"EU-15 SOVEREIGN GOVERNMENTS' COST OF BORROWING AFTER SEVEN YEARS OF MONETARY UNION"

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Abstract

Yield spreads over 10-year German government securities of the EU-15 countries converged dramatically in the seven years after the beginning of Monetary Integration. In this paper, we investigate the relative influence of systemic and idiosyncratic risk factors on their behaviour. Our conclusions suggest that in EMU-countries the relative importance of domestic risk factors (both credit and liquidity risk factors) is higher than that of international factors, which appear to play a secondary but significant role in non-EMU countries.

JEL Classification Numbers: E44, F36, G15.

Keywords: Monetary integration, sovereign securities markets, systemic and idiosyncratic risk.

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1. Introduction.

The market capitalization of international bond markets is larger than that of international equity markets. However, compared to the large body of literature on international equity market linkages (see Bessler and Yang, 2003), there are few empirical studies of bond systematic risk or international bond market linkages (Smith, 2002 and Barr and Priestley, 2004). However, the extent of international bond market linkages does merit investigation, as it may have important implications for the cost of financing fiscal deficit, monetary policymaking independence, modelling and forecasting long-term interest rates, and bond portfolio diversification.

Conversely, more has been written on emerging countries, where a very important question in the study of spread co-movements is the analysis of the relative influence of fundamental variables on that behaviour (see Cifarelli and Paladino, 2006). Economies are related through trade and financial flows, and shifts in the economic fundamentals of one country may affect its neighbours. However, in periods of growing uncertainty, changes in market sentiment may go beyond fundamentals and generate "contagion phenomena". Calvo and Reinhart (1996), Masson (1998) and, more recently, Bekaert, Harvey and Ng (2005) draw a distinction between fundamentals-based contagion, which arises when the "infected country" is connected to others via trade and/or financial links, and pure contagion, which is due to a shift in market sentiment without (or beyond) links in economic fundamentals.

Therefore, even though there is far more literature on emerging than on developed economies, in both cases, it is well established that bond markets in different countries tend to move together, i.e. bond prices and returns are positively correlated across countries. Some earlier studies used co-integration analysis to document this phenomenon. Long-term interest rates seem to be co-integrated across countries, indicating that international bond markets are linked. These co-integration analyses do not, however, examine co-movement in the underlying factors determining bond yields. Ilmanen (1995) suggests a number of factors determining international bond returns, and finds that a small set of global (world) factors accounts for the predictable variation in bond returns and their cross-country correlation. In particular, wealth-dependent risk-aversion of bond investors appears to be an important source of international co-movement. Barr and Priestley

(2004) also find that bond returns in different countries are predictable over time; based on an international CAPM they find that 70 per cent of the variation in expected returns is due to world risk factors while the remaining 30 per cent is due to local country-specific risk factors. They interpret this result as indicating that national bond markets are only partially integrated into world markets. Actually, in our paper, we will base our analysis on Barr and Priestley (2004) in order to assess the relative importance of systemic and idiosyncratic risk in EU-15 country yield spreads since the beginning of Monetary Integration. Our data set covers the first seven years of EMU, from 1999 to 2005. So the main goal of this paper will be to assess the relative importance of systemic/international/world risk factors or idiosyncratic/domestic/local risk factors in explaining yield spreads in European countries after the introduction of the common currency. In our opinion, the recent literature overestimates the impact of systemic risk on the behaviour of yield differentials in the EMU (see Dune, Moore and Portes (2002); Favero, Pagano and Von Thadden (2005); Geyer, Kossmeier and Pischer (2004) or Pagano and Von Thadden (2004), among others). Certainly, yield evolution depends on both world and local risk factors, i.e. systemic and idiosyncratic risk. However, when differentials between yields are taken, the impact of world or common risk factors should mostly cancel out. Therefore, implementing a similar methodology as in our previous papers (Gómez-Puig, 2006a, Gómez-Puig 2006b), we aim to carry out both a panel data and a country-specific analysis for EMU and non-EMU participating countries during the first seven years of Monetary Integration in order to assess the relative importance of the two kinds of factors of risk in yield differentials in both groups of countries. As far as we know, this is the first empirical study that implements an analysis of the effects of Monetary Union on the relative importance of systemic and idiosyncratic risk in EU-15 governments' bonds yield spreads for such a long period of time (seven years since the beginning of EMU). The rest of the paper is organized as follows. Section 2 summarizes the related literature on this topic. Section 3 explains the methodology, whilst data and explanatory variables are described in Section 4. The model is explained in Section 5. Finally, Section 6 reports the results and section 7 draws the main conclusions.

2. Related Literature.

Some recent literature (using other approaches) has assessed the relative importance of systemic and idiosyncratic risk in EMU sovereign yield spreads (see Geyer, Kossmeier and Pischler (2004), Pagano and von Thadden (2004))[1] Nevertheless, our results differ in suggesting that it is idiosyncratic factors that mostly drive yield differentials, and that systemic risk plays only a marginal role. In this sense, Geyer et al. estimate a multi-issuer state-space version of the Cox-Ingersoll-Ross (1985) model of the evolution of bond-yield spreads (over Germany) for four EMU countries (Austria, Belgium, Italy and Spain). Their main findings are (i) one single ("global") factor explains a large part of the movement of all four processes, (ii) idiosyncratic country factors have almost no explanatory power, and (iii) the variation in the single global factor can to a limited extent be explained by EMU corporate-bond risk, but by nothing else. The most striking finding in Geyer et al. (2004) is the virtual absence of country-specific yield-spread risk. On the other hand, despite the considerable differences in the methodology and data used, Geyer et al. and Pagano and von Thadden (2004) analysis agree that yield differentials under EMU are driven mainly by a common risk (default) factor and suggest that liquidity differences have at best a minor role in the time-series behaviour of yield spreads. Our results differ clearly in suggesting that it is idiosyncratic factors that mostly drive yield differentials. Nevertheless, it is important to note that Geyer et al.'s measurement of liquidity variables is more indirect than ours, as they do not use data on bid-ask spreads; furtherm, and that, on the other hand, Pagano and von Thadden work with data taken from the Euro MTS trading platform which includes only the transactions made through this platform and not in the whole market, as we do in our paper. Even so, Pagano and von Thadden recognize that fundamental (global) risk and liquidity may interact with each other in non-trivial manners, which allows us to accept that their results are consistent with the ones presented in this paper. In

[1] Or Dunne, Moore and Portes (2002). These authors analyze benchmark status in European Bond Markets assuming that the underlying criterion for being a reference point should be the fact of being the security against which the rest of bonds of the market are priced. This definition highlights the benchmark security's sensitivity to systematic risk as opposed to country-specific risk. Their empirical method relies on a result, based on Davidson (1998), that the structural nature of the co-integration relationship between a benchmark and other bonds can be identified. However, when they formalize the concept of a benchmark security they identify the source of the non-stationarity as the systematic risk. With this intuition they are assuming that any country-specific dynamics should be stationary. So, they are implicitly considering that it is international or common factors rather than domestic factors that drive yield spreads behaviour.

particular, Favero, Pagano and von Thadden (2005) make this point in a context of a general equilibrium model where idiosyncratic liquidity shocks may force investors to sell their bonds before maturity. The most important insight of their theoretical analysis is that liquidity matters for pricing, but that it interacts with fundamental risk. In particular, if a market becomes less liquid, this can either amplify or dampen the effect of increases in the world price of risk. For these authors, this implies that a direct estimation of the impact of liquidity on prices, i.e. an estimation that ignores the indirect effect caused by the interaction with world-wide risk, is likely to underestimate the impact of liquidity. Therefore, their "liquidity risk view" highlights that liquidity is priced not only because it creates trading costs but also because it is itself a source of risk since it changes unpredictably over time. Since investors care about returns net of trading costs, the variability of trading costs affects the risk of a security. So, current liquidity is a predictor of future liquidity risk, and is therefore priced. This approach is then consistent with the self-fulfilling nature of liquidity put forward in Gómez-Puig (2006a, 2006b, and 2006c), where, following Economides and Siow (1988), the author presents empirical evidence that if liquidity is self-fulfilling, proxies of market liquidity should present a non-linear relationship, i.e. a liquid/illiquid market leads to an increasingly lower/higher liquidity premium. This non-linear behaviour will also be analysed in this paper.

3. Methodology.

An important issue for assets that are traded internationally is the extent to which the time-varying compensation that investors require for accepting a risky payoff is the extent to which this compensation is driven by world, rather than domestic, factors, i.e. the extent to which the domestic market is integrated into world markets. Several papers have investigated this issue but, as we noted above, most of them focus on equity markets. In this paper we ask what can be learned from European bond markets after Monetary Integration and, in particular, we will assess the relative importance of systemic/international/world risk factors or idiosyncratic/domestic/local risk factors in explaining European Union-15 countries' yield spreads after the introduction of the Euro.

One way to study this is to assume that markets are fully integrated, and to test the restrictions generated by Asset Pricing Models (APMs): a rejection is interpreted as a rejection of the joint hypothesis of full integration and the APM (Dumas and Solnik, 1995). However, this integration assumption reflects a fundamental difficulty in international asset pricing, since current APMs can accommodate only the two extremes of integration or segmentation, and both of these will be rejected if markets are only partially integrated. Some combination of the polar models is required in order to deal with partially integrated markets. The work by Bekaert and Harvey (1995, 1997) is in this vein and allows the level of integration to change over time by combining the polar models. In our paper, following Barr and Priestley (2005), we use a version of Bekaert and Harvey's (1995) CAPM-based model mixed with Pagano and von Thadden's (2004) model in order to investigate the level of integration in the European Union bond markets.

Therefore:

If we assume that excess returns (r) for country i are related to world and local information variables as follows (see Barr and Priestley, 2005)

$$r_{i,t} = a_i + b^{W}_{i} Z^{W}_{i,t} \; b^{L}_{i} Z^{L}_{i,t} + b^{WL}_{i} [Z^{W}_{i,t} \,.\, Z^{L}_{i,t}] + \varepsilon_{i,t} \qquad (1)$$

Where $Z^{W}_{i,t}$ represents the world variables, $Z^{L}_{i,t}$ represents local variables for country i, $Z^{W}_{i,t} \,.\, Z^{L}_{i,t}$ represents the interaction between them, and $\varepsilon_{i,t}$ is an error term. Therefore, following Pagano and von Thadden (2004), we allow excess returns to be explained in terms of exogenous risk premiums (specifically, banking risk premiums in the United States) which will appear in the regression both linearly and interacting with the domestic risk variables. This means that a single direct estimation of the impact of domestic risk variables on prices, i.e. an estimation that ignores the indirect effect caused by the interaction with world-wide risk, will underestimate their impact. This captures the idea that international risk affects excess returns because European government bonds are imperfect substitutes due to differences in either market liquidity or default risk. Therefore, the interaction term identifies changes in excess returns that can be entirely attributed to domestic risk differentials. This equation is consistent with a range of asset pricing models, and with any level of integration. If a market is fully integrated the local variables should be absent from Eq. (1). Similarly, if it is completely segmented, the world variables will be absent.

However, it should be easy to understand that when we take differences between excess returns, i.e. we calculate yield spreads ($S_{i,t}$) for country *i* over Germany, the effect of world risk variables should mostly disappear or cancel out. So, yield spreads will mostly depend on local or domestic risk factors. However, due to the recent debate in the literature, we will assess the impact of both kinds of variable on yield spreads by assuming that they are related to world and local information variables and to the interaction between them, as follows:

$$S_{i,t} = a_i + b^W_i Z^W_{i,t} + b^L_i Z^L_{i,t} + b^{WL}_i [Z^W_{i,t} . Z^L_{i,t}] + \varepsilon_{i,t} \qquad (2)$$

The yield patterns are reflected in their correlation across countries. All EU-15 (EMU and non-EMU participating) country yields are fairly highly correlated with the U.S. 10-year yields. Table 1 shows that the cross-sectional average correlation is 0.75, providing weak evidence of integration. Therefore, the average contribution of world factors to domestic returns across the thirteen countries we study (Luxembourg and Greece are excluded from our sample) is 75%. This level seems surprisingly low in view of the absence of impediments to cross-country investment. Nevertheless, the figures in this table show a very high and similar correlation across EU-15 countries' yields (the average correlation with Germany 10-year yields is 0.98 and 0.99 if we consider only EMU-countries), except in the case of the United Kingdom which presents an average level of correlation of 0.84 with German yields and one of 0.82 with the rest of EU-15 countries in our sample. This evidence supports the idea (see Gómez-Puig 2006c) that outside the Euro-area, the Currency Union has enhanced the "singularity" of the debt markets because their securities are still denominated in their own currency. In particular, the British market, which before EMU was not only one of the most important European debt markets, but was also the European market with the highest share of foreign assets as a function of total financial wealth (see Adjaouté et al., 2001 or Tesar and Werner, 1995), is surely the one that has capitalized most on this new advantage and has attracted a significant volume of funds.

Table 2 shows the correlation between spreads (adjusted spreads or spreads corrected from the exchange rate factor in the case of non-EMU countries[2]) and the world risk variable used to capture international risk (the differential between 10-year fixed interest rates on US swaps and the yield on 10-year Moody's Seasoned AAA US corporate bonds ($USSPREAD_{it}$)). This table clearly shows that the correlation with global risk factors can mostly be ignored when differentials are taken in EMU countries (the average value is -0.04, and Portugal is the only country that presents a slight positive average value of 0.107). In the case of non-EMU countries we find very different results. The average correlation between the variable adjusted spread (the yield spread corrected from the foreign exchange factor) and the global risk factor is 0.4. The country with the lowest coefficient is Denmark, whilst the country with the highest one is the United Kingdom (0.56) Finally, Table 3 presents the evolution of yield spreads or adjusted yield spreads (in the case of non-EMU countries) during three sub-periods into which the whole sample has been broken down: 1999-2000, 2001-2002, and 2003-2005. It can be observed that, within the EMU, yield differentials experience a high decrease during the last three years of the period. During the third sub-period, 2003-2005, except in the case of Italy, the average values are less than half the value they present for the whole period. In the case of non-EMU countries, except in the case of Denmark which only presents a negative value during the third period (the fact that the exchange rate regime, in this country, links the evolution of its currency to the Euro explains why Denmark's yield spreads present a behaviour which is closer to EMU-countries than to non-EMU countries), the other two countries (Sweden and the United Kingdom) display negative adjusted spread values in the four periods. Nevertheless, this negative differential is lower at the end of the sample than during the first years following the introduction of the Euro. Therefore, market capitalization of the advantage presented by these markets over Euro-area debt markets in terms of the benefits derived from portfolio diversification and risk reduction was higher in the first years afoterthe beginning of Monetary Union. On the other hand, it can also be observed that volatility (measured by the standard deviation) has sharply decreased in the last period of the sample for most of the European

[2] As we will explain later in this paper, following Favero, Giavazzi and Spaventa (1997), we will correct non-EMU spreads by estimating the foreign exchange factor as the differential between the 10 year swap rate in the currency of denomination of the bond and the 10 year swap rate in Deutsche marks.

countries (the only exceptions are Finland, the Netherlands and Ireland) These observations suggest that three separate estimations for each one of the sub-periods will present wider information than a single estimation for the complete sample. So, we will estimate the model for the four samples (the whole period and the three sub-periods) in order to compare the results.

Figures 1 and 2 display the evolution of 10-year yields and 10-year yield spreads over Germany, respectively, for EMU countries. These figures show, on the one hand, the high co-movement presented by 10-year yields during the first seven years of Currency Union (figure 1) and, on the other, the lower co-movement and higher volatility presented by yield spreads throughout the sample (figure 2). The evolution of the same variables in the case of the three non-Euro countries included in our sample is displayed in figures 3 and 4. In particular, these figures show that the country with the highest spread over Germany is the United Kingdom, while the country whose government's yields follow those of Germany most closely is Denmark. Finally, figure 5 presents the evolution of 10-year swap spreads over Germany of the three countries in our sample that do not participate in the Euro (since, as will explain, we will use the 10-year swap differential over Germany as an approximation of currency risk), whilst figure 6 displays the evolution of the dependent variable we will use in the case of these countries: the spread corrected from the exchange rate risk factor which we will call "adjusted spread" (note that this variable presents a negative value in the case of Sweden and the United Kingdom throughout the sample).

As discussed by Favero et al. (1997) a direct measure of the component of yield differentials not related to exchange rate factors can be obtained by comparing the yields of assets issued by two different states in two different currencies (say, one in Spanish pesetas, the other in D-marks) and the yield spreads in the same currencies and with the same life to maturity issued by the same (non-government) subject, or by two otherwise comparable issuers (in the second case, apart from the exchange rate risk, other factors influencing yield spreads can then be ignored when differences are taken). Candidates for this measure are: (1) long-term bonds issued by the same supra-national organization (such as the World Bank or the European Investment Bank), (2) long-term bonds issued by the private sector, and (3) the fixed interest rates on swap contracts. However, on balance, the drawbacks of the interest differential on supranational issues or corporate issues seem to be greater. So though not a perfect measure, the spread on fixed interest rate swap contracts can be used as an indicator of the exchange rate determinant of the yield spread on government bonds, as it seems to be the best indicator of this yield spread component[3].

So we denominate:

$I_{i,10}$ = 10-year Yield on sovereign bonds of country *i*

$IRS_{i,10}$= 10-year Interest Rate Swap rate of currency *i*

Where, considering that differences in tax-regimes were reduced to insignificant levels during the course of the 1990s:

$$I_{i,10}=f(DR_{i,10},L_{i,10},ER_{i,,10}) \quad (3)$$

$DR_{i,10}$ = Default risk of country *i* 10-year sovereign bonds.

$L_{i,10}$ = Liquidity of country *i* 10-year sovereign bonds.

$ER_{i,,10}$ = Exchange rate risk of currency *i* over a 10-year horizon.

Therefore the 10-year yield differential of country *i* over Germany will be:

$$YIELD\ SPREAD_{it}=[I_{i,10}-I_{GE,10}]_t=f([DR_{i,10}-DR_{GE,10}]_t,[L_{i,10}-L_{GE,10}]_t,[ER_{i,10}-ER_{GE,10}]_t) \quad (4)$$

Then, if we approximate:

$$[IRS_{i,10}-IRS_{GE,10}]_t=[ER_{i,10}-ER_{GE,10}]_t \quad (5)$$

We can build up the variable "$ADJUSTED\ SPREAD_{it}$", as the difference between the total yield differential and the swap rate differential,

$$ADJUSTED\ SPREAD_{it} = ASPREAD_{it} =$$

$$= [I_{i,10} - I_{GE,10}]_t - [IRS_{i,10} - IRS_{GE,10}]_t =$$

$$=f([DR_{i,10}-DR_{GE,10}]_t,[L_{i,10}-L_{GE,10}]_t,[ER_{i,10}-ER_{GE,10}]_t)-[ER_{i,10}-ER_{GE,10}]_t \quad (6)$$

it can be inferred that the variable $ASPREAD_{it}$, which will be used as the dependent variable in the case of non-EMU countries, will mainly account for credit risk and market liquidity differences[4] of country *i*'s sovereign securities over Germany. So this variable could be considered an appropriate indicator of yield differential components not related to exchange rate factors. Table 4 presents the difference of 10-year spreads over Germany, in the three countries mentioned, when they are

[3] See Gómez-Puig (2006b) more a much more detailed explanation.

[4] We are not considering the effect of international risk factors in this breakdown

corrected from the exchange rate factor. As figure 6 shows, in the case of Sweden and the United Kingdom, their average is negative during the seven-year period.

4. Data and explanatory variables.

The sample includes all EU-15 countries, with the exception of Luxembourg and Greece. So, in this paper, we will expand on the analysis presented in Gómez-Puig (2006b and 2006c), where we studied the immediate effect of the introduction of a common currency on the risk factors that drive the evolution of yield spreads in both groups of countries. We will then use daily data spanning the period January 1, 1999 to December 31, 2005 which will enable us to analyse yield spreads behaviour of all EU-15 countries with the perspective given by this long period of time (seven years) since the beginning of Monetary Union.

The dependent variable used in our estimations is the spread (or adjusted spread) of 10-year government yield over Germany. Therefore, a crucial issue in this paper (and one that is vital for policymaking) is the identification of the two main local or domestic sources of risk that have made up yield spreads in European countries since the start of Monetary Integration. So, we attempt to break down the liquidity premium and credit-risk components by modelling their behaviour to a number of factors that can potentially affect only one of them. With this goal in mind, the relative debt-to-GDP ratio will be used as a proxy to measure differences in credit risk[5]. This variable has been widely used in the literature by other authors (Bayoumi, Goldstein and Woglom (1995) among them)[6] and, compared with other measures such as the rating differential, presents the advantage that it cannot be considered an ex-post measure of fiscal sustainability. Considering that a liquid market can be defined as one in which participants can rapidly execute a large volume of transactions with a small impact on prices, in this paper, two different proxy variables will be used to measure this effect: (i) the bid/ask spread and (ii) the on-the run/off-the run spread. The

[5] Table 5 presents the outstanding amounts of government's securities at the end of each year of the sample. If we consider the EU-15 as a whole, the biggest markets, in descending order: the Italian, the German, the French, the British and the Spanish.

[6] In particular, these authors find support for the market discipline hypothesis in the U.S. bond markets. This hypothesis assumes that yields rise smoothly at an increasing rate with the level of borrowing. However, if these incentives prove ineffective, credit markets will eventually respond by denying irresponsible borrowers further access to credit. Nevertheless, the model presented in this paper and Bayoumi et al. model do not control for the same variables and cannot be compared.

bid/ask spread is one of the best measures of liquidity because it reflects the cost incurred by a typical investor in unwinding an asset position and measures one of the most important dimensions of liquidity: tightness, i.e. how far transaction prices differ from mid-market prices. Additionally, the liquidity of an asset is generally understood as the ease of its conversion into money. Therefore, because the conversion of an asset into money involves certain costs (search costs, delays, broker's commissions, etc…), the higher these costs, the lower the degree of liquidity. Note that as market dealers reduce their liquidity risk, the bid/ask spread should narrow with trading activity. Nevertheless, we will also include in our model a secondary measure of liquidity: the yield spread between more and less liquid securities, which is also a liquidity measure used in the Treasury market (see Fleming, 2003). Since liquidity has value, more liquid securities tend to have higher prices (lower yields) than less liquid securities. The yield spread is often calculated as the difference between the yield of an off-the-run (older securities of a given maturity) and that of an on-the-run (benchmark) security with similar cash-flow characteristics. Positive spreads indicate that on-the-run securities are trading at a yield discount (or price premium) to off-the-run securities. Lastly, as noted above, a third point that will be assessed in this paper is the influence of international risk factors on yield spreads. Hence, the analysis will also build on the findings of recent works that suggest that yield spreads on government securities are sensitive to international risk factors, and compare the relative importance of these two sources (domestic and international) of risk factors on yield spreads.

Yields and swap rates were obtained from Datastream and correspond to the "on the run" (benchmark) 10-year issue for each market at every moment of time. They are quoted rates at market close. Datastream creates continuous yield series by taking the yield from the current benchmark in each market and using it to update a separate time series. As a benchmark changes, data are taken from a new stock on the first day of the month. Table 6 presents the starting benchmark dates used by Datastream as well as the characteristics of the different benchmarks that compose the yield series for the different countries of our sample. With regard to the bid/ask spreads series, daily time-series were created by calculating the spread between the bid and ask quotations provided by Bloomberg for the "on the run" (benchmark) 10-year issue for each market at every moment in time, using the same benchmarks and starting dates that Datastream uses to create the 10-year yield series. For all the different issues Bloomberg provides daily quoted prices calculated as the average bid and ask quotations at the close. A similar methodology is used to build the on-the-run/off-the-run spread daily time-series. These series were created by calculating the differences between the "on the run" (benchmark) 10-year issue and the "off the run" (immediately older security) 10-year issue yields provided by Bloomberg for each market at every moment of time, also using the same benchmarks and starting dates that Datastream uses to create the 10-year yield and swap rates series (see table 6). The overall outstanding amounts of public debt data have been drawn from the Bank for International Settlements (BIS; see table 5) and the GDP from Eurostat. However, as these series are only provided every three months, for the construction of the relative debt-to-GDP ratio daily time-series, the rest of the data have been extrapolated assuming a daily constant rate of increase of those volumes, which in fact present very slight differences within countries over the studied period. For this reason, it can be assumed that the extrapolation will not produce important biases in the data and can be applied in this case. And finally, the spread between 10-year fixed interest rates on US swaps and the yield on 10-year Moody's Seasoned AAA US corporate bonds ($USSPREAD_{it}$), has been calculated from daily data obtained from Datastream. All the variables included in the estimation that capture domestic risk factors are relative to the German ones. Thus, $BIDASKDIF_{it}$ is the difference between the bid/ask spread in country *i* and the bid/ask spread in Germany, $ONOFFDIF_{it}$ is the difference between the on the run /off the run spread in country *i* and that in Germany and $LNDEBTGDP_{it}$ is the (log) deviation of country *i* debt-to-GDP ratio from Germany's debt-to-GDP ratio.

5. Model.

In the specification, in addition to the local and world risk variables mentioned ($LNDEBTGDP_{it}$, $BIDASKDIF_{it}$, $ONOFFDIF_{it}$, and $USSPREAD_{it}$), country and monthly dummy variables will be introduced. Further, in order to assess whether there exists a varying relationship between liquidity variables and the yield $SPREADS_{it}$ or $ASPREADS_{it}$ (if liquidity is self-fulfilling, the proxies of market liquidity might present a non-linear relationship, i.e. a liquid/illiquid market might lead to an increasingly lower/higher liquidity premium, see Economides and Siow (1988)) a quadratic specification for the variables $BIDASKDIF_{it}$, and $ONOFFDIF_{it}$ is formulated.

So, with the following defined previously:

$BIDASKDIF2_{it} = (BIDASKDIF)^2_{it}$

$ONOFFDIF2_{it} = (ONOFFDIF)^2_{it}$

The local risk variables ($Z^L_{i,t}$) will be:

$$Z^L_{i,t} = (LNDEBTGDP_{it}, BIDASKDIF_{it}, BIDASKDIF2_{it}, ONOFFDIF_{it}, ONOFFDIF2_{it}) \quad (7)$$

While the world risk variables ($Z^W_{i,t}$) will be:

$$Z^W_{i,t} = USSPREAD_{it} \quad (8)$$

Therefore, model I will be a static panel regression[7] with both domestic and international risk variables that will be estimated for both group of countries (EMU and non-EMU participating)

$$y_{it} = \alpha_i + \beta X_{it} + \delta MONTHLYDUMMIES_t + \lambda COUNTRYDUMMIES_i + \varepsilon_{it}$$

Where, with the world ($Z^W_{i,t}$) and local risk variables ($Z^L_{i,t}$) previously defined,

The vector of independent variables will be:

$$X_{it} = (Z^W_{i,t}, Z^L_{i,t}, [Z^W_{i,t} \cdot Z^L_{i,t}]) \quad (9)$$

In the above panel regressions, with very few exceptions, country dummies turn out to be significant at the 5 per cent confidence level, meaning that specific factors in each different country are relevant and suggesting that a separate estimation for each of them will provide fuller information. We will do this in the second set of regressions (model II) where, using the same independent variables as in the panel regressions, a static regression will be implemented separately for each of the twelve countries in the sample. Therefore, the following empirical model on daily data will be implemented separately for each individual country:

$$y_{it} = \alpha_i + \beta X_{it} + \delta MONTHLYDUMMIES_t + \varepsilon_{it} \quad (10)$$

Hence, twelve regressions will be calculated, where the vector of independent variables will be:

$$X_{it} = (Z^W_{i,t}, Z^L_{i,t}, [Z^W_{i,t} \cdot Z^L_{i,t}])$$

[7] In Gómez-Puig (2006b), we estimated a dynamic model but the introduction of a lag of the dependent variable did not improve the results.

Model I and II will be estimated for the whole period (1999-2005), and the three sub-periods into which we have broken it down and, for both groups of countries. Our intention is to analyse whether the impact of the different variables changes throughout the two samples and between them. The first sub-period spans 1999 to 2000, the second 2001 to 2002 and the third 2003 to 2005.

6. Results

The estimation methods used in all specifications, Feasible Generalized Least Squares (FGLS) in the panel estimation and a regression with Newey-West standard errors in the estimations for each Euro-country, are robust to the possible existence of autocorrelation and heteroscedasticity in the error terms. Tables 7 and 8 present the results for EMU-countries. The panel regressions (table 7) clearly show that domestic risk factors are much more significant than common or international risk factors in explaining yield spread behaviour in EMU countries during the first seven years of Monetary Union. Actually, the world risk variable is only positively significant at the 10% confidence level in the estimation corresponding to the whole period. With regard to the domestic risk factors, the results show the following conclusions. Both credit risk (when it is interacted with the international risk variable) and liquidity risk (this one captured by the bid-ask spread) are the variables with higher impact on yield spreads. Both variables are positively significant at the 5% confidence level not only in the whole sample, but also in the three sub-periods. The self-fulfilling nature of liquidity is corroborated by the results. If we consider the coefficients of the quadratic liquidity variables interacted with the world risk variable, we can conclude that both the bid-ask spread and the on-the-run/off-the-run spread present a positive non-linear behaviour (except in the period 1999-2000). Consequently, liquidity will be "self-reinforcing": since traders prefer to participate in liquid markets, more will participate in them, and the more liquid they will be. Finally, country dummy variables turn out to be always significant, with very few exceptions (France and the Netherlands in the estimation that includes the entire period, and Belgium in the first and second sub-periods). These results mean that specific factors in each different country are relevant and suggest that a separate estimation for each of them will provide wider information. This is why we estimate nine individual regressions for each country, using the same periods and the same explanatory variables as in the panel regressions. From these sets of estimations (tables 8) the following conclusions are worth noting. In the majority of the countries, the world risk factor only plays a marginal role. Actually, only in the case of Italy and Portugal (as we noted in table 2, Portugal is the only country that presented a positive correlation between its 10-year yield spread over Germany and the US banking risk factor), does the world risk factor present a positive coefficient at the 5% confidence level not only for the complete period but also for at least one of the sub-periods. With regard to the domestic risk variables, the credit risk variable, except in the case of Ireland is positively significant in most of the countries at least for one or two sub-periods. It is also important to note that the negative coefficient that this variable presents in the case of France and Italy (the two biggest debt markets relative to the German one, see table 5) has been positive since 2003 in the case of France, and since 2001 in the case of Italy. These results imply that the "Too-big-to-fail" theory that we claimed in our earlier papers (see Gómez-Puig 2006b and Gómez-Puig 2006c) may only be valid in the years immediately after the beginning of the Monetary Union. Therefore, with a longer time perspective, agents seem to believe in the "no-bail-out" clause imposed by the EMU, even in the case of large debt markets. With regard to the liquidity variables, the linear and the non-linear behaviour of both the on-the-run/off-the-run spread and the bid-ask spread is supported by the results (at least in most of the countries and sub-periods studied). Tables 9 and 10 present the results for non-EMU countries. In particular, table 9 displays the results of the panel estimation for the four periods. The most important conclusion that can be drawn from these results is that non-EMU countries present a greater vulnerability to world risk factors than EMU-countries. In particular, the coefficient of the international risk factor is always positively significant at the 5% confidence level except for the period 2001-2002. The fact that these countries do not share a common Monetary Policy might explain their greater vulnerability to external risk factors. The results shown in table 9 also corroborate the importance of domestic risk factors (both liquidity and credit risk) in yield spread behaviour. Moreover, the non-linear behaviour presented by liquidity proxies supports the self-fulfilling nature of liquidity. Finally, table 10 presents the results for each of the three countries in this second group. Note that whilst panel regression supported the relevance of systemic risk in adjusted spread behaviour, the significance of the variable that captures this effect disappears in country-specific estimations. In these sets of estimations, it is domestic variables, and especially liquidity risk variables (both in their linear and non-linear form) that mostly drive adjusted spread behaviour.

5. Conclusions

In this paper we have implemented a panel regression both for the whole period (1999-2005) and for the three sub-periods into which these seven years have been broken down, and an individual regression (with the same explanatory variables as in the panel regressions) for the nine and three countries in the two groups (EMU participants and EMU non-participants respectively). Specific-country regressions are estimated for the same four periods as in the panel regressions. The results present clear evidence that it is domestic rather than international risk factors that mostly drive the evolution of 10-year yield spread differentials over Germany in all EMU countries during the seven years after the beginning of Monetary Integration. These results appear to be sound if we bear in mind that common factors (captured by world risk factors) will disappear when we take differentials between bond yields that present a very high correlation (0.99 on average). Therefore, even though bond returns present a high co-movement (systemic risk accounts for a large proportion of their behaviour), a very substantial part of this movement cancels out if we study yield spreads, which mostly reflect idiosyncratic/local or domestic risk, i.e. specific factors in each different country. In the case of non-EMU countries, where 10-year government yields do not display such high co-movement (see figure 3), adjusted yield spreads (corrected from the foreign exchange factor) are influenced more by world risk factors. The fact that these countries do not share a common Monetary Policy might explain these results. In addition, outside the Monetary Union, these debt markets did not suffer the increase in their degree of substitutability and competition experienced by EMU-debt markets since January 1999. So this situation has benefited them, insofar as market participants consider their risk premium to be low and the investment advantages to be high. Finally, the results also support the relevance of domestic risk factors (especially market liquidity differences, which influence yield spreads both in a linear and in a non-linear way) in adjusted spread behaviour in non-EMU participating countries.

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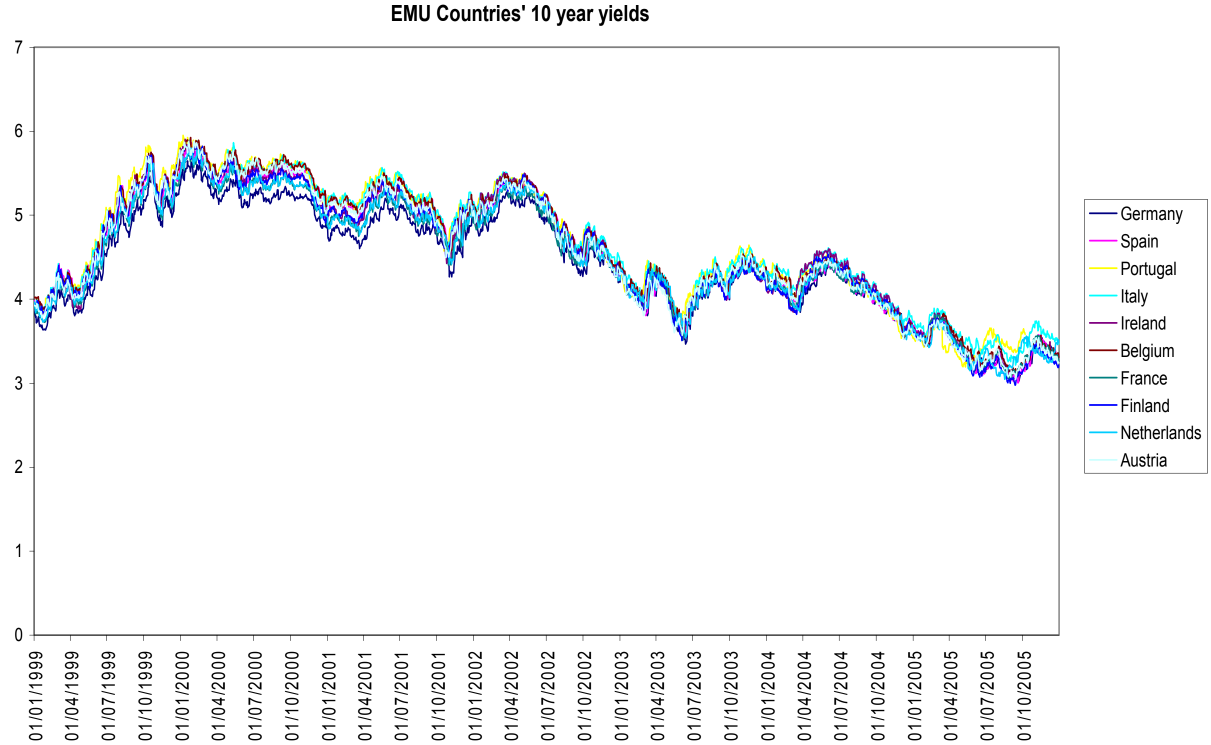
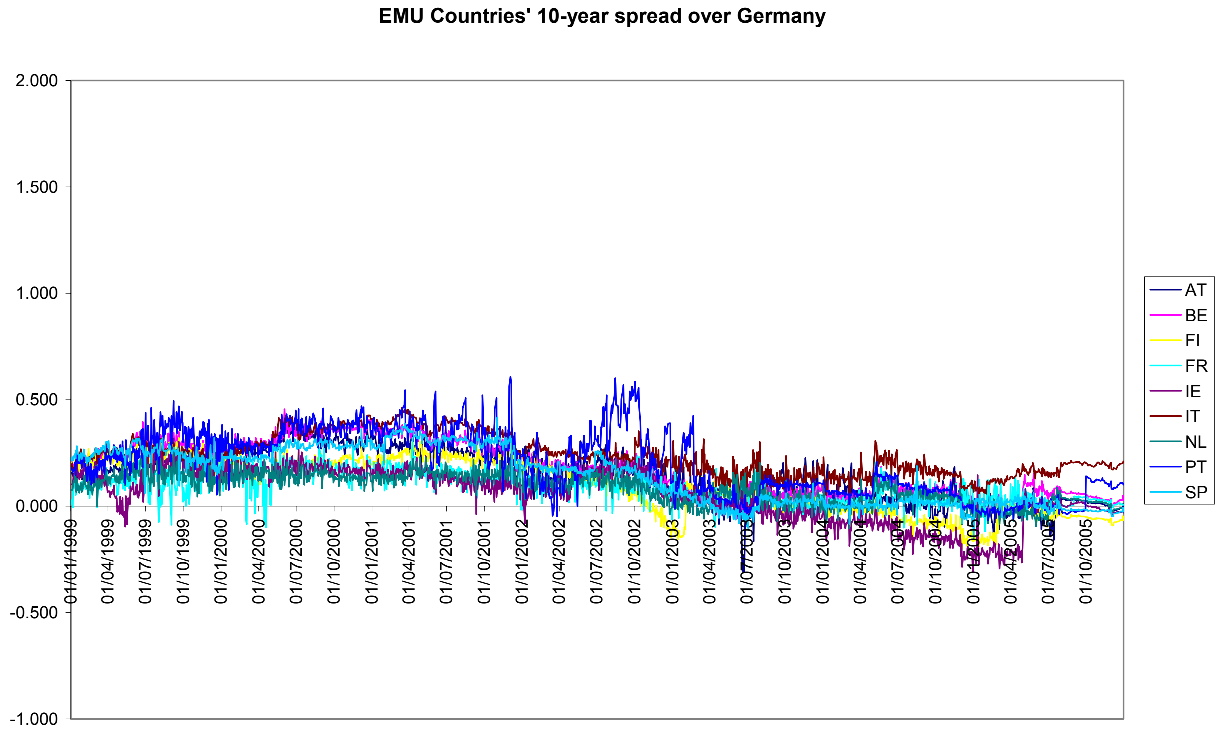
Figure 1



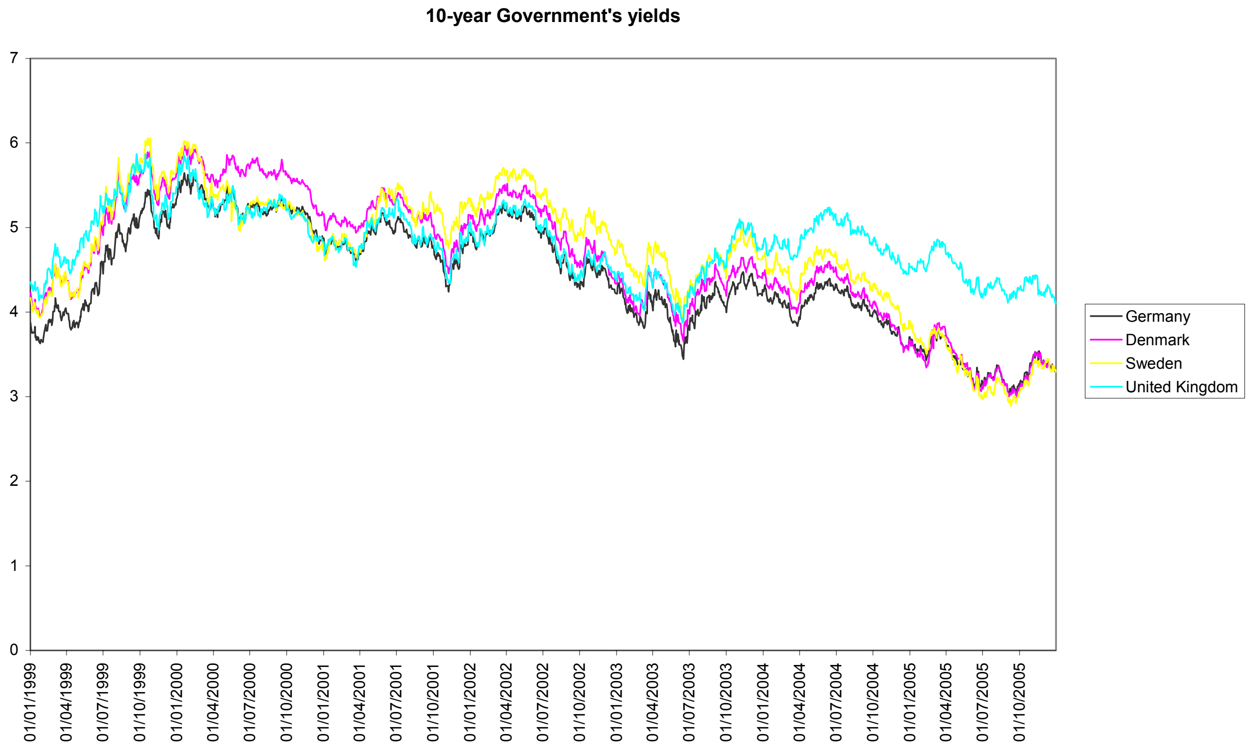
Source: Datastream

Figure 2



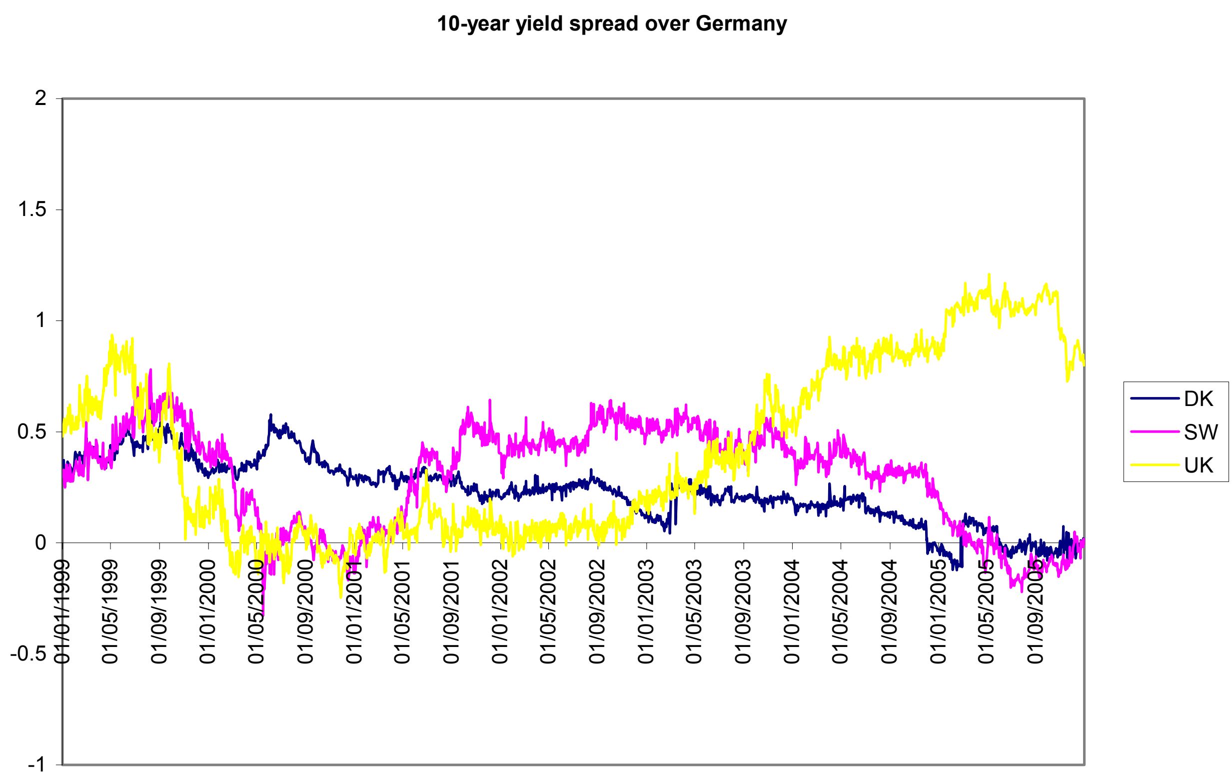
NOTE: AT: Austria, BE: Belgium, FI: Finland, FR: France, IE: Ireland, IT: Italy, NL: The Netherlands, PT: Portugal, SP: Spain. Source: Datastream

Figure 3



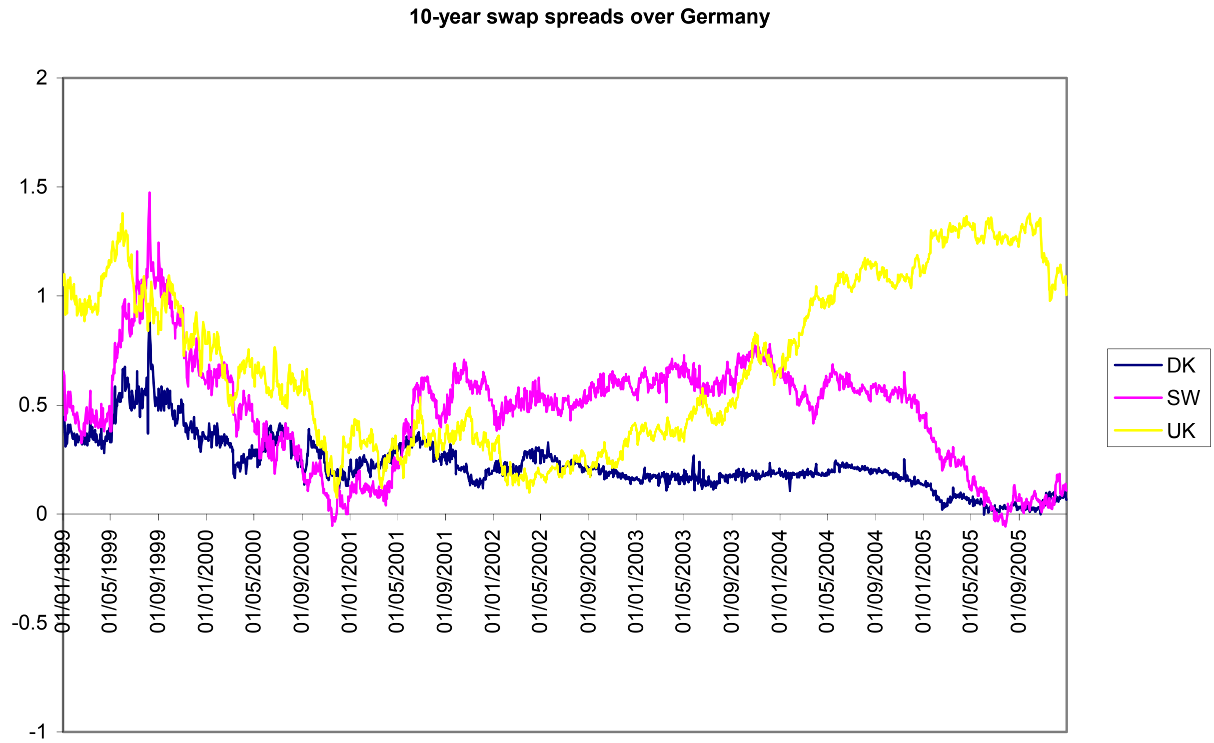
Source: Datastream

Figure 4



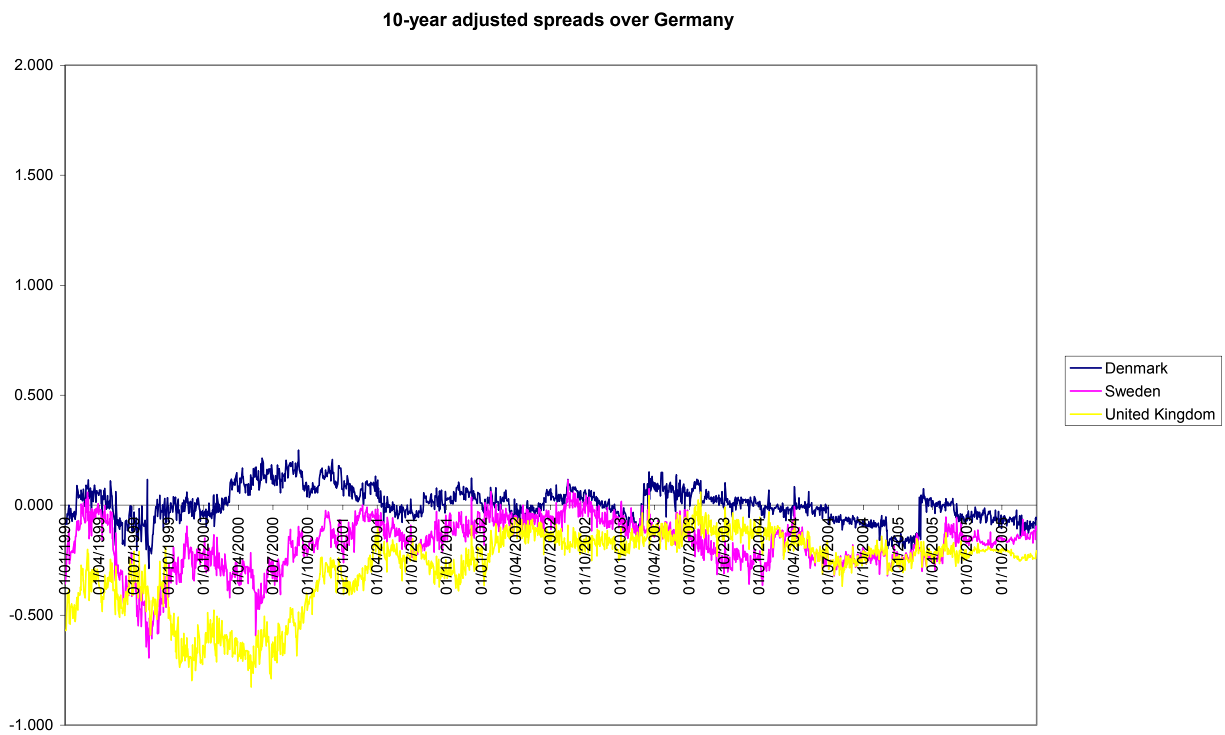
NOTE: DK: Denmark, SW: Sweden and UK: the United Kingdom. Source: Datastream

Figure 5



NOTE: DK: Denmark, SW: Sweden and UK: the United Kingdom. Source: Datastream

Figure 6



Source: Datastream.

Table 1- Correlation coefficient: 10-year government yields in the EU-15 and US (1999-2005)

	US	GE	AT	BE	FI	FR	IE	IT	NL	PT	SP	DK	SW	UK
US	1.000													
GE	0.743	1.000												
AT	0.757	0.996	1.000											
BE	0.769	0.994	0.997	1.000										
FI	0.768	0.993	0.994	0.997	1.000									
FR	0.751	0.997	0.996	0.996	0.994	1.000								
IE	0.754	0.992	0.994	0.995	0.994	0.993	1.000							
IT	0.757	0.995	0.997	0.998	0.995	0.997	0.994	1.000						
NL	0.754	0.998	0.996	0.997	0.996	0.997	0.995	0.997	1.000					
PT	0.744	0.990	0.994	0.994	0.990	0.992	0.993	0.994	0.992	1.000				
SP	0.766	0.993	0.997	0.998	0.997	0.995	0.994	0.997	0.996	0.993	1.000			
DK	0.765	0.992	0.992	0.993	0.995	0.992	0.991	0.990	0.994	0.988	0.993	1.000		
SW	0.622	0.955	0.943	0.940	0.948	0.948	0.946	0.937	0.954	0.943	0.942	0.957	1.000	
UK	0.793	0.836	0.820	0.825	0.821	0.826	0.803	0.817	0.833	0.805	0.820	0.834	0.797	1.000

NOTE: US: The United States, GE: Germany, AT: Austria, BE: Belgium, FI: Finland, FR: France, IE: Ireland, IT: Italy, NL: The Netherlands, PT: Portugal, SP: Spain, DK: Denmark, SW: Sweden and UK: The United Kingdom. Source: Datastream

Table 2- Correlation coefficient: EU-15 spreads/aspreads over 10-year Germany government yields and US risk factor (1999-2005)

	US
US	1.000
AT	-0.056
BE	-0.136
FI	-0.113
FR	-0.026
IE	-0.004
IT	-0.017
NL	-0.055
PT	0.107
SP	-0.052
DK	0.088
SW	0.546
UK	0.556

NOTE: US: The United States, AT: Austria, BE: Belgium, FI: Finland, FR: France, IE: Ireland, IT: Italy, NL: The Netherlands, PT: Portugal, SP: Spain, DK: Denmark, SW: Sweden, UK: The United Kingdom. Source: Datastream

Table 3- 10-year yield spreads/aspreads over Germany (1999-2005)

10 year yield spread/adjusted spread over Germany					
		1P: 1999-2000	2P: 2001-2002	3P: 2003-2005	1999-2005
AT	average	0.240	0.209	0.021	0.137
	st.deviation	0.066	0.067	0.062	0.120
BE	average	0.295	0.245	0.054	0.177
	st.deviation	0.057	0.080	0.042	0.124
FI	average	0.214	0.165	-0.027	0.097
	st.deviation	0.037	0.091	0.066	0.128
FR	average	0.136	0.122	0.033	0.088
	st.deviation	0.062	0.051	0.042	0.070
IE	average	0.156	0.128	-0.065	0.053
	st.deviation	0.060	0.050	0.090	0.126
IT	average	0.298	0.309	0.156	0.240
	st.deviation	0.062	0.075	0.045	0.094
NL	average	0.139	0.125	0.022	0.085
	st.deviation	0.037	0.044	0.047	0.070
PT	average	0.307	0.306	0.062	0.202
	st.deviation	0.081	0.125	0.070	0.152
SP	average	0.256	0.235	0.004	0.142
	st.deviation	0.037	0.083	0.030	0.131
DK	average	0.034	0.020	-0.029	0.003
	st.deviation	0.093	0.043	0.067	0.076
SW	average	-0.254	-0.084	-0.186	-0.176
	st.deviation	0.138	0.061	0.066	0.112
UK	average	-0.496	-0.213	-0.183	-0.281
	st.deviation	0.146	0.080	0.064	0.168

NOTE: AT: Austria, BE: Belgium, FI: Finland, FR: France, IE: Ireland, IT: Italy, NL: The Netherlands, PT: Portugal, SP: Spain, DK: Denmark, SW: Sweden, UK: The United Kingdom. Source: Datastream

Table 4

		EMU (1999-2005)		
		(I_i-I_{DM})	(IRS_i-IRS_{DM})	$ASPREAD_i$
		(1)	(2)	(3)=(1)-(2)
DK	Average	0.233	0.230	0.003
	St.dev.	0.145	0.126	0.076
SW	Average	0.301	0.478	-0.176
	St.dev.	0.228	0.248	0.112
UK	Average	0.414	0.694	-0.281
	St.dev.	0.392	0.380	0.168

NOTE: DK: Denmark, SW: Sweden, UK: The United Kingdom. Source: Datastream

Table 5

OUTSTANDING AMOUNTS OF GOVERNMENT'S DEBT (billions of euros)										
	1999-12	2000-12	2001-12	2002-12	2003-12	2004-12	2005-12	average 99-05	average% of EMU	average% of EU-15
Austria	75.35	81.03	83.40	83.25	78.41	77.60	80.1	79.9	2.19%	1.88%
Belgium	233.82	238.90	247.93	252.50	252.54	250.13	256.9	247.5	6.78%	5.84%
Finland	45.89	46.00	46.98	47.20	52.14	54.55	49.2	48.9	1.34%	1.15%
France	603.72	639.98	676.16	732.14	817.7	862.93	910.6	749.0	20.52%	17.67%
Germany	610.29	640.19	680.25	744.64	812.94	875.63	899.7	751.9	20.59%	17.74%
Greece	88.99	93.28	103.48	123.20	138.81	158.95	175.9	126.1	3.45%	2.97%
Ireland	24.89	23.21	20.20	22.69	28.33	31.35	31.7	26.1	0.71%	0.61%
Italy	1041.21	1042.67	1063.43	1060.65	1074.6	1097.50	1156.2	1076.6	29.49%	25.40%
Netherlands	180.87	176.36	179.73	188.23	203.41	214.82	227.35	195.8	5.36%	4.62%
Portugal	37.73	40.84	46.18	56.74	62.62	70.85	82.8	56.8	1.56%	1.34%
Spain	299.52	314.45	319.19	328.79	330.56	337.57	343.2	324.8	8.89%	7.66%
EMU	3242.29	3336.92	3466.92	3640.03	3852.06	4031.86	3988.0	3651.2	100.00%	86.14%
Denmark	92.08	88.88	88.28	93.07	83.65	84.58	77.2	86.8	-	2.05%
Sweden	123.83	113.06	92.36	99.27	112.54	117.25	109.8	109.7	-	2.59%
United Kingdom	459.88	458.36	466.58	452.01	466.31	602.58	680.41	512.30	-	12.09%
non-EMU	675.79	660.29	647.23	644.04	601.11	696.87	867.4	684.68	-	16.15%
EU-15	3918.08	3997.21	4114.15	4284.07	4453.17	4728.73	4175.1	4238.64	-	100.00%
United States	4380.35	4408.28	4765.57	4329.74	3984.84	4059.10	4806.0	4390.56	-	-

Source: Bank for International Settlements

Table 6

	Issue Date	Symbol	Coupon	Maturity Date
AUSTRIA	01/02/1998	RAGB	5%	15/01/2008
	01/04/1999	RAGB	4%	15/07/2009
	01/12/1999	RAGB	5.50%	15/01/2010
	01/05/2001	RAGB	5.25%	04/01/2011
	01/05/2002	RAGB	5%	15/07/2012
	01/08/2003	RAGB	3.80%	20/10/2013
	01/11/2004	RAGB	4.30%	15/07/2014
	01/08/2005	RAGB	3.50%	25/10/2015
BELGIUM	01/01/1997	BGB	6.25%	28/03/2007
	01/12/1997	BGB	5.75%	28/03/2008
	01/02/1999	BGB	3.75%	28/03/2009
	01/02/2000	BGB	5.75%	28/09/2010
	01/05/2001	BGB	5%	28/09/2011
	01/08/2002	BGB	5%	28/09/2012
	01/07/2003	BGB	4.25%	28/09/2013
	01/05/2004	BGB	4.25%	28/09/2014
	01/05/2005	BGB	3.75%	28/09/2015
FINLAND	01/12/1998	RFGB	5%	25/04/2009
	01/02/2000	RFGB	5.75%	23/02/2011
	01/02/2001	RFGB	5.75%	23/02/2011
	01/02/2003	RFGB	5.38%	04/07/2013
	01/03/2005	RFGB	4.25%	04/07/2015

Table 6 (cont)

	Issue Date	Symbol	Coupon	Maturity Date
FRANCE	01/01/1999	FRTR	4%	25/04/2009
	01/07/1999	FRTR	4%	25/10/2009
	01/03/2000	FRTR	5.50%	25/04/2010
	01/09/2000	FRTR	5.50%	25/10/2010
	01/06/2001	FRTR	6.50%	25/04/2011
	01/01/2002	FRTR	5%	25/10/2011
	01/05/2002	FRTR	5%	25/04/2012
	01/10/2002	FRTR	4.75%	25/10/2012
	01/04/2003	FRTR	4%	25/04/2013
	01/01/2004	FRTR	4%	25/10/2013
	01/05/2004	FRTR	4%	25/04/2014
	01/12/2004	FRTR	4%	25/10/2014
	01/05/2005	FRTR	3.50%	25/04/2015
	01/09/2005	FRTR	3%	25/10/2015
	01/03/2006	FRTR	3.25%	25/04/2016
GERMANY	01/08/1998	DBR	4 3/4%	04/07/2008
	01/02/1999	DBR	3 3/4%	04/01/2009
	01/04/1999	DBR	4%	04/07/2009
	01/08/1999	DBR	4 1/2%	04/07/2009
	01/11/1999	DBR	5 3/8%	04/01/2010
	01/06/2000	DBR	5 1/4%	04/07/2010
	01/12/2000	DBR	5 1/4%	04/01/2011
	01/06/2001	DBR	5%	04/07/2011
	01/02/2002	DBR	5%	04/01/2012
	01/08/2002	DBR	5%	04/07/2012
	01/02/2003	DBR	4.50%	04/01/2013
	01/08/2003	DBR	3.75%	04/07/2013
	01/01/2004	DBR	4.25%	04/01/2014
	01/12/2004	DBR	3.75%	04/01/2015
	01/06/2005	DBR	3.25%	04/07/2015
	01/12/2005	DBR	3.50%	04/01/2016
IRELAND	01/10/1997	IRISH	6%	18/08/2008
	01/07/1999	IRISH	4%	18/04/2010
	01/05/2002	IRISH	5%	18/04/2013
	01/05/2005	IRISH	4.60%	18/04/2016
ITALY	01/02/1998	BTPS	6%	01/11/2007
	01/07/1998	BTPS	5%	01/05/2008
	01/01/1999	BTPS	4.50%	01/05/2009
	01/10/1999	BTPS	4.25%	01/11/2009
	01/07/2000	BTPS	5.50%	01/11/2010
	01/06/2001	BTPS	5.25%	01/08/2011
	01/02/2002	BTPS	5%	01/02/2012
	01/10/2002	BTPS	4.75%	01/02/2013
	01/07/2003	BTPS	4.25%	01/08/2013
	01/05/2004	BTPS	4.25%	01/08/2014
	01/02/2005	BTPS	4.25%	01/02/2015
	01/08/2005	BTPS	3.75%	01/08/2015
NETHERLAND	01/02/1998	NETHER	5.25%	15/07/2008
	01/02/1999	NETHER	3.75%	15/07/2009
	01/02/2000	NETHER	5.50%	15/07/2010
	01/04/2001	NETHER	5%	15/07/2011
	01/05/2002	NETHER	5%	15/07/2012
	01/04/2003	NETHER	4.25%	15/07/2013
	01/05/2004	NETHER	3.75%	15/07/2014
	01/07/2005	NETHER	3.25%	15/07/2015

Table 6 (cont)

	Issue Date	Symbol	Coupon	Maturity Date
PORTUGAL	01/06/1998	PGB	5.375%	23/06/2008
	01/07/1999	PGB	3.95%	15/07/2009
	01/06/2000	PGB	5.85%	20/05/2010
	01/04/2001	PGB	5.15%	15/06/2011
	01/05/2002	PGB	5%	15/06/2012
	01/08/2003	PGB	5.45%	23/09/2013
	01/05/2004	PGB	4.38%	16/06/2014
	01/10/2005	PGB	3.35%	15/10/2015
SPAIN	01/11/1997	SPGB	6%	31/01/2008
	01/01/1999	SPGB	5.15%	30/07/2009
	01/01/2000	SPGB	4.00%	31/01/2010
	01/02/2001	SPGB	5.40%	30/07/2011
	01/10/2001	SPGB	5.35%	31/10/2011
	01/07/2002	SPGB	5%	30/07/2012
	01/08/2003	SPGB	4.80%	30/07/2013
	01/07/2004	SPGB	4.75%	30/07/2014
	01/01/2005	SPGB	4.40%	31/01/2015
DENMARK	01/07/1997	DGB	7%	15/11/2007
	01/02/1999	DGB	6%	15/11/2009
	01/03/2001	DGB	6%	15/11/2011
	01/03/2003	DGB	5%	15/11/2013
	01/03/2005	DGB	4%	15/11/2015
SWEDEN	01/07/1998	SGB	9%	20/04/2009
	01/02/2001	SGB	5.25%	15/03/2011
	01/08/2002	SGB	5.50%	08/10/2012
	01/02/2004	SGB	6.75%	05/05/2014
	01/05/2005	SGB	4.50%	12/08/2015
U.KINGDOM	Oct-98	UKT	9%	13/10/2008
	Apr-99	UKT	5.75%	07/12/2009
	Apr-01	UKT	6.25%	25/11/2010
	Aug-01	UKT	5%	07/03/2012
	Sep-03	UKT	8.50%	27/09/2013
	Dec-03	UKT	5%	07/09/2014
	Mar-05	UKT	4.75%	07/09/2015

Source: Datastream

Table 7

Cross-Sectional Time-Serie FGLS Regression. dependent variable: *SPREAD*				
X_{it} **	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_{it}$	**0.043**	**0.556**	-0.159	-0.327
	(0.060)	**(0.019)**	(0.028)	(0.012)
ONOFFDIF $_{it}$	0.480	0.407	-0.529	-0.510
	(0.024)	(0.107)	(0.054)	(0.046)
ONOFFDIF2 $_{it}$	-1.553	-	**2.827**	-2.881
	(0.108)		**(0.385)**	(0.172)
BIDASKDIF $_{it}$	**0.529**	**0.153**	**0.191**	**0.471**
	(0.033)	**(0.053)**	**(0.082)**	**(0.061)**
BIDASKDIF2 $_{it}$	**0.874**	-1.057*	1.382*	**1.775**
	(0.362)	(0.567)	(0.743)	**(0.757)**
USSPREAD $_{it}$	0.008*	-	-	-0.048
	(0.005)			(0.008)
LNDEBTGDP*USSPREAD $_{it}$	**0.007**	**0.018**	**0.010**	**0.018**
	(0.002)	**(0.008)**	**(0.004)**	**(0.003)**
ONOFFDIF*USSPREAD $_{it}$	-0.500	-	-	-
	(0.024)			
ONOFFDIF2*USSPREAD $_{it}$	**1.547**	-4.065	-0.792	**2.381**
	(0.094)	(-3.826)	(0.238)	**(0.148)**
BIDASKDIF*USSPREAD $_{it}$	-0.303	-	-	-0.539
	(0.037)			(0.063)
BIDASKDIF2*USSPREAD $_{it}$	-0.997	-	-1.687	-
	(0.364)		(0.604)	
DAUSTRIA	0.056	0.517	-0.182	0.320
	(0.004)	(0.018)	(0.026)	(0.008)
DBELGIUM	0.056	-	-	0.678
	(0.009)			(0.018)
DFINLAND	0.022	0.458	-0.215	0.226
	(0.004)	(0.017)	(0.029)	(0.007)
DFRANCE	-	0.305	-0.234	0.510
		(0.015)	(0.214)	(0.012)
DITALY	0.123	0.056	0.065	0.761
	(0.008)	(0.002)	(0.003)	(0.017)
DNETHERLANDS	-	0.261	0.240	0.423
		(0.013)	(0.024)	(0.010)
DPORTUGAL	0.107	0.630	-0.114	0.466
	(0.004)	(0.020)	(0.028)	(0.011)
DSPAIN	0.059	0.352	-0.102	0.388
	(0.005)	(0.012)	(0.020)	(0.010)
CONSTANT	0.072	-0.478	0.445	-0.267
	(0.006)	(0.024)	(0.033)	(0.017)
Number of observations =	14674	4253	4174	6254
Number of groups =	9	9	9	9
Avg obs per group =	1669	500	494	696
Log likelihood =	30311.21	9864.034	9683.918	14767.5
Wald chi2 =	102334.55	1741.75	31258.25	25701.7
Prob > chi2 =	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.

*Significant at 10 percent confidence level.

Standard Errors within parentheses

Table 8a

Regression with Newey-West Standard Errors
dependent variable: *SPREAD*

	AUSTRIA				BELGIUM				FINLAND			
X_t^{**}	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_t$	-	-	-	**0.292** **(0.098)**	**0.261*** **(0.140)**	-	**1.198** **(0.451)**	**0.413** **(0.100)**	**0.195** **(0.090)**	-	-	**0.414** **(0.078)**
ONOFFDIF $_t$	-0.728 (0.065)	**0.625** **(0.316)**	-0.662 (0.179)	-0.942 (0.030)	-0.435 (0.083)	-	-1.236 (0.223)	-0.995 (0.057)	-0.576 (0.128	-	-0.748 (0.134)	-1.029 (0.090)
ONOFFDIF2 $_t$	**1.647** **(0.292)**	-	-	-	**6.306** **(0.846)**	-	-	-	**1.458** **(0.472)**	**4.052*** **(2.094)**	-	-
BIDASKDIF $_t$	**0.272*** **(0.153)**	-0.376* (0.223)	-	**0.514** **(0.158)**	-	-	-	**0.597** **(0.119)**	-	-	-	-
BIDASKDIF2 $_t$	**-0.764** **(0.418)**	-	-	**-1.427** **(0.501)**	-	-	13.918 (5.358)	3.549 (1.149)	-	-	-	**6.674** **(3.160)**
USSPREAD $_t$	-	0.200* (0.116)	-0.096 (0.041)	-0.034 (0.010)	-0.130 (0.044)	-	0.391* (0.223)	-	-	-	**-0.025** **(0.009)**	**-0.089** **(0.018)**
LNDEBTGDP*USSPREAD $_t$	**0.288** **(0.052)**	-0.962* (0.577)	**1.009** **(0.293)**	-0.256 (0.083)	**0.143** **(0.045)**	-	**0.344*** **(0.209)**	-	-	-	-	-0.229 (0.076)
ONOFFDIF*USSPREAD $_t$	-	-	-	-	-0.414 (0.086)	-	**0.304*** **(0.167)**	-	-	-	-0.266 (0.105)	-
ONOFFDIF2*USSPREAD $_t$	**-1.018** **(0.234)**	-	-	**-0.233** **(0.117)**	**-4.490** **(0.751)**	-	-	-	**-0.753** **(0.335)**	-	-	-
BIDASKDIF*USSPREAD $_t$	-0.330 (0.165)	**0.833** **(0.419)**	-	-0.455 (0.143)	-0.275 (0.120)	-	-0.652* (1.611)	-0.621 (0.126)	-	-	-	-
BIDASKDIF2*USSPREAD $_t$	**0.969** **(0.441)**	-	-	**1.272** **(0.469)**	**2.806*** **(1.469)**	-	**-9.122*** **(4.814)**	-	-	-	-	**-7.841** **(3.412)**
CONSTANT	0.112 (0.018)	-	-	-	-	-	-0.924* (0.499)	-0.387 (0.089)	0.163 (0.022)	0.188* (0.099)	-	0.087 (0.035)
Number of obs	1748	513	521	714	1755	516	522	717	1742	505	520	717
F =	2080.63	229.8	453.2	3726.1	2482.82	158.57	785.09	3898.08	2410.33	24.72	662.46	1194.5
Prob > F =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.
*Significant at 10 percent confidence level.
Standard Errors within parentheses

Table 8b

Regression with Newey-West Standard Errors
dependent variable: *SPREAD*

	FRANCE				IRELAND				ITALY			
X_t^{**}	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_t$	**-1.647** **(0.566)**	**-4.854** **(1.609)**	-	**0.865** **(0.157)**	-	-	-	-	**-0.322** **(0.123)**	**-1.000** **(0.336)**	**2.552** **(0.323)**	**0.863** **(0.147)**
ONOFFDIF $_t$	-0.832 (0.040)	-	-0.948 (0.064)	-0.993 (0.012)	**0.203** **(0.097)**	-	-	-	-0.214 (0.102)	**1.360** **(0.342)**	-1.220 (0.220)	-0.89 (0.067)
ONOFFDIF2 $_t$	1.149 (0.541)	-	-	-	1.414 (0.357)	-	3.644 (1.132)	0.684* (0.403)	**3.166** **(0.820)**	-	**3.450*** **(1.757)**	-
BIDASKDIF $_t$	-	-	-2.469 (0.936)	-0.217 (0.070)	**0.719** **(0.273)**	-	**10.934*** **(6.597)**	-	**0.129*** **(0.071)**	-	-	-0.308 (0.184)
BIDASKDIF2 $_t$	-	**-13.533** **(6.332)**	-	**-1.519** **(0.623)**	**-9.077*** **(5.252)**	-	**-145.522*** **(74.633)**	-	**-4.065** **(1.188)**	**-9.224** **(1.992)**	-	-
USSPREAD $_t$	-	-	-	0.312 (0.046)	-	-0.380* (0.198)	-	-	0.100 (0.051)	-	0.600 (0.181)	0.524 (0.101)
LNDEBTGDP*USSPREAD $_t$	-	-	-	**0.992** **(0.151)**	**0.332** **(0.146)**	**-1.139** **(0.515)**	-	-	-	-	**-0.553** **(0.180)**	**-0.644** **(0.124)**
ONOFFDIF*USSPREAD $_t$	-0.123 (0.033)	-	-	-	-0.393 (0.114)	**1.653*** **(0.940)**	-	-	**0.643** **(0.094)**	-	**0.282*** **(0.148)**	-0.110* (0.065)
ONOFFDIF2*USSPREAD $_t$	**-0.874** **(0.435)**	-	-	-	**-0.857** **(0.302)**	-	**-2.347** **(0.838)**	-	**-2.691** **(0.656)**	-	-	-
BIDASKDIF*USSPREAD $_t$	-	-	**2.318** **(0.773)**	**0.221** **(0.076)**	-1.037 (0.443)	-	-	-1.085 (0.487)	-0.288 (0.073)	-	-	-
BIDASKDIF2*USSPREAD $_t$	-	-	-	-	**13.466*** **(7.595)**	-	-	-	**5.034** **(1.412)**	**11.008** **(3.228)**	-	-
CONSTANT	0.741 (0.212)	1.990 (0.627)	-	-0.222 (0.048)	-	0.335 (0.131)	-	-0.852 (0.390)	-	1.495 (0.398)	-2.296 (0.330)	-0.53 (0.121)
Number of obs	1739	508	517	714	936	149	147	640	1756	517	522	717
F =	1013.24	21.79	339.24	3495.14	1358.62	135.88	211.60	580.03	1942.83	293.27	1227.55	1582.69
Prob > F =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.
*Significant at 10 percent confidence level.
Standard Errors within parentheses

Table 8c

Regression with Newey-West Standard Errors dependent variable: *SPREAD*												
	THE NETHERLANDS				PORTUGAL				SPAIN			
X_t **	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_t$	**0.322* (0.179)**	-	-	-	**0.957 (0.404)**	-	-	**-0.450 (0.183)**	-	-	-	**0.193 (0.093)**
ONOFFDIF $_t$	-0.485 (0.080)	-	-0.844 (0.195)	-0.520 (0.096)	-0.815 (0.086)	-1.224* (0.632)	-	-1.025 (0.069)	-0.327 (0.119)	-	-	-0.815 (0.064)
ONOFFDIF2 $_t$	**3.672 (0.753)**	-	-	**1.576 (0.658)**	1.525 (0.429)	-	**-0.773* (0.403)**	-	**6.191 (1.468)**	-	-	**-1.239 (0.594)**
BIDASKDIF $_t$	-	-	-	-	**0.298 (0.118)**	-	-	-	-	-	-	**0.440 (0.095)**
BIDASKDIF2 $_t$	-	-	-	-	-	-	-	-	-	-	-	**-2.832 (1.120)**
USSPREAD $_t$	-	-	-	-0.070* (0.042)	0.221 (0.045)	-0.289 (0.109)	0.317 (0.086)	-0.164 (0.039)	-	-	-	-
*LNDEBTGDP*USSPREAD* $_t$	-	-	-	-	**-0.863 (0.206)**	**2.472* (1.267)**	**-1.734 (0.696)**	**0.725 (0.168)**	**0.109 (0.048)**	-	-	-
*ONOFFDIF*USSPREAD* $_t$	**0.323 (0.072)**	-	-	-0.384 (0.100)	-	**1.774 (0.855)**	-	**0.100 (0.049)**	-0.438 (0.125)	-	-0.688 (0.322)	
*ONOFFDIF2*USSPREAD* $_t$	**-2.420 (0.595)**	**-11.240 (5.180)**	-	**-1.444 (0.614)**	**-0.866 (0.282)**	-	-	-	**-4.003 (1.261)**	-	-	**1.400 (0.645)**
*BIDASKDIF*USSPREAD* $_t$	-	-	-	-	-0.412 (0.145)	-	-	-	-	-	-	-0.514 (0.106)
*BIDASKDIF2*USSPREAD* $_t$	-	-	-	-	-	-	-	-	-	-	-	**3.549 (1.127)**
CONSTANT	-	-	-	-	-	0.265 (0.090)	-	0.175 (0.044)	-	-	-	-0.014 (0.005)
Number of obs	1691	517	513	661	1402	511	522	717	1557	517	390	650
F =	616.11	8.45	302.59	413.25	3786.13	75.48	1455.87	4306.99	3635.23	65.53	925.85	374.91
Prob > F =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.

*Significant at 10 percent confidence level.

Standard Errors within parentheses

Table 9

Cross-Sectional Time-Serie FGLS Regression. dependent variable: *ASPREAD*				
X_{it} **	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_{it}$	-0.554 (0.024)	**0.637** **(0.248)**	-0.597 (0.049)	-0.108 (0.035)
ONOFFDIF $_{it}$	**0.776** **(0.044)**	**3.631** **(0.337)**	-	-
ONOFFDIF2 $_{it}$	**3.662** **(0.282)**	-17.711 (2.734)	**-**	**1.100** **(0.484)**
BIDASKDIF $_{it}$	**0.300** **(0.140)**	-2.392 (0.414)	-0.889 (0.348)	**1.198** **(0.161)**
BIDASKDIF2 $_{it}$	**-**	**34.105** **(6.208)**	-6.962 (2.791)	-4.503 (1.444)
USSPREAD $_{it}$	0.717 (0.010)	0.758 (0.112)	-0.039 (0.014)	0.034 (0.011)
LNDEBTGDP*USSPREAD $_{it}$	**0.251** **(0.016)**	**-2.192** **(0.405)**	**0.238** **(0.020)**	**0.127** **(0.033)**
ONOFFDIF*USSPREAD $_{it}$	-0.541 (0.043)	-4.782 (0.667)	**0.237** **(0.065)**	**0.453** **(0.144)**
ONOFFDIF2*USSPREAD $_{it}$	-3.819 **(0273)**	**19.747** **(5.473)**	-	**-**
BIDASKDIF*USSPREAD $_{it}$	-0.691 (0.174)	4.864 (0.777)	-	-1.789 (0.203)
BIDASKDIF2*USSPREAD $_{it}$	-	-64.322 (10.581)	**6.525** **(2.971)**	**11.563** **(1.828)**
DSWEDEN	-0.201 (0.003)	-0.283 (0.007)	-0.153 (0.006)	-0.182 (0.007)
DUNITED KINGDOM	-0.368 (0.007)	-	-0.380 (0.018)	-0.181 (0.014)
CONSTANT	0.094 (0.011)	-0.222 (0.080)	0.177 (0.020)	-
Number of observations =	4715	1030	1392	2293
Number of groups =	3	3	3	3
Avg obs per group =	1611	515	466	765
Log likelihood =	9518.28	1901.09	3303.71	5124.37
Wald chi2 =	20059.37	5962.64	9637.16	9348.36
Prob > chi2 =	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.

*Significant at 10 percent confidence level.

Standard Errors within parentheses

Table 10

Regression with Newey-West Standard Errors
dependent variable: A*SPREAD*

	DENMARK				SWEDEN				UNITED KINGDOM			
X_t^{**}	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005	1999-2005	1999-2000	2001-1002	2003-2005
LNDEBTGDP $_t$	-	-1.193	**1.362**	**-**	-0.872	-1.168	**1.090**	-0.751	**-**	-	-	**-**
		(0.566)	**(0.436)**		(0.157)	(0.353)	**(0.570)**	(0.201)				
ONOFFDIF $_t$	-	-1.179*	0.763	-	**0.731**	**1.657**	-1.182	-	-	-	-	-0.790
		(0.697)	(0.303)		**(0.316)**	**(0.487)**	(0.380)					(0.402)
ONOFFDIF2 $_t$	**1.450**	**9.343**	-	-	**5.428***	-	-18.133	-	**-**	**-**	-	-
	(0.643)	**(4.476)**			**(3.281)**		(5.289)					
BIDASKDIF $_t$	**0.828**	**3.432***	-	**0.927**	-	-	-	**-**	-	-	-4.953	-
	(0.344)	**(0.020)**		**(0.328)**							(2.132)	
BIDASKDIF2 $_t$	-15.815	-76.229	-196.309	**-**	-	**15.937**	-	-	-	-	**79.569**	**-**
	6.182)	(37.060)	(99.346)			**(5.766)**					**(35.310)**	
USSPREAD $_t$	-	-	-	-	-	-0.498	-	-	-	-	**-**	**-**
						(0.186)						
LNDEBTGDP*USSPREAD $_t$	**-**	-	-1.023	-	**0.478**	**2.420**	-1.035	**0.698**	-	-	-	-
			(0.309)		**(0.141)**	**(0.674)**	(0.357)	**(0.270)**				
ONOFFDIF*USSPREAD $_t$	-	**3.182**	-0.347*	-	-0.540*	-	**0.905**	**2.181**	-	-	-	-
		(0.988)	(0.188)		(0.300)		**(0.312)**	**(0.952)**				
ONOFFDIF2*USSPREAD $_t$	-1.433	-20.695	-	-4.101	**-**	-	15.428	**10.449***	**-**	-	-	-
	(0.607)	(7.289)		(2.024)			(4.988)	**(5.801)**				
BIDASKDIF*USSPREAD $_t$	-0.865	-1.915	-	-1.198	-	-	-	-	-	-	**4.374**	-
	(0.422)	(2.339)		(0.451)							**(1.922)**	
BIDASKDIF2*USSPREAD $_t$	**17.454**	**68.083**	-	**-**	**-**	-30.827	**-**	-	-	-	-68.230	-12.434
	(9.925)	**(47.263)**				(9.752)					(30.098)	(6.051)
CONSTANT	-	0.371	-	-	-	-	-	-	-0.141	-	-	-0212
		(0.160)							(0.030)			(0.079)
Number of obs	1804	513	508	783	1686	517	442	727	1225	450	442	783
F =	222.24	108.44	55.48	148.21	134.82	114.47	54.13	83.23	79.96	196.6	57.23	88.39
Prob > F =	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Significant at 5 percent confidence level.

*Significant at 10 percent confidence level.

Standard Errors within parentheses