given by equation (8). The results are similar to those of the baseline regression given in table (13). R^2 ranges from 0.64 for maturities of one and two years to 0.39 for the seven-year maturity. For all maturities, inclusion of our credit factors significantly increases R^2. The common euro credit factor is significant for the majority of core and peripheral countries for most maturities, while the country-specific credit factor is significant mainly for peripheral euro-area countries.

The last issue we explore here is related to the common euro-zone factor. As this factor is extracted from the data using a principal components analysis, we do not know what its underlying economic forces are. Longstaff et al. (2011) document that their global credit factor is more related to the US stock and high-yield market than to local economic variables. This suggests looking at the correlation between the common euro-zone credit factor and the EuroStoxx600 index and the corresponding volatility index VStoxx. It turns out that the common credit factor shows a correlation coefficient of 0.497 with the Eurostoxx600 and -0.66 with the VStoxx.

3.4 Out-of-Sample Analysis

All results discussed so far are based on an in-sample analysis. To further investigate whether expected risk premiums have been negative over the sample period, we conduct an out-of-sample analysis based on equation (9). We estimate this baseline regression repeatedly, using a rolling window of 52 weeks and derive expected total risk premiums for each regression according to:

$$\mathbb{E}[\overline{rx}_{t+1}^{(i)}] = \delta_0^{(i)} + \boldsymbol{\gamma}'\boldsymbol{MF}_t + \delta_1^{(i)} CF_t^{(Country,i)} + \delta_2^{(i)} CF_t^{(Euro)}. \tag{11}$$

The expected out-of-sample average risk premiums are depicted in figures (4) and (5), in which core and peripheral countries are separated. According to table (34), average expected risk premiums over the sample period are positive for core countries including Italy and Spain and negative for the remaining peripheral states. This strongly supports our argument of financial repression being the cause of negative risk premiums.

4 Using the Cross Section of Yields and CDS Spreads

The approach introduced in the preceding section makes use of information contained in forward rates extracted through principal components. While the principal components allow us to construct a common and an orthogonal country-specific credit factor, they are latent factors and, hence, cannot directly be related to observable economic variables. To avoid this criticism we choose an alternative route and construct a market and a credit factor directly out of available forward curves.

4.1 Forward Rates as Forecasting Factors

As before, the German term structure and the corresponding forward rates are assumed to represent risk-free rates and are used to construct the single market factor that applies to all euro-zone countries. The credit factor is now country-specific and constructed directly from forward CDS spreads. We apply the same notation as before:

$$\begin{aligned} \boldsymbol{MF}_t' &= \begin{bmatrix} f_t^{(4)} & f_t^{(6)} & f_t^{(8)} \end{bmatrix}, \\ \boldsymbol{CF}_t' &= \begin{bmatrix} cf_t^{(4)} & cf_t^{(6)} & cf_t^{(8)} \end{bmatrix}. \end{aligned}$$

These forward rates are translated into a single market and country-specific credit factor by estimating the baseline regression of the restricted model given by:

$$\overline{rx}_{t+1}^{(i)} = \delta_0^{(i)} + \boldsymbol{\gamma}'\boldsymbol{MF}_t^{(\boldsymbol{DE})} + \boldsymbol{\delta}'^{(\boldsymbol{i})}\boldsymbol{CF}_t^{(\boldsymbol{i})} + \varepsilon_{t+1}^{(i)}, \quad i = 1, \ldots, N, \tag{12}$$

where N is the number of countries in the sample, $\varepsilon_{t+1}^{(i)}$ are the residuals for country i, and the parameter vectors are given by:

$$\begin{aligned} \boldsymbol{\gamma}' &= \begin{bmatrix} \gamma_4 & \gamma_6 & \gamma_8 \end{bmatrix}, \\ \boldsymbol{\delta}' &= \begin{bmatrix} \delta_4 & \delta_6 & \delta_8 \end{bmatrix}. \end{aligned}$$

The single market factor, which is identical to all countries, becomes $\hat{\boldsymbol{\gamma}}'\boldsymbol{MF}_t^{(\boldsymbol{DE})}$ while each country-related credit factor is given by $\hat{\boldsymbol{\delta}}'^{(\boldsymbol{i})}\boldsymbol{CF}_t^{(\boldsymbol{i})}$, where $\hat{\gamma}$ and $\hat{\delta}$ denote the estimates of γ and δ, respectively. These two linear factors are then used to explain excess holding period returns for different maturities n as in:

$$rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}\boldsymbol{\gamma}'\boldsymbol{MF}_t^{(\boldsymbol{DE})} + b_3^{(i,n)}\boldsymbol{\delta}'^{(\boldsymbol{i})}\boldsymbol{CF}_t^{(\boldsymbol{i})} + \varepsilon_{t+1}^{(i,n)}. \tag{13}$$

Using equation (13) it follows that the estimate $\hat{b}_2^{(i,n)}(\hat{\boldsymbol{\gamma}}'\boldsymbol{MF}_t^{(\boldsymbol{DE})})$ corresponds to the expected market risk premium while $\hat{b}_3^{(i,n)}(\hat{\boldsymbol{\delta}}'^{(\boldsymbol{i})}\boldsymbol{CF}_t^{(\boldsymbol{i})})$ corresponds to the expected credit risk premium. Both the market and the credit risk premiums vary from country to country and with different maturities. Since the estimation results for the unrestricted model are similar to those of the baseline regression (12), especially for longer maturities, we do not report them in the appendix.

4.2 Forecasting Excess Bond Returns

Table (27) reports the results for the baseline regression given by equation (12). Comparing these estimates with those from our general case reported in table (13) reveals two important communalities that are worth mentioning. First, the improvement of predictability by moving from a model with a single market factor to one with a market and a credit factor is almost identical to what we have seen in the preceding section. R^2 increases from 0.21 to 0.56 (compared to 0.20 and 0.52). Second, the level of the estimated parameters for the market factor is substantially higher when forward rates are used instead of principal components. This does not come as a surprise, as the PC analysis factors out the level of the forward rates. Moreover, the estimates of the credit factor do not result in a common pattern across countries as it was the case in the preceding section. Signs of the coefficient estimates related to the different forward rates change regularly without any stable pattern.

Looking at the estimation results for equation (13) we find that on average results look better than for equation (10) of the standard model. In particular, R^2 for Ireland is much higher by ranging from 0.10 to 0.27, while those of Spain remain at very low levels between 0.04 and 0.12. What we do find in general now is that for a large majority of countries and maturities both factors have a statistically significant influence on excess returns. Finally, it is worth pointing out that loadings to the market as well as the credit factor increase with maturity across countries.

Again we can explore the relative contributions of the market and the credit factors toward the model's overall ability to predict excess bond returns. Table (36) reports the standard deviations of the excess holding period returns, the market and the credit risk premiums. The evidence is mixed. For half of the countries the contribution of the credit factor is more pronounced than that of the market factor with no clear pattern across countries.

5 Conclusion

We introduce a novel asset pricing model for sovereign bond risk premiums that consistently incorporates market and credit factors based on the cross section of yields and CDS spreads. In the general model, market and credit factors are based on principal components of the German forward curve as well as country-specific forward CDS spreads, while in an alternative specification of the model they are constructed directly from the respective forward curves. We find that these sets of factors do a good job in predicting excess bond returns. In particular, we find that the inclusion of a credit factor increases R^2 from 0.20 to as high as 0.52. This is a remarkable result and it comes as a surprise how valuable information in forward markets can be. In the general model we construct a euro-zone and a country-specific credit factor and find that the euro-zone factor is statistically significant for most of the countries, while the country-specific factor is significant mainly for peripheral countries such as Italy, Portugal, Greece, Ireland, and Spain. Using our factors we are able to compute expected market and credit bond risk premiums and find that these risk premiums are negative over long subintervals of our sample period. We interpret this result as the outcome of financial repression and argue that the current investor base for European government bonds supports this interpretation.

6 Appendix

6.1 CDS Valuation & Forward CDS Spreads

Forward CDS spreads are extracted from the term structure of spot CDS spreads with discount factors computed from German zero-coupon yields for euro-area countries. The fair premium c_t^T of a CDS equates the premium and protection leg of a contract. The premium leg V_t^{prem} is the expected present value of premium payments made by the protection buyer to the protection seller until the contract matures or a credit event occurs:

$$V_t^{prem} = c_t^T RPV_t^T, \tag{14}$$

$$\begin{aligned} RPV_t^T &= \sum_{n=1}^{N} \delta(t_{n-1}, t_n) Z(t, t_n) Q(t, t_n) \\ &+ \sum_{n=1}^{N} \int_{t_{n-1}}^{t_n} \delta(t_{n-1}, u) Z(t, u) Q(t, u)(-dQ(t, u)), \end{aligned} \tag{15}$$

where $t_0 = t$, $t_N = t + T$, N denotes the number of premium payments over the life of the CDS contract, and $\delta(t_{n-1}, t_n)$ refers to the day count fraction between two consecutive premium payment dates t_{n-1} and t_n. The variable $Z(t, u)$ denotes the price of a risk-free zero coupon bond at time t maturing at time u and $Q(t, u)$ refers to the risk-neutral survival probability until time u. Hence, the first term on the right-hand side of equation (15) is the expected present value of premium payments conditional on surviving to the respective payments dates, while the second term captures the accrued premium to be paid if a credit event occurs between payment dates.

The protection leg V_t^{prot} is the expected present value of the protection payment made by the protection seller to the protection buyer if a credit event occurs:

$$V_t^{prot} = (1 - R) \int_t^{t+T} Z(t, u)(-dQ(t, u)), \tag{16}$$

where R denotes the recovery rate. Equating the premium and protection leg yields:

$$c_t^T = \frac{(1 - R) \int_t^{t+T} Z(t, u)(-dQ(t, u))}{RPV_t^T}. \tag{17}$$

Given observed market CDS spreads we bootstrap the survival curve $Q(t, t_i)$ for various maturities t_i assuming a recovery rate R of 40% and computing risk-free zero-coupon bond prices $Z(t, u)$ based on the German zero yield curve for euro-area countries.

A forward CDS contract is a hypothetical CDS contract that provides protection against default of a reference obligation for a future time period of length T starting at a forward date $t + \tau,\ \tau > 0$. The premium to be paid over this future protection period is determined today at contract inception. For such a forward CDS contract, market participants should be indifferent between trading a $\tau + T$-period spot contract or a combination of spot and forward contracts covering the same period of time:

$$c_t^{\tau+T} RPV_t^{\tau+T} = c_t^{\tau} RPV_t^{\tau} + cf_t^{\tau\times T} RPV_t^{\tau\times T}, \tag{18}$$

where $RPV_t^{\tau\times T} = RPV_t^{\tau+T} - RPV_t^{\tau}$ and $cf_t^{\tau\times T}$ is the spread of a forward contract with forward date $t+\tau$ and maturity date $t+T$. Hence, the expected present value of a stream of spot CDS premiums $c_t^{\tau+T}$ of a contract with maturity date $t+\tau+T$ is equal to the expected present value of a stream of CDS premiums c_t^{τ} of a contract with maturity date $t+\tau$ plus the expected present value of a stream of forward CDS premiums $cf_t^{\tau\times T}$ of a forward contract with forward date $t+\tau$ and maturity date $t+\tau+T$.

6.2 Constructing Credit and Market Factors

Table 1: Principal Components Analysis – Forward Interest Rates

Principal Components Analysis – Forward Interest Rates			
Principal Component	**Percent explained**	**Total**	
First	0.82	0.82	
Second	0.15	0.97	
Third	0.03	1.00	
Loadings	**First**	**Second**	**Third**
$f^{2,DE}$	0.4618	0.6996	0.3689
$f^{4,DE}$	0.5407	0.1927	-0.1709
$f^{6,DE}$	0.5250	-0.2393	-0.6860
$f^{8,DE}$	0.4677	-0.6451	0.6035

Table 2: Principal Components Analysis – Forward CDS Austria

Principal Components Analysis – Forward CDS Austria			
Principal Component	**Percent explained**	**Total**	
First	0.98	0.98	
Second	0.02	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Austria}$	0.4925	0.8392	0.2261
$cf^{4,Austria}$	0.5035	-0.0783	-0.8418
$cf^{6,Austria}$	0.5030	-0.2956	0.1601
$cf^{8,Austria}$	0.5009	-0.4497	0.4632

Table 3: Principal Components Analysis – Forward CDS Belgium

Principal Components Analysis – Forward CDS Belgium			
Principal Component	**Percent explained**	**Total**	
First	1.00	1.00	
Second	0.00	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Belgium}$	0.4986	0.8660	-0.0376
$cf^{4,Belgium}$	0.5004	-0.2518	0.8104
$cf^{6,Belgium}$	0.5006	-0.3035	-0.2392
$cf^{8,Belgium}$	0.5005	-0.3075	-0.5335

Table 4: Principal Components Analysis – Forward CDS France

Principal Components Analysis – Forward CDS France			
Principal Component	**Percent explained**	**Total**	
First	0.99	0.99	
Second	0.01	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,France}$	0.4955	0.8343	0.2219
$cf^{4,France}$	0.5023	-0.0528	-0.8430
$cf^{6,France}$	0.5013	-0.3467	0.4620
$cf^{8,France}$	0.5008	-0.4254	0.1633

Table 5: Principal Components Analysis – Forward CDS Greece

Principal Components Analysis – Forward CDS Greece			
Principal Component	**Percent explained**	**Total**	
First	0.95	0.95	
Second	0.04	0.99	
Third	0.01	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Greece}$	0.4869	0.8496	0.1843
$cf^{4,Greece}$	0.5014	-0.3973	0.6755
$cf^{6,Greece}$	0.5058	-0.0887	-0.6984
$cf^{8,Greece}$	0.5057	-0.3353	-0.1487

Table 6: Principal Components Analysis – Forward CDS Ireland

Principal Components Analysis – Forward CDS Ireland			
Principal Component	**Percent explained**	**Total**	
First	0.97	0.97	
Second	0.03	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Ireland}$	0.4906	0.8071	0.1014
$cf^{4,Ireland}$	0.5043	-0.1958	-0.8409
$cf^{6,Ireland}$	0.5062	-0.0399	0.3254
$cf^{8,Ireland}$	0.4987	-0.5555	0.4203

Table 7: Principal Components Analysis – Forward CDS Italy

Principal Components Analysis – Forward CDS Italy			
Principal Component	**Percent explained**	**Total**	
First	0.99	0.99	
Second	0.01	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Italy}$	0.4982	0.8659	0.0121
$cf^{4,Italy}$	0.5003	-0.3120	0.7634
$cf^{6,Italy}$	0.5010	-0.2442	-0.1456
$cf^{8,Italy}$	0.5005	-0.3054	-0.6292

Table 8: Principal Components Analysis – Forward CDS Netherlands

Principal Components Analysis – Forward CDS Netherlands			
Principal Component	**Percent explained**	**Total**	
First	0.97	0.97	
Second	0.03	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Netherlands}$	0.4853	0.8567	0.1562
$cf^{4,Netherlands}$	0.5063	-0.1423	-0.8442
$cf^{6,Netherlands}$	0.5058	-0.2609	0.2516
$cf^{8,Netherlands}$	0.5023	-0.4217	0.4467

Table 9: Principal Components Analysis – Forward CDS Portugal

Principal Components Analysis – Forward CDS Portugal			
Principal Component	**Percent explained**	**Total**	
First	0.99	0.99	
Second	0.01	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Portugal}$	0.4946	0.8113	0.0128
$cf^{4,Portugal}$	0.5009	-0.3930	0.7454
$cf^{6,Portugal}$	0.5038	0.0239	-0.0986
$cf^{8,Portugal}$	0.5007	-0.4322	-0.6592

Table 10: Principal Components Analysis – Forward CDS Slovakia

Principal Components Analysis – Forward CDS Slovakia			
Principal Component	**Percent explained**	**Total**	
First	0.98	0.98	
Second	0.01	0.99	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Slovakia}$	0.4973	0.6698	0.5435
$cf^{4,Slovakia}$	0.5016	0.2629	-0.7122
$cf^{6,Slovakia}$	0.5026	-0.3077	-0.2134
$cf^{8,Slovakia}$	0.4985	-0.6225	0.3896

Table 11: Principal Components Analysis – Forward CDS Spain

Principal Components Analysis – Forward CDS Spain			
Principal Component	**Percent explained**	**Total**	
First	0.99	0.99	
Second	0.01	1.00	
Third	0.00	1.00	
Loadings	**First**	**Second**	**Third**
$cf^{2,Spain}$	0.4982	0.8666	0.0168
$cf^{4,Spain}$	0.5003	-0.3081	0.7875
$cf^{6,Spain}$	0.5009	-0.2611	-0.2337
$cf^{8,Spain}$	0.5006	-0.2931	-0.5700

Table 12: Principal Components Analysis – Country Components

Principal Components Analysis – Country Components			
Principal Component	**Percent explained**	**Total**	
First	0.88	0.88	
Second	0.09	0.97	
Third	0.01	0.98	
Loadings	**First**	**Second**	**Third**
Austria	0.2914	0.5075	0.3058
Belgium	0.3325	-0.0995	0.0285
France	0.3330	-0.0712	-0.1989
Greece	0.3129	-0.3658	-0.1097
Ireland	0.3186	-0.1812	0.6675
Italy	0.3299	-0.0029	-0.4011
Netherlands	0.3049	0.4360	0.1477
Portugal	0.3127	-0.3702	-0.1700
Slovakia	0.2973	0.4394	-0.4133
Spain	0.3260	-0.2016	0.1614

6.3 Estimating the Standard Model

Table 13: Baseline Regression

Model: $\overline{rx}_{t+1}^{(i)} = \delta_0^{(i)} + \boldsymbol{\gamma}'\boldsymbol{MF}_t + \delta_1^{(i)} CF_t^{(Country,i)} + \delta_2^{(i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(i)}$	-0.0027	-0.0048	-0.0025	-0.0564	-0.0106	-0.0088	-0.0010	-0.0250	-0.0054	-0.0067
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(i)}$	0.0004	0.0111	0.0028	-0.0447	0.0132	0.0149	-0.0012	-0.0201	-0.0022	-0.0034
	(0.84)	(0.00)	(0.53)	(0.00)	(0.00)	(0.00)	(0.53)	(0.00)	(0.04)	(0.02)
$\delta_2^{(i)}$	-0.0020	-0.0021	-0.0020	-0.0278	-0.0011	-0.0037	-0.0010	-0.0102	-0.0032	-0.0017
	(0.01)	(0.00)	(0.01)	(0.00)	(0.13)	(0.00)	(0.19)	(0.00)	(0.00)	(0.02)
$\boldsymbol{\gamma_1}$	-0.0015	(0.20)	$\boldsymbol{R^2}$	0.52						
$\boldsymbol{\gamma_2}$	-0.0024	(0.43)	$\boldsymbol{R_F^2}$	0.20						
$\boldsymbol{\gamma_3}$	-0.0169	(0.01)	**Wald**	0.00						

This table reports the results of estimating the system of equations given in (9). The sample period ranges from January 2006 to February 2012 and the estimation is based on weekly data. The variable R_F^2 denotes the R^2 of a regression that excludes credit risk factors: $\overline{rx}_{t+1}^{(i)} = \delta_0^{(i)} + \boldsymbol{\gamma}'\boldsymbol{MF}_t + \varepsilon_{t+1}^{(i)}$ and the term "Wald" corresponds to the p-value of a Wald test under the null that R_F^2 is equal to the R^2 of the total model. Numbers in parentheses represent p-values based on White covariances robust to within cross-section serial correlation and heteroskedasticity.

6.3.1 Estimating Restricted Regressions for the Standard Model

Tables (14) to (18) show the results of estimating equation (10). The sample period ranges from January 2006 to February 2012 and the estimation is based on weekly data. Numbers in brackets correspond to p-values that are based on HAC (Newey-West) covariances robust to serial correlation and heteroskedasticity.

Table 14: Restricted Regression (1)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}(\hat{\gamma}'\boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)} CF_t^{(Country,i)}) + b_4^{(i,n)}(\hat{\delta}_2^{(i)} CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}$

n	**Austria**					**Belgium**				
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$
1	-0.0000	-0.0065	0.6634	-0.0049	0.03	-0.0008	0.1394	0.2123	0.2587	0.17
	(0.64)	(0.83)	(0.24)	(0.86)		(0.04)	(0.09)	(0.23)	(0.09)	
2	-0.0008	0.1462	3.3647	0.1985	0.30	-0.0021	0.3751	0.4788	0.4830	0.13
	(0.13)	(0.01)	(0.02)	(0.07)		(0.01)	(0.02)	(0.15)	(0.05)	
3	-0.0014	0.2347	5.5632	0.2600	0.24	-0.0034	0.6042	0.6951	0.6639	0.12
	(0.11)	(0.06)	(0.02)	(0.13)		(0.02)	(0.04)	(0.24)	(0.14)	
4	-0.0025	0.3037	5.7568	0.6197	0.25	-0.0044	0.7445	0.9450	0.7742	0.11
	(0.00)	(0.09)	(0.03)	(0.01)		(0.00)	(0.01)	(0.06)	(0.08)	
5	-0.0033	0.6189	8.6976	0.9747	0.37	-0.0057	1.0022	1.0839	1.0651	0.16
	(0.04)	(0.00)	(0.05)	(0.00)		(0.02)	(0.02)	(0.11)	(0.08)	
6	-0.0040	0.5158	10.7221	1.0945	0.36	-0.0066	1.0279	1.0810	1.2082	0.15
	(0.02)	(0.03)	(0.04)	(0.00)		(0.02)	(0.03)	(0.13)	(0.08)	
7	-0.0047	0.3306	12.9356	1.1867	0.34	-0.0074	0.9918	1.0034	1.3293	0.14
	(0.01)	(0.22)	(0.04)	(0.00)		(0.02)	(0.07)	(0.15)	(0.08)	
8	-0.0049	0.7779	14.0200	1.4018	0.36	-0.0080	1.3581	1.0907	1.4850	0.17
	(0.04)	(0.09)	(0.15)	(0.00)		(0.01)	(0.02)	(0.08)	(0.06)	

Table 15: Restricted Regression (2)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}(\hat{\gamma}'\boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)} CF_t^{(Country,i)}) + b_4^{(i,n)}(\hat{\delta}_2^{(i)} CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}$

n	**France**					**Greece**				
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$
1	-0.0002	0.0102	-0.2099	0.0543	0.08	-0.0325	1.0261	1.0657	0.7226	0.64
	(0.16)	(0.64)	(0.49)	(0.30)		(0.00)	(0.48)	(0.01)	(0.00)	
2	-0.0007	0.0697	-0.5644	0.1667	0.13	-0.0516	2.9812	1.2159	1.0995	0.72
	(0.08)	(0.16)	(0.36)	(0.16)		(0.00)	(0.08)	(0.00)	(0.00)	
3	-0.0014	0.1581	-0.9465	0.3705	0.20	-0.0593	4.8068	0.8927	1.2365	0.72
	(0.00)	(0.01)	(0.24)	(0.00)		(0.00)	(0.00)	(0.00)	(0.00)	
4	-0.0022	0.3115	-0.9891	0.6125	0.26	-0.0610	6.2688	0.5460	1.2716	0.65
	(0.01)	(0.01)	(0.43)	(0.02)		(0.00)	(0.01)	(0.14)	(0.00)	
5	-0.0029	0.4009	-1.8304	0.8279	0.32	-0.0566	7.0148	0.1608	1.2336	0.55
	(0.00)	(0.00)	(0.20)	(0.01)		(0.00)	(0.02)	(0.75)	(0.00)	
6	-0.0035	0.4652	-1.7495	1.0008	0.32	-0.0608	6.2839	0.2995	1.2040	0.53
	(0.00)	(0.00)	(0.24)	(0.01)		(0.00)	(0.02)	(0.55)	(0.00)	
7	-0.0042	0.5250	-1.5071	1.1799	0.31	-0.0614	4.9676	0.4011	1.0653	0.45
	(0.00)	(0.00)	(0.35)	(0.01)		(0.00)	(0.04)	(0.44)	(0.00)	
8	-0.0046	0.7094	-0.4919	1.3899	0.33	-0.0680	3.2978	0.9325	1.0751	0.48
	(0.00)	(0.00)	(0.78)	(0.00)		(0.00)	(0.11)	(0.02)	(0.00)	

Table 16: Restricted Regression (3)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}(\hat{\gamma}'\boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)}CF_t^{(Country,i)}) + b_4^{(i,n)}(\hat{\delta}_2^{(i)}CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}$

n	**Ireland**					**Italy**				
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$
1	-0.0030	0.1842	-0.1209	0.6382	0.04	-0.0017	0.1559	0.3114	0.1958	0.12
	(0.03)	(0.35)	(0.69)	(0.30)		(0.07)	(0.25)	(0.30)	(0.27)	
2	-0.0054	0.3251	0.1164	0.1202	0.00	-0.0040	0.5359	0.6337	0.4491	0.16
	(0.31)	(0.57)	(0.93)	(0.96)		(0.02)	(0.05)	(0.21)	(0.12)	
3	-0.0073	0.5147	0.7171	0.0176	0.02	-0.0061	0.8535	0.7859	0.6773	0.16
	(0.37)	(0.57)	(0.71)	(1.00)		(0.01)	(0.05)	(0.31)	(0.10)	
4	-0.0095	1.0638	1.2490	0.7568	0.04	-0.0081	1.1578	0.9140	0.9567	0.19
	(0.32)	(0.34)	(0.57)	(0.85)		(0.01)	(0.04)	(0.33)	(0.06)	
5	-0.0113	1.1412	1.6345	1.2292	0.04	-0.0101	1.4064	1.0142	1.2363	0.22
	(0.30)	(0.40)	(0.49)	(0.78)		(0.01)	(0.03)	(0.34)	(0.04)	
6	-0.0137	0.9289	1.6340	1.1814	0.04	-0.0118	1.5324	1.2924	1.4380	0.22
	(0.24)	(0.55)	(0.49)	(0.81)		(0.01)	(0.05)	(0.27)	(0.04)	
7	-0.0163	0.5610	1.4754	1.1087	0.03	-0.0135	1.6049	1.5908	1.6273	0.23
	(0.17)	(0.74)	(0.50)	(0.82)		(0.01)	(0.09)	(0.22)	(0.04)	
8	-0.0181	0.4482	1.1412	0.7518	0.02	-0.0148	1.9417	1.8371	1.7014	0.24
	(0.16)	(0.81)	(0.56)	(0.89)		(0.01)	(0.06)	(0.17)	(0.04)	

Table 17: Restricted Regression (4)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}(\hat{\gamma}'\boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)} CF_t^{(Country,i)}) + b_4^{(i,n)}(\hat{\delta}_2^{(i)} CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}$

n	**Netherlands**					**Portugal**				
	b_1	b_2	b_3	b_4	R^2	b_1	b_2	b_3	b_4	R^2
1	-0.0001	0.0144	-0.3108	-0.0292	0.12	-0.0061	-0.7339	0.6121	0.1642	0.31
	(0.57)	(0.52)	(0.00)	(0.34)		(0.00)	(0.10)	(0.00)	(0.25)	
2	-0.0002	0.0462	-0.7929	-0.0058	0.27	-0.0123	-0.4361	0.8653	0.3453	0.28
	(0.32)	(0.28)	(0.00)	(0.93)		(0.00)	(0.55)	(0.00)	(0.17)	
3	-0.0006	0.1086	-1.2901	0.1259	0.27	-0.0191	0.5645	0.8576	0.7071	0.33
	(0.12)	(0.12)	(0.00)	(0.34)		(0.00)	(0.46)	(0.08)	(0.01)	
4	-0.0009	0.2231	-1.9488	0.2120	0.30	-0.0234	1.6118	0.7072	1.0307	0.44
	(0.22)	(0.06)	(0.03)	(0.28)		(0.00)	(0.02)	(0.21)	(0.00)	
5	-0.0013	0.3937	-1.3738	0.6181	0.30	-0.0291	1.7336	0.9864	1.2639	0.49
	(0.10)	(0.00)	(0.06)	(0.00)		(0.00)	(0.05)	(0.10)	(0.00)	
6	-0.0015	0.3372	-1.9992	0.5772	0.30	-0.0333	1.6172	1.2033	1.3963	0.50
	(0.08)	(0.00)	(0.02)	(0.00)		(0.00)	(0.10)	(0.05)	(0.00)	
7	-0.0018	0.2333	-2.7429	0.4800	0.27	-0.0369	1.3668	1.4188	1.4934	0.51
	(0.06)	(0.10)	(0.01)	(0.03)		(0.00)	(0.21)	(0.06)	(0.00)	
8	-0.0017	0.5030	-2.9590	0.4904	0.33	-0.0396	1.5248	1.5368	1.5344	0.47
	(0.20)	(0.03)	(0.03)	(0.14)		(0.00)	(0.12)	(0.02)	(0.00)	

Table 18: Restricted Regression (5)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}(\hat{\gamma}'\boldsymbol{MF}_t) + b_3^{(i,n)}(\hat{\delta}_1^{(i)}CF_t^{(Country,i)}) + b_4^{(i,n)}(\hat{\delta}_2^{(i)}CF_t^{(Euro)}) + \varepsilon_{t+1}^{(i,n)}$

n	**Slovakia**					**Spain**				
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{b_4}$	$\boldsymbol{R^2}$
1	-0.0009	0.2004	-0.4153	0.1837	0.15	-0.0014	-0.0576	0.2936	0.1493	0.02
	(0.31)	(0.15)	(0.35)	(0.05)		(0.08)	(0.59)	(0.71)	(0.54)	
2	-0.0019	0.1639	-0.5954	0.2519	0.07	-0.0029	0.0263	0.5798	0.2641	0.02
	(0.25)	(0.56)	(0.50)	(0.14)		(0.02)	(0.90)	(0.66)	(0.37)	
3	-0.0033	0.3923	-0.3382	0.4732	0.10	-0.0044	0.1599	1.2300	0.2786	0.03
	(0.18)	(0.19)	(0.73)	(0.05)		(0.02)	(0.64)	(0.49)	(0.49)	
4	-0.0047	0.6743	0.1833	0.7996	0.15	-0.0060	0.3075	1.4583	0.5411	0.04
	(0.11)	(0.06)	(0.88)	(0.01)		(0.01)	(0.49)	(0.47)	(0.24)	
5	-0.0062	0.9717	1.4252	1.0467	0.17	-0.0079	0.4238	1.6386	0.9128	0.06
	(0.09)	(0.03)	(0.37)	(0.01)		(0.01)	(0.41)	(0.47)	(0.15)	
6	-0.0073	1.0584	1.5856	1.2475	0.18	-0.0091	0.3058	2.3052	0.8702	0.05
	(0.09)	(0.02)	(0.40)	(0.01)		(0.01)	(0.62)	(0.37)	(0.24)	
7	-0.0082	1.1094	1.7054	1.4460	0.18	-0.0101	0.1157	3.0922	0.7517	0.05
	(0.10)	(0.02)	(0.45)	(0.01)		(0.01)	(0.87)	(0.29)	(0.37)	
8	-0.0105	2.0459	3.1633	2.1701	0.30	-0.0115	0.2663	2.9629	0.8871	0.05
	(0.05)	(0.00)	(0.21)	(0.00)		(0.01)	(0.73)	(0.34)	(0.31)	

6.3.2 Estimating Unrestricted Regressions for the Standard Model

Tables (19) to (26) report the results of estimating equation (8). The sample period ranges from January 2006 to February 2012 and the estimation is based on weekly data. The variable R_F^2 denotes the R^2 of a regression that excludes credit risk factors: $rx_{t+1}^{(n,i)} = \delta_0^{(n,i)} + \boldsymbol{\gamma}'^{(n)}\boldsymbol{MF}_t + \varepsilon_{t+1}^{(n,i)}$ and the term "Wald" corresponds to the p-value of a Wald test under the null that R_F^2 is equal to the R^2 of the total model. Numbers in parentheses represent p-values based on White covariances robust to within cross-section serial correlation and heteroskedasticity.

Table 19: Unrestricted Regression – 1Y

Model: $rx_{t+1}^{(1,i)} = \delta_0^{(1,i)} + \boldsymbol{\gamma}'^{(1)} \boldsymbol{MF}_t + \delta_1^{(1,i)} CF_t^{(Country,i)} + \delta_2^{(1,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(1,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(1,i)}$	-0.0001	-0.0008	-0.0002	-0.0325	-0.0030	-0.0017	-0.0001	-0.0061	-0.0009	-0.0014
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(1,i)}$	-0.0003	0.0026	0.0001	-0.0512	-0.0016	0.0041	0.0002	-0.0078	0.0013	-0.0020
	(0.61)	(0.06)	(0.96)	(0.00)	(0.00)	(0.00)	(0.68)	(0.00)	(0.00)	(0.05)
$\delta_2^{(1,i)}$	-0.0009	-0.0014	-0.0010	-0.0201	-0.0015	-0.0015	-0.0009	-0.0033	-0.0014	-0.0012
	(0.25)	(0.10)	(0.20)	(0.00)	(0.07)	(0.06)	(0.27)	(0.00)	(0.10)	(0.13)
$\boldsymbol{\gamma_1^{(1)}}$	-0.0014	(0.26)	$\boldsymbol{R^2}$	0.64						
$\boldsymbol{\gamma_2^{(1)}}$	-0.0030	(0.24)	$\boldsymbol{R_F^2}$	0.15						
$\boldsymbol{\gamma_3^{(1)}}$	-0.0001	(0.97)	**Wald**	0.00						

Table 20: Unrestricted Regression – 2Y

Model: $rx_{t+1}^{(2,i)} = \delta_0^{(2,i)} + \boldsymbol{\gamma}'^{(2)} \boldsymbol{MF}_t + \delta_1^{(2,i)} CF_t^{(Country,i)} + \delta_2^{(2,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(2,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(2,i)}$	-0.0008	-0.0021	-0.0007	-0.0516	-0.0054	-0.0040	-0.0002	-0.0123	-0.0019	-0.0029
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(2,i)}$	0.0006	0.0060	0.0001	-0.0648	0.0019	0.0075	-0.0002	-0.0133	0.0012	-0.0020
	(0.63)	(0.03)	(0.97)	(0.00)	(0.00)	(0.00)	(0.89)	(0.00)	(0.03)	(0.02)
$\delta_2^{(2,i)}$	-0.0016	-0.0020	-0.0016	-0.0292	-0.0012	-0.0025	-0.0013	-0.0052	-0.0020	-0.0017
	(0.13)	(0.06)	(0.13)	(0.00)	(0.27)	(0.02)	(0.23)	(0.00)	(0.06)	(0.10)
$\boldsymbol{\gamma}_\mathbf{1}^{(2)}$	-0.0023	(0.18)	$\boldsymbol{R^2}$	0.64						
$\boldsymbol{\gamma}_\mathbf{2}^{(2)}$	-0.0026	(0.42)	$\boldsymbol{R_F^2}$	0.17						
$\boldsymbol{\gamma}_\mathbf{3}^{(2)}$	-0.0055	(0.09)	**Wald**	0.00						

Table 21: Unrestricted Regression – 3Y

Model: $rx_{t+1}^{(3,i)} = \delta_0^{(3,i)} + \boldsymbol{\gamma}'^{(3)} \boldsymbol{MF}_t + \delta_1^{(3,i)} CF_t^{(Country,i)} + \delta_2^{(3,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(3,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(3,i)}$	-0.0014	-0.0034	-0.0014	-0.0593	-0.0073	-0.0061	-0.0006	-0.0191	-0.0033	-0.0044
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(3,i)}$	-0.0002	0.0098	0.0026	-0.0555	0.0098	0.0111	-0.0013	-0.0160	-0.0000	-0.0026
	(0.91)	(0.02)	(0.53)	(0.00)	(0.00)	(0.00)	(0.47)	(0.00)	(1.00)	(0.02)
$\delta_2^{(3,i)}$	-0.0014	-0.0019	-0.0016	-0.0312	-0.0006	-0.0028	-0.0011	-0.0078	-0.0022	-0.0014
	(0.16)	(0.05)	(0.09)	(0.00)	(0.52)	(0.00)	(0.26)	(0.00)	(0.02)	(0.15)
$\boldsymbol{\gamma_1^{(3)}}$	-0.0018	(0.23)	$\boldsymbol{R^2}$	0.59						
$\boldsymbol{\gamma_2^{(3)}}$	-0.0025	(0.48)	$\boldsymbol{R_F^2}$	0.19						
$\boldsymbol{\gamma_3^{(3)}}$	-0.0135	(0.03)	**Wald**	0.00						

Table 22: Unrestricted Regression – 4Y

Model: $rx_{t+1}^{(4,i)} = \delta_0^{(4,i)} + \boldsymbol{\gamma}'^{(4)} \boldsymbol{MF}_t + \delta_1^{(4,i)} CF_t^{(Country,i)} + \delta_2^{(4,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(4,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(4,i)}$	-0.0025	-0.0044	-0.0022	-0.0610	-0.0095	-0.0081	-0.0009	-0.0234	-0.0047	-0.0060
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(4,i)}$	-0.0017	0.0151	0.0059	-0.0436	0.0165	0.0146	-0.0021	-0.0158	-0.0017	-0.0020
	(0.46)	(0.00)	(0.31)	(0.00)	(0.00)	(0.00)	(0.39)	(0.00)	(0.19)	(0.27)
$\delta_2^{(4,i)}$	-0.0019	-0.0019	-0.0018	-0.0307	-0.0008	-0.0035	-0.0009	-0.0100	-0.0029	-0.0016
	(0.02)	(0.02)	(0.02)	(0.00)	(0.30)	(0.00)	(0.25)	(0.00)	(0.00)	(0.05)
$\boldsymbol{\gamma_1^{(4)}}$	-0.0015	(0.20)	$\boldsymbol{R^2}$	0.52						
$\boldsymbol{\gamma_2^{(4)}}$	-0.0030	(0.40)	$\boldsymbol{R_F^2}$	0.19						
$\boldsymbol{\gamma_3^{(4)}}$	-0.0217	(0.02)	**Wald**	0.00						

Table 23: Unrestricted Regression – 5Y

Model: $rx_{t+1}^{(5,i)} = \delta_0^{(5,i)} + \boldsymbol{\gamma}'^{(5)}\boldsymbol{MF}_t + \delta_1^{(5,i)} CF_t^{(Country,i)} + \delta_2^{(5,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(5,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(5,i)}$	-0.0033	-0.0057	-0.0029	-0.0566	-0.0113	-0.0101	-0.0013	-0.0291	-0.0062	-0.0079
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(5,i)}$	-0.0008	0.0168	0.0065	-0.0276	0.0214	0.0176	-0.0036	-0.0202	-0.0047	-0.0020
	(0.79)	(0.00)	(0.41)	(0.00)	(0.00)	(0.00)	(0.27)	(0.00)	(0.01)	(0.43)
$\delta_2^{(5,i)}$	-0.0020	-0.0020	-0.0019	-0.0287	-0.0010	-0.0040	-0.0009	-0.0120	-0.0031	-0.0018
	(0.03)	(0.03)	(0.04)	(0.00)	(0.28)	(0.00)	(0.35)	(0.00)	(0.00)	(0.05)
$\boldsymbol{\gamma_1}^{(5)}$	-0.0008	(0.61)	$\boldsymbol{R^2}$	0.44						
$\boldsymbol{\gamma_2}^{(5)}$	-0.0039	(0.32)	$\boldsymbol{R_F^2}$	0.18						
$\boldsymbol{\gamma_3}^{(5)}$	-0.0267	(0.02)	**Wald**	0.00						

Table 24: Unrestricted Regression – 6Y

Model: $rx_{t+1}^{(6,i)} = \delta_0^{(6,i)} + \boldsymbol{\gamma}'^{(6)} \boldsymbol{MF}_t + \delta_1^{(6,i)} CF_t^{(Country,i)} + \delta_2^{(6,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(6,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(6,i)}$	-0.0040	-0.0066	-0.0035	-0.0608	-0.0137	-0.0118	-0.0015	-0.0333	-0.0073	-0.0091
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(6,i)}$	0.0002	0.0154	0.0044	-0.0318	0.0217	0.0199	-0.0025	-0.0249	-0.0045	-0.0040
	(0.94)	(0.00)	(0.52)	(0.00)	(0.00)	(0.00)	(0.39)	(0.00)	(0.01)	(0.13)
$\delta_2^{(6,i)}$	-0.0023	-0.0022	-0.0022	-0.0285	-0.0011	-0.0046	-0.0009	-0.0134	-0.0037	-0.0018
	(0.03)	(0.03)	(0.04)	(0.00)	(0.28)	(0.00)	(0.41)	(0.00)	(0.00)	(0.08)
$\boldsymbol{\gamma_1^{(6)}}$	-0.0010	(0.59)	$\boldsymbol{R^2}$	0.43						
$\boldsymbol{\gamma_2^{(6)}}$	-0.0028	(0.46)	$\boldsymbol{R_F^2}$	0.19						
$\boldsymbol{\gamma_3^{(6)}}$	-0.0249	(0.02)	**Wald**	0.00						

Table 25: Unrestricted Regression – 7Y

Model: $rx_{t+1}^{(7,i)} = \delta_0^{(7,i)} + \boldsymbol{\gamma}'^{(7)} \boldsymbol{MF}_t + \delta_1^{(7,i)} CF_t^{(Country,i)} + \delta_2^{(7,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(7,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(7,i)}$	-0.0047	-0.0074	-0.0042	-0.0614	-0.0163	-0.0135	-0.0018	-0.0369	-0.0082	-0.0101
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(7,i)}$	0.0014	0.0125	0.0015	-0.0326	0.0199	0.0219	-0.0008	-0.0296	-0.0040	-0.0065
	(0.48)	(0.00)	(0.78)	(0.00)	(0.00)	(0.00)	(0.73)	(0.00)	(0.00)	(0.02)
$\delta_2^{(7,i)}$	-0.0026	-0.0024	-0.0023	-0.0257	-0.0013	-0.0051	-0.0007	-0.0145	-0.0041	-0.0017
	(0.03)	(0.04)	(0.05)	(0.00)	(0.28)	(0.00)	(0.52)	(0.00)	(0.00)	(0.16)
$\boldsymbol{\gamma}_1^{(7)}$	-0.0010	(0.61)	$\boldsymbol{R^2}$	0.39						
$\boldsymbol{\gamma}_2^{(7)}$	-0.0011	(0.76)	$\boldsymbol{R_F^2}$	0.18						
$\boldsymbol{\gamma}_3^{(7)}$	-0.0211	(0.02)	**Wald**	0.00						

Table 26: Unrestricted Regression – 8Y

Model: $rx_{t+1}^{(8,i)} = \delta_0^{(8,i)} + \boldsymbol{\gamma}'^{(8)} \boldsymbol{MF}_t + \delta_1^{(8,i)} CF_t^{(Country,i)} + \delta_2^{(8,i)} CF_t^{(Euro)} + \varepsilon_{t+1}^{(8,i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\delta_0^{(8,i)}$	-0.0049	-0.0080	-0.0046	-0.0680	-0.0181	-0.0148	-0.0017	-0.0396	-0.0105	-0.0115
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
$\delta_1^{(8,i)}$	0.0037	0.0108	0.0015	-0.0505	0.0160	0.0224	0.0008	-0.0330	-0.0049	-0.0064
	(0.48)	(0.00)	(0.78)	(0.00)	(0.00)	(0.00)	(0.73)	(0.00)	(0.00)	(0.02)
$\delta_2^{(8,i)}$	-0.0032	-0.0031	-0.0033	-0.0281	-0.0016	-0.0058	-0.0012	-0.0155	-0.0063	-0.0024
	(0.01)	(0.00)	(0.68)	(0.00)	(0.00)	(0.00)	(0.58)	(0.00)	(0.00)	(0.00)
$\boldsymbol{\gamma_1}^{(8)}$	-0.0024	(0.17)	$\boldsymbol{R^2}$	0.42						
$\boldsymbol{\gamma_2}^{(8)}$	-0.0007	(0.86)	$\boldsymbol{R_F^2}$	0.19						
$\boldsymbol{\gamma_3}^{(8)}$	-0.0218	(0.00)	**Wald**	0.00						

6.4 Estimating the Alternative Model

Table 27: Baseline Regression – Alternative Model

Model: $\overline{rx}_{t+1}^{(i)} = \delta_0^{(i)} + \boldsymbol{\gamma}' \boldsymbol{MF}_t^{(\boldsymbol{DE})} + \boldsymbol{\delta}'^{(i)} \boldsymbol{CF}_t^{(i)} + \varepsilon_{t+1}^{(i)}$

	Austria	**Belgium**	**France**	**Greece**	**Ireland**	**Italy**	**Netherl.**	**Portugal**	**Slovakia**	**Spain**
$\boldsymbol{\delta_0}$	-0.0339	-0.0350	-0.0348	-0.0330	-0.0307	-0.0359	-0.0352	-0.0349	-0.0322	-0.0362
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	(0.04)	(0.04)	(0.06)	(0.03)
$\boldsymbol{\delta_4}$	0.2367	2.2394	-3.5434	-2.3457	0.8998	-2.5143	-3.5438	-6.3672	-1.1553	-0.9277
	(0.93)	(0.04)	(0.21)	(0.00)	(0.00)	(0.06)	(0.23)	(0.00)	(0.25)	(0.32)
$\boldsymbol{\delta_6}$	-2.5797	7.0132	-2.9846	-0.9571	7.9922	3.6505	-3.9202	4.3712	-2.3175	8.9250
	(0.12)	(0.00)	(0.10)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)	(0.00)	(0.00)
$\boldsymbol{\delta_8}$	1.5189	-10.034	5.6772	1.7278	-10.970	-1.7498	6.7339	0.4710	2.2955	-8.5427
	(0.41)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.08)	(0.00)	(0.00)	(0.00)
$\boldsymbol{\gamma_4}$	-2.7955	(0.00)	$\boldsymbol{R^2}$	0.56						
$\boldsymbol{\gamma_6}$	5.7627	(0.00)	$\boldsymbol{R_F^2}$	0.21						
$\boldsymbol{\gamma_8}$	-2.2438	(0.01)	**Wald**	0.00						

This table reports the results of estimating the system of equations given in (12). The sample period ranges from January 2006 to February 2012 and the estimation is based on weekly data. The variable R_F^2 denotes the R^2 of a regression that excludes forward CDS spreads: $\overline{rx}_{t+1}^{(i)} = \boldsymbol{\gamma}' \boldsymbol{F}_t^{(\boldsymbol{DE})} + \varepsilon_{t+1}^{(i)}$ and the term "Wald" corresponds to the p-value of a Wald test under the null that R_F^2 is equal to the R^2 of the total model. Numbers in parentheses represent p-values.

6.5 Estimating Restricted Regressions for the Alternative Model

Tables (28) to (32) show the results of estimating equation (13). The sample period ranges from January 2006 to February 2012 and the estimation is based on weekly data. Numbers in brackets correspond to p-values that are based on HAC (Newey-West) covariances robust to serial correlation and heteroskedasticity.

Table 28: Restricted Regression – Alternative Model (1)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)}\boldsymbol{\gamma' MF_t^{(DE)}} + b_3^{(i,n)}\boldsymbol{\delta'^{(i)} CF_t^{(i)}} + \varepsilon_{t+1}^{(i,n)}$

n	Austria				Belgium			
	b_1	b_2	b_3	R^2	b_1	b_2	b_3	R^2
1	-0.0008	0.0188	-0.0033	0.02	-0.0025	0.0856	0.2543	0.20
	(0.14)	(0.22)	(0.91)		(0.05)	(0.04)	(0.05)	
2	-0.0081	0.2228	0.1457	0.24	-0.0074	0.2293	0.5468	0.21
	(0.00)	(0.00)	(0.36)		(0.00)	(0.00)	(0.03)	
3	-0.0130	0.3480	0.1785	0.22	-0.0130	0.3846	0.7710	0.20
	(0.00)	(0.00)	(0.44)		(0.00)	(0.00)	(0.03)	
4	-0.0177	0.5057	0.6465	0.26	-0.0163	0.4721	0.9041	0.19
	(0.00)	(0.00)	(0.07)		(0.01)	(0.01)	(0.03)	
5	-0.0264	0.7535	0.8518	0.31	-0.0210	0.6022	1.1304	0.23
	(0.00)	(0.00)	(0.04)		(0.00)	(0.00)	(0.01)	
6	-0.0273	0.7816	1.0270	0.29	-0.0218	0.6199	1.2808	0.22
	(0.00)	(0.00)	(0.03)		(0.00)	(0.00)	(0.01)	
7	-0.0268	0.7673	1.2018	0.25	-0.0213	0.6012	1.4079	0.20
	(0.00)	(0.00)	(0.03)		(0.00)	(0.01)	(0.02)	
8	-0.0375	1.0682	1.2455	0.29	-0.0294	0.8098	1.3839	0.22
	(0.00)	(0.00)	(0.03)		(0.00)	(0.00)	(0.02)	

Table 29: Restricted Regression – Alternative Model (2)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)} \boldsymbol{\gamma' MF_t^{(DE)}} + b_3^{(i,n)} \boldsymbol{\delta'^{(i)} CF_t^{(i)}} + \varepsilon_{t+1}^{(i,n)}$

n	**France**				**Greece**			
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$
1	-0.0011	0.0311	0.0638	0.08	-0.0368	1.3554	0.7437	0.60
	(0.04)	(0.07)	(0.29)		(0.05)	(0.01)	(0.00)	
2	-0.0034	0.0905	0.1644	0.11	-0.0721	2.3423	1.0651	0.71
	(0.01)	(0.02)	(0.19)		(0.00)	(0.00)	(0.00)	
3	-0.0074	0.2016	0.3725	0.20	-0.1024	3.0734	1.1225	0.74
	(0.00)	(0.00)	(0.12)		(0.00)	(0.00)	(0.00)	
4	-0.0124	0.3395	0.5845	0.27	-0.1287	3.7122	1.0906	0.67
	(0.00)	(0.00)	(0.04)		(0.00)	(0.00)	(0.00)	
5	-0.0159	0.4404	0.8162	0.30	-0.1355	3.8907	1.0082	0.57
	(0.00)	(0.00)	(0.03)		(0.00)	(0.00)	(0.00)	
6	-0.0180	0.4932	0.9460	0.28	-0.1329	3.6764	0.9933	0.54
	(0.00)	(0.00)	(0.03)		(0.00)	(0.00)	(0.00)	
7	-0.0198	0.5342	1.0667	0.26	-0.1219	3.1637	0.8808	0.44
	(0.00)	(0.00)	(0.02)		(0.00)	(0.00)	(0.00)	
8	-0.0224	0.6081	1.1763	0.26	-0.1104	2.7966	0.9676	0.46
	(0.00)	(0.00)	(0.02)		(0.00)	(0.01)	(0.00)	

Table 30: Restricted Regression – Alternative Model (3)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)} \boldsymbol{\gamma' MF_t^{(DE)}} + b_3^{(i,n)} \boldsymbol{\delta'^{(i)} CF_t^{(i)}} + \varepsilon_{t+1}^{(i,n)}$

n	**Ireland**				**Italy**			
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$
1	-0.0125	0.3307	0.1445	0.10	-0.0041	0.1109	0.1916	0.06
	(0.00)	(0.00)	(0.00)		(0.08)	(0.19)	(0.32)	
2	-0.0347	1.1351	0.7179	0.20	-0.0131	0.3485	0.3887	0.11
	(0.01)	(0.00)	(0.00)		(0.00)	(0.02)	(0.25)	
3	-0.0541	1.7822	1.0785	0.24	-0.0217	0.5797	0.5976	0.13
	(0.01)	(0.00)	(0.00)		(0.00)	(0.01)	(0.21)	
4	-0.0758	2.4222	1.2817	0.26	-0.0300	0.8215	0.8739	0.17
	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.12)	
5	-0.0838	2.6685	1.4586	0.27	-0.0355	0.9903	1.1632	0.20
	(0.01)	(0.00)	(0.00)		(0.00)	(0.00)	(0.07)	
6	-0.0838	2.6319	1.5260	0.27	-0.0377	1.0501	1.3683	0.19
	(0.01)	(0.01)	(0.00)		(0.00)	(0.00)	(0.07)	
7	-0.0775	2.3733	1.5024	0.25	-0.0381	1.0636	1.5689	0.17
	(0.01)	(0.01)	(0.00)		(0.00)	(0.00)	(0.07)	
8	-0.0805	2.4430	1.5864	0.27	-0.0451	1.2310	1.5961	0.18
	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.07)	

Table 31: Restricted Regression – Alternative Model (4)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)} \boldsymbol{\gamma' MF_t^{(DE)}} + b_3^{(i,n)} \boldsymbol{\delta'^{(i)} CF_t^{(i)}} + \varepsilon_{t+1}^{(i,n)}$

n	**Netherlands**				**Portugal**			
	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$	$\boldsymbol{b_1}$	$\boldsymbol{b_2}$	$\boldsymbol{b_3}$	$\boldsymbol{R^2}$
1	-0.0008	0.0193	-0.0797	0.13	-0.0018	0.0608	0.2529	0.24
	(0.06)	(0.11)	(0.00)		(0.76)	(0.73)	(0.00)	
2	-0.0017	0.0324	-0.2261	0.26	-0.0114	0.3458	0.5155	0.35
	(0.05)	(0.13)	(0.00)		(0.35)	(0.35)	(0.00)	
3	-0.0045	0.0989	-0.2894	0.25	-0.0310	0.9066	0.7926	0.44
	(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)	
4	-0.0090	0.2158	-0.3262	0.28	-0.0489	1.4080	0.9614	0.53
	(0.00)	(0.00)	(0.14)		(0.00)	(0.00)	(0.00)	
5	-0.0121	0.2996	-0.1295	0.24	-0.0598	1.7115	1.1750	0.57
	(0.00)	(0.00)	(0.47)		(0.00)	(0.00)	(0.00)	
6	-0.0115	0.2696	-0.2773	0.23	-0.0643	1.8289	1.3266	0.59
	(0.00)	(0.00)	(0.18)		(0.00)	(0.00)	(0.00)	
7	-0.0098	0.2088	-0.4660	0.19	-0.0665	1.8786	1.4523	0.60
	(0.00)	(0.02)	(0.08)		(0.00)	(0.00)	(0.00)	
8	-0.0151	0.3492	-0.7025	0.30	-0.0748	2.1114	1.5558	0.58
	(0.01)	(0.02)	(0.06)		(0.00)	(0.00)	(0.00)	

Table 32: Restricted Regression – Alternative Model (5)

Model: $rx_{t+1}^{(i,n)} = b_1^{(i,n)} + b_2^{(i,n)} \boldsymbol{\gamma' MF_t^{(DE)}} + b_3^{(i,n)} \boldsymbol{\delta'^{(i)} CF_t^{(i)}} + \varepsilon_{t+1}^{(i,n)}$

n	Slovakia				Spain			
	b_1	b_2	b_3	R^2	b_1	b_2	b_3	R^2
1	-0.0069	0.1957	0.1050	0.12	-0.0032	0.0852	0.2077	0.04
	(0.04)	(0.01)	(0.36)		(0.07)	(0.09)	(0.24)	
2	-0.0083	0.2199	0.1676	0.04	-0.0090	0.2372	0.3845	0.06
	(0.14)	(0.13)	(0.42)		(0.02)	(0.04)	(0.10)	
3	-0.0143	0.4023	0.3881	0.09	-0.0162	0.4219	0.5308	0.07
	(0.06)	(0.01)	(0.11)		(0.00)	(0.01)	(0.07)	
4	-0.0208	0.6246	0.6996	0.16	-0.0226	0.5927	0.7397	0.10
	(0.01)	(0.00)	(0.02)		(0.00)	(0.01)	(0.03)	
5	-0.0265	0.8250	1.0398	0.20	-0.0271	0.7100	1.0060	0.12
	(0.01)	(0.00)	(0.00)		(0.00)	(0.00)	(0.05)	
6	-0.0286	0.9099	1.2640	0.21	-0.0276	0.7163	1.1464	0.10
	(0.01)	(0.00)	(0.00)		(0.00)	(0.02)	(0.06)	
7	-0.0295	0.9680	1.4944	0.20	-0.0264	0.6751	1.2691	0.09
	(0.00)	(0.00)	(0.00)		(0.02)	(0.07)	(0.06)	
8	-0.0458	1.5143	2.1167	0.31	-0.0301	0.7596	1.3889	0.09
	(0.00)	(0.00)	(0.00)		(0.01)	(0.05)	(0.05)	

Table 33: Descriptive Statistics

Country	$\overline{\overline{rx}}$	$\sigma_{\overline{rx}}$	Min	Max
Austria	-0.0027	0.0095	-0.0598	0.0279
Belgium	-0.0048	0.0148	-0.0953	0.0552
France	-0.0025	0.0075	-0.0459	0.0247
Greece	-0.0564	0.1144	-0.5292	0.1658
Ireland	-0.0106	0.0551	-0.2684	0.4017
Italy	-0.0088	0.0252	-0.1306	0.0785
Netherlands	-0.0010	0.0048	-0.0240	0.0180
Portugal	-0.0250	0.0491	-0.2763	0.0859
Slovakia	-0.0054	0.0193	-0.0557	0.0435
Spain	-0.0067	0.0203	-0.0810	0.0497

Table (33) shows the mean ($\overline{\overline{rx}}$), standard deviation ($\sigma_{\overline{rx}}$), minimum (Min), and maximum (Max) of the average excess holding period returns as defined in (7). The sample period ranges from January 2006 to February 2012.

Table 34: Expected Risk Premiums – Out-of-Sample

Country	$\overline{RP}$	σ_{RP}
Austria	0.0042	0.0204
Belgium	0.0019	0.0226
France	0.0038	0.0191
Greece	-0.0478	0.0869
Ireland	-0.0097	0.0629
Italy	0.0013	0.0288
Netherlands	0.0070	0.0197
Portugal	-0.0164	0.0424
Slovakia	-0.0033	0.0337
Spain	0.0032	0.0292

Table (34) reports the average expected risk premium $\overline{RP}$ and its standard deviation of the out-of-sample analysis discussed in section (3.4).

Table 35: Weekly standard deviations of excess returns for a maturity of five years $\sigma_{rx^{(i,5)}}$, market risk premiums σ_{MRP}, country specific credit risk premiums σ_{CRPC}, and euro-zone credit risk premiums σ_{CRPE} for the standard model.

Country	$\sigma_{rx^{(i,5)}}$	σ_{MRP}	σ_{CRPC}	σ_{CRPE}
Austria	0.0125	0.0042	0.0032	0.0057
Belgium	0.0177	0.0067	0.0036	0.0067
France	0.0089	0.0027	0.0015	0.0048
Greece	0.1287	0.0472	0.0052	0.1021
Ireland	0.0683	0.0077	0.0136	0.0042
Italy	0.0288	0.0095	0.0059	0.0137
Netherlands	0.0063	0.0026	0.0014	0.0018
Portugal	0.0581	0.0117	0.0145	0.0385
Slovakia	0.0226	0.0065	0.0029	0.0100
Spain	0.0231	0.0029	0.0028	0.0046

Table 36: Weekly standard deviations of excess returns for a maturity of five years $\sigma_{rx^{(i,5)}}$, market risk premiums σ_{MRP}, and credit risk premiums σ_{CRP} for the alternative model.

Country	$\sigma_{rx^{(i,5)}}$	σ_{MRP}	σ_{CRP}
Austria	0.0125	0.0072	0.0037
Belgium	0.0177	0.0058	0.0065
France	0.0089	0.0042	0.0038
Greece	0.1287	0.0373	0.0873
Ireland	0.0683	0.0256	0.0397
Italy	0.0288	0.0095	0.0098
Netherlands	0.0063	0.0029	0.0004
Portugal	0.0581	0.0164	0.0416
Slovakia	0.0226	0.0079	0.0089
Spain	0.0231	0.0068	0.0057

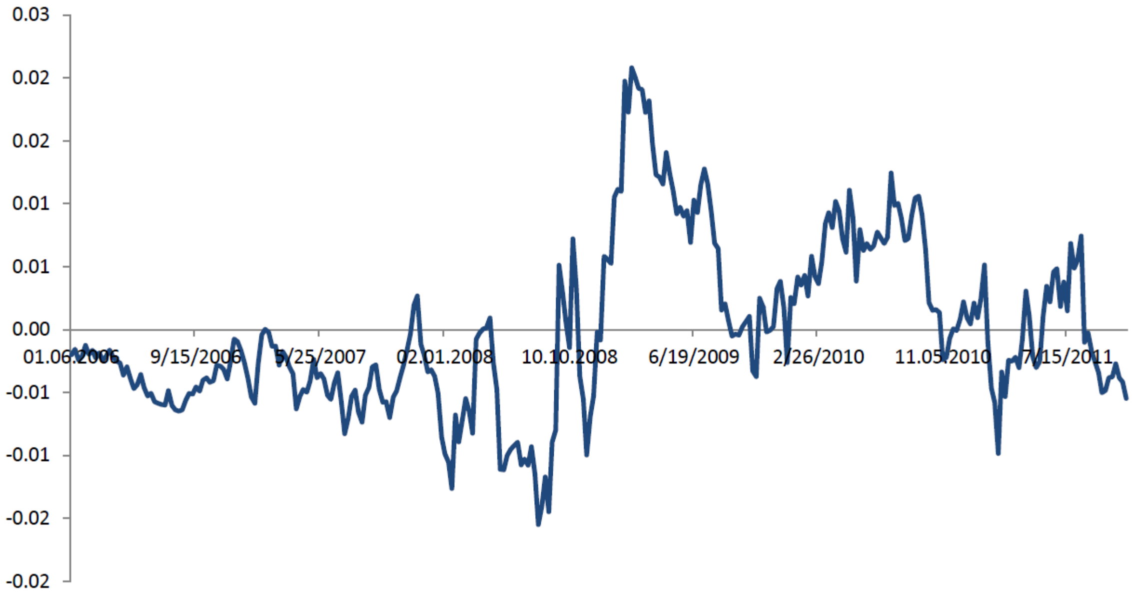

Figure 1: Market Risk Premium

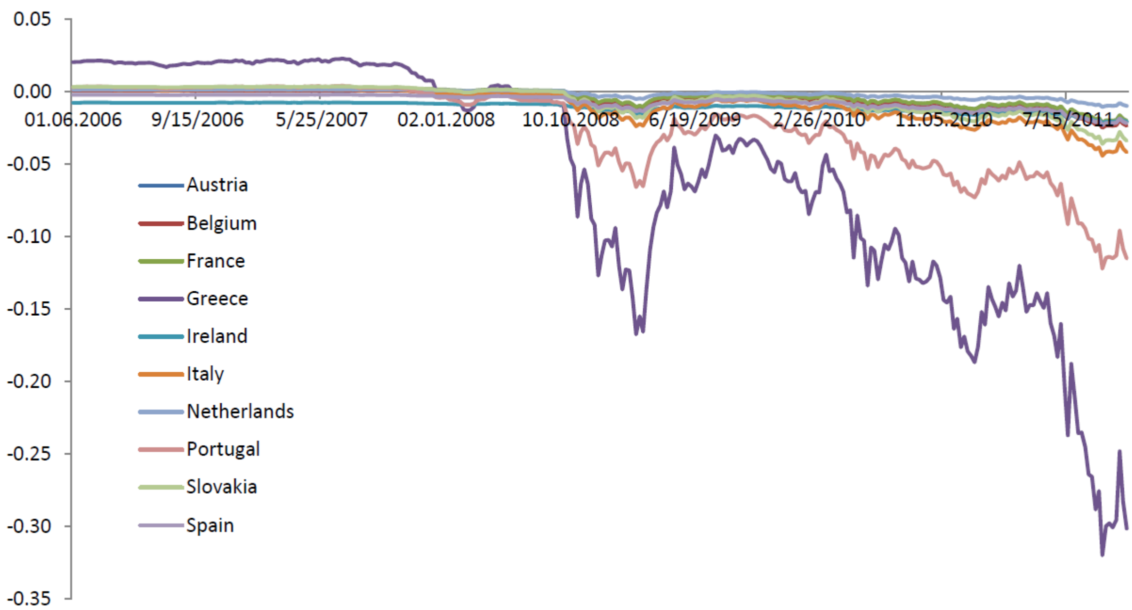

Figure 2: Europe Credit Risk Premium

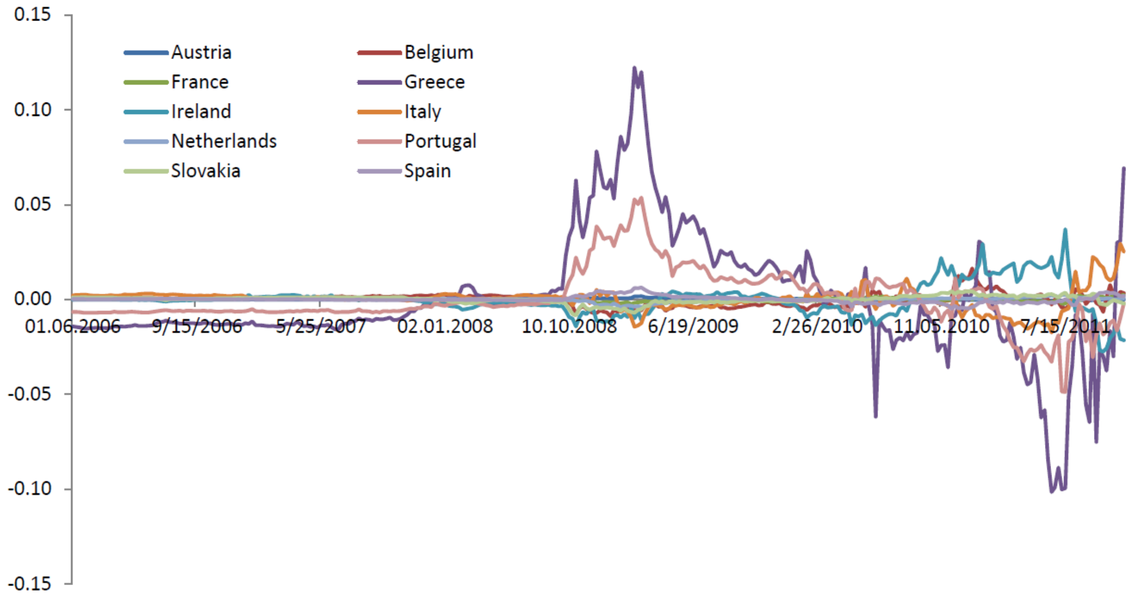

Figure 3: Country Credit Risk Premium

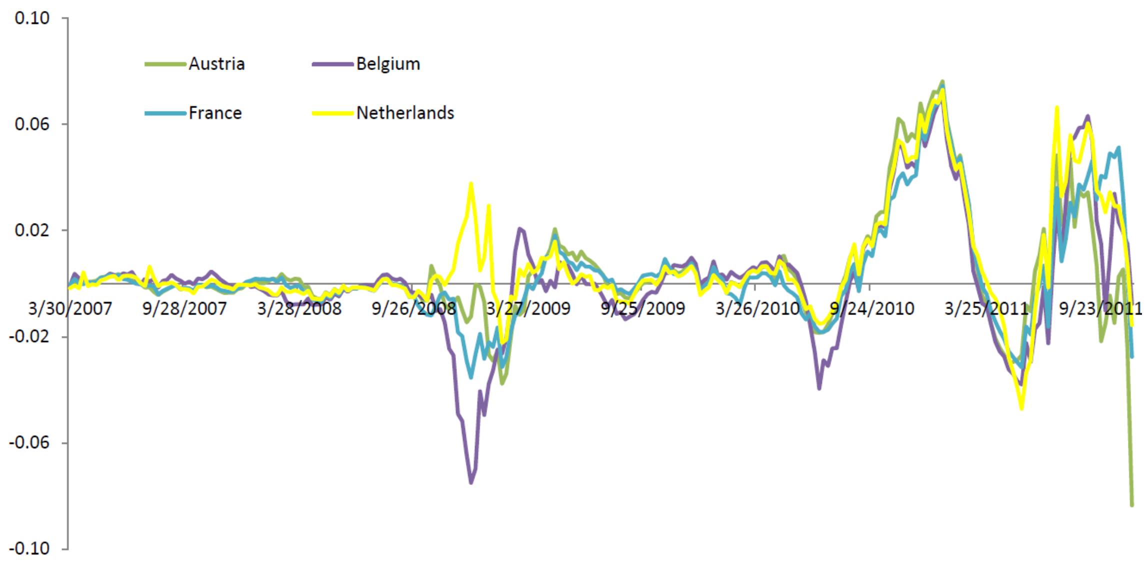

Figure 4: Expected Risk Premiums - Core Euro-Area Countries (Out-of-Sample Analysis)

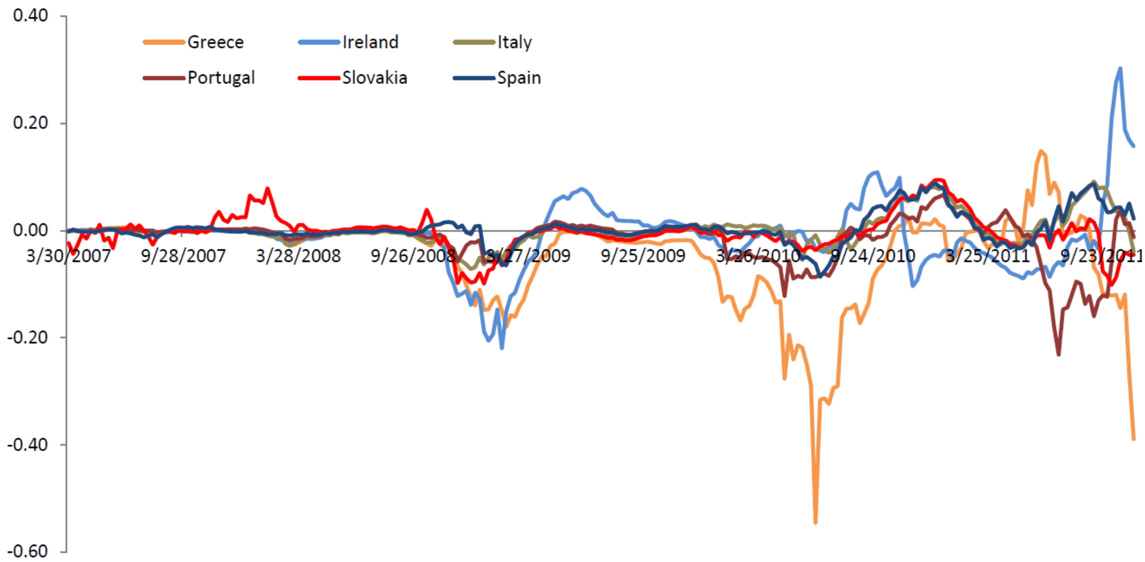

Figure 5: Expected Risk Premiums - Peripheral Euro-Area Countries (Out-of-Sample Analysis)

References

Bernoth, K., von Hagen, J., & Schuknecht, L. (2012). Sovereign risk premiums in the european government bond market. Journal of International Money and Finance 31(5), 975-995.

Caceres, C., Guzzo, V., & Segoviano, M. (2010). Sovereign spreads: Global risk aversion, contagion or fundamentals? IMF Working Paper 10/120.

Campbell, J. Y. & Shiller, R. J. (1991). Yield spreads and interest rate movements: A bird's eye view. Review of Economic Studies 58, 495-514.

Cieslak, A. & Povala, P. (2011). Understanding bond risk premia. Working Paper, Northwestern University Kellogg School of Management and University of Lugano (USI) Institute of Finance.

Cochrane, J. H. & Piazzesi, M. (2005). Bond risk premia. American Economic Review 95(1), 138-160.

Dahlquist, M. & Hasseltoft, H. (2011). International bond risk premia.

Duffee, G. R. (2011). Information in (and not in) the term structure. Review of Financial Studies 24, 2895-2934.

Fama, E. & Bliss, R. R. (1987). The information in long-maturity forward rates. American Economic Review 77, 680-692.

Ferson, W. E. & Harvey, C. R. (1991). The variation of economic risk premiums. Journal of Political Economy 99, 385-415.

Haugh, D., Ollivaud, P., & Turner, D. (2009). What drives sovereign risk premiums? OECD Economics Department Working Papers, No. 718, OECD Publishing.

Ilmanen, A. (1995). Time-varying expected returns in international bond markets. Journal of Finance 50, 481-506.

Litterman, R. B. & Scheinkman, J. (1991). Common factors affecting bond returns. Journal of Fixed Income 1, 54-61.

Longstaff, F. A., Pan, J., Pedersen, L. H., & Singleton, K. J. (2011). How sovereign is sovereign credit risk. American Economic Journal: Macroeconomics 3(2), 75-103.

Ludvigson, S. C. & Ng, S. (2009). Macro factors in bond risk premia. Review of Financial Studies 22, 5027-5067.

CENTER FOR FINANCIAL STUDIES

CFS Working Paper Series

No.	Author(s)	Title
2013/27	**Johann Reindl** **Neal Stoughton** **Josef Zechner**	Market Implied Costs of Bankruptcy
2013/26	**Jaewon Choi** **Dirk Hackbarth** **Josef Zechner**	Granularity of Corporate Debt
2013/25	**Giuseppe Bertola** **Winfried Koeniger**	Hidden Insurance in a Moral Hazard Economy
2013/24	**Rong Hai** **Dirk Krueger** **Andrew Postlewaite**	On the Welfare Cost of Consumption Fluctuations in the Presence of Memorable Goods
2013/23	**Jill E. Fisch** **Tess Wilkinson-Ryan**	Why Do Retail Investors Make Costly Mistakes? An Experiment on Mutual Fund Choice
2013/22	**Christiane Baumeister** **Pierre Guérin** **Lutz Kilian**	Do High-Frequency Financial Data Help Forecast Oil Prices? The MIDAS Touch at Work
2013/21	**Brigitte Haar**	Investor protection through model case procedures – implementing collective goals and individual rights under the 2012 Amendment of the German Capital Markets Model Case Act (KapMuG)
2013/20	**Nikolaus Hautsch** **Julia Schaumburg** **Melanie Schienle**	Financial Network Systemic Risk Contributions
2013/19	**Taras Bodnar** **Nikolaus Hautsch**	Copula-Based Dynamic Conditional Correlation Multiplicative Error Processes

All CFS Working Papers can be downloaded at *www.ifk-cfs.de/publications/working-papers*.