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CONDITIONAL EUROBONDS AND THE EUROZONE SOVEREIGN DEBT CRISIS

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Conditional Eurobonds and the Eurozone Sovereign Debt Crisis

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Abstract

This paper proposes that all new euro area sovereign borrowing be in the form of jointly guaranteed Eurobonds. To avoid classic moral hazard problems and to insure the guarantors against default, each country would pay a risk premium conditional on economic fundamentals to a joint debt management agency. This suggests that these bonds be called 'Euro-insurance-bonds'. While the sovereign debt markets have taken increasing account of the economic fundamentals, the signal to noise ratio has been weakened by huge market volatility, so undercutting incentives for appropriate reforms and obscuring economic realities for voters. This paper uses an econometric model to show that competitiveness, public and private debt to GDP, and the fall-out from housing market crises are the most relevant economic fundamentals. Formula-based risk spreads based on these fundamentals would provide clear incentives for governments to be more oriented towards economic reforms to promote long-run growth than mere fiscal contraction. Putting more weight on *incentives* that come from risk spreads, than on fiscal centralisation and the associated heavy bureaucratic procedures, would promote the principle of subsidiarity to which member states subscribe. The paper compares Euro-insurance-bonds incorporating these risk spreads with other policy proposals.

Keywords: Sovereign spreads; eurobonds; eurozone sovereign debt crisis; subsidiarity.
JEL Classification Numbers: E43, E44, G01, G10, G12.

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1. Introduction

Moves towards a euro area banking union and a series of game-changers from the European Central Bank (ECB) have ameliorated the risks that feedback loops between high sovereign debt yields and banking problems could blow apart monetary union. The two longer-term refinancing operations allotted in December 2011 and February 2012, the Securities Markets Programme (SMP) and the Outright Monetary Transactions (OMT) which replaced the SMP in September 2012 have helped, so far, to cap Spanish and Italian bond yields, which had increasingly been factoring in the risk of a disorderly break-up of monetary union.

Germany's slow and grudging acceptance of the necessity of these two types of reforms reflects difficult domestic political economy battles[1]. Unfortunately, the word 'Eurobond' has acquired such negative connotations in Germany that rational debate about a better alternative to the conditional OMT has been stifled. This paper fleshes out a proposal for a type of Eurobond which shares conditionality with the OMT but promises to be superior in transparency, stability, fair burden sharing, subsidiarity and democratic accountability and in overall cost to euro area tax-payers. This type of Eurobond is a variant of one originally proposed by Wim Boonstra as long ago as 1991 for the basic design of European monetary union.

The basic idea is that all new euro area debt should be in the form of jointly underwritten Eurobonds trading at the same price for outside investors, but with country risk premia paid by each country, conditional on its economic circumstances. These premia would be paid into a common fund to insure the underwriting countries against the higher risk of future delinquencies, for example of Spanish or Italian government bonds. I therefore call this kind of bond a 'Euro-insurance-bond', see Muellbauer (2012a), and Muellbauer (2011) for an earlier version of the proposal. The risk premia would be based on a formula attaching weights to long-run economic fundamentals. These risk factors and their weights would have to be negotiated between members of the euro area. However, empirical evidence from the behaviour of sovereign spreads is very helpful in selecting both the

[1] The battles rage over the principle and degree to which mutualisation of future fiscal obligations are entailed in these reforms.

relevant fundamentals and plausible value for the weights. For this an econometric model is derived which sorts long-run fundamentals from temporary fluctuations due to global risk appetite and fears of disintegration of the euro area. This novel econometric model for 10-year sovereign spreads for nine euro area economies finds four basic components for the long-run fundamentals: competitiveness, the government debt to GDP ratio, the private sector debt to GDP ratio and a measure capturing the fall-out on banking systems of housing market booms and busts.

In this respect, there is a major difference from Boonstra's 1991 proposal and his later updates, Boonstra (2004, 2011, 2012) which propose risk premia based entirely on government deficit and debt to GDP ratios. These would have had perverse incentive effects before 2009 when Ireland and Spain had larger budget surpluses and lower government debt relative to GDP than Germany. An even lower cost of government borrowing could have encouraged an even greater house price and credit boom and even bigger subsequent banking problems in these countries. By introducing competitiveness, private debt to GDP, and the fall-out from housing market crises, account is taken of other long-term determinants of the sustainability of public debt: growth prospects and private sector risk factors, particularly those associated with the banking system. The incentives for governments are therefore more oriented towards economic reforms to promote long-run growth and financial stability than mere fiscal contraction. However, as in Boonstra's proposals, putting more weight on incentives that come from risk spreads, than on fiscal centralisation and the associated heavy bureaucratic procedures, promotes the principle of subsidiarity to which member states subscribe.

The proposed formula rests on panel econometrics on 10-year euro area bond spreads which finds strong support for the basic economics of such risk spreads from market behaviour in recent years. However, it is a fact that even when the model builds in the evident structural changes in the sovereign debt markets, including the growing attentiveness after 2007Q3 to previously ignored fundamentals, it is not possible to rationalise risk spreads at the peak levels experienced in the last three years without contagion indicators and temporary risk-amplification. The suggestion is that these peak levels priced in fears of a disorderly break-up of the euro area and widespread defaults on government bonds at the periphery. Once account is taken of these temporary episodes of risk-amplification, the econometrics suggests plausible relative weights for the fundamental economic drivers of risk spreads.

Section 2 discusses recent changes in the euro areas's fiscal framework and the economic background. Section 3 presents the econometric model, provides some counterfactual simulation results and considers calibration possibilities.

Section 4 discusses institutional structures through which conditional Eurobonds with formula-based risk spreads could be made operational. A further institutional reform to sharpen the incentives for the riskier countries and protect the underwriting countries would require the posting of foreign exchange and gold reserves by the riskier countries as collateral against the top slice of risk.

The paper concludes by comparing pros and cons of Euro-insurance-bonds incorporating the above risk spreads with other policy proposals.

2. Fiscal reforms and economic back-ground.

Sovereign debt yield spreads for the first seven years of monetary union failed to signal growing imbalances and risks. Until the financial crisis, the ECB treated all sovereign debt held by banks as equivalent in terms of collateral, see Buiter and Sibert (2005) for a detailed account and an early warning of the dangers[2] . Figure 1a below shows 10-year government bond yield spreads against Germany for Spain, Italy, Ireland, Portugal and Greece. These only began to diverge noticeably in 2007, more dramatically after the collapse of Lehman Bros. in 2008Q4 and 2009Q1, and most dramatically in the period 2010 to mid-2012. Figure 1b shows spreads against Germany for the more stable Northern European members of the euro area. It is noticeable that in 2008-9, the smaller sovereign bond markets showed a sharper divergence of spreads than the larger ones, suggesting a temporary liquidity crisis. In the later crisis, divergences of economic fundamentals seem to have played a greater role.

The ECB, European Commission and member states failed to appreciate underlying differences in credit, housing and labour market institutions[3], and were slow even to track rising divergences.[4] Constâncio (2013) argues that European financial integration and the

[2] Since the financial crisis, it has adopted the practice of applying agency ratings, e.g. BBB, to set the minimum standard for acceptance of collateral and applied haircuts on the acceptance of lower rated sovereign debt.
[3] Maclennan et al (1998) pointed to the dangers posed by these differences, particularly in housing and credit markets.
[4] The ECB arguably was less deficient than the other actors, see for example, Trichet (2006)

associated explosion of cross-border banking activity made it hard to manage the resulting credit and asset price bubbles, leaving periphery countries vulnerable to capital flight. The fiscal rules in the Stability and Growth Pact were poorly designed and implemented. So when cheap borrowing became available in the previously higher inflation economies, private and (sometimes) public debt soared, eventually resulting in crises and rescue packages in Greece, Ireland, Portugal and recently Cyprus. The induced growth encouraged wage inflation and made these economies uncompetitive.

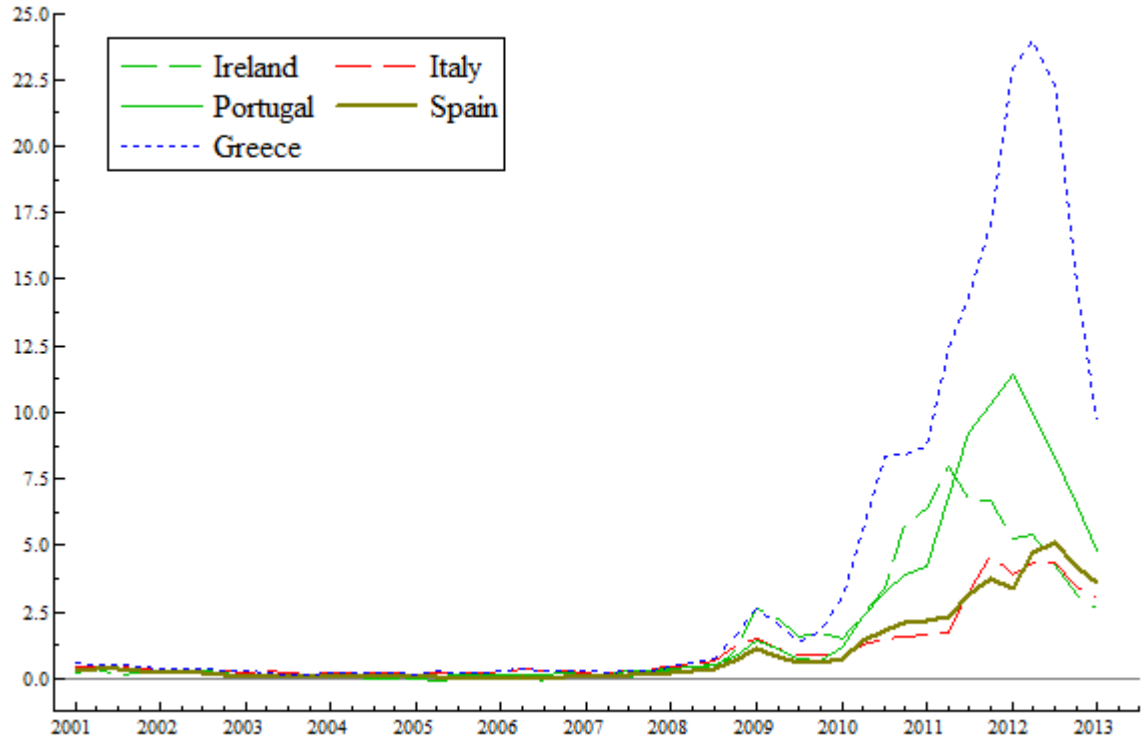

Figure 1a: 10-year bond spreads vs. Germany for periphery.

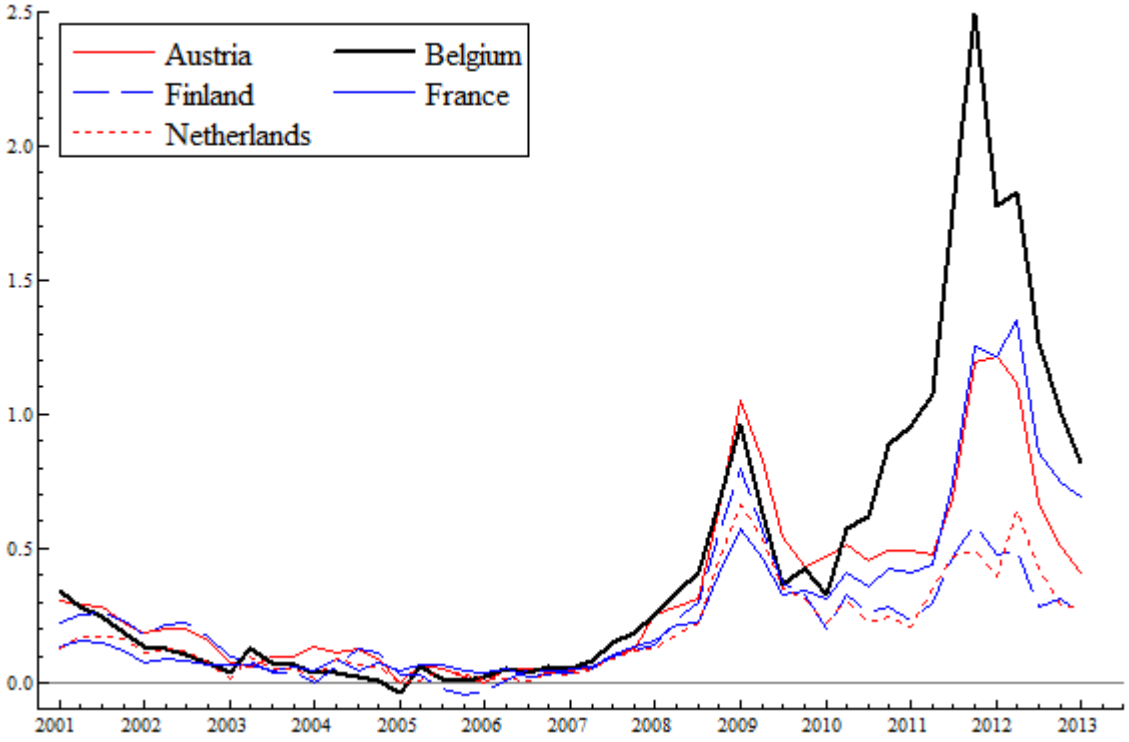

Figure 1b: 10-year bond spreads vs. Germany for core.

By December 2011, the euro area was facing a rapidly escalating 'diabolical twin' banking and sovereign debt crisis, despite a range of earlier policy responses from the ECB[5]. Italian and Spanish sovereign bond spreads had reached record levels and bank shares were in free-fall, as asset bases of banks shrank. Then the ECB introduced its longer-term refinancing operations (LTROs) offering cheap 3-year finance to banks against collateral – much then invested in sovereign debt, often domestic. This proved to be only a temporary fix and by early summer 2012 spreads had widened again and bank shares were again under pressure. One response was the enthusiastic embrace by the ECB and the EC of the basic principles of banking union with an action plan, beginning intensive rounds of negotiation with member states. The speech by ECB President Mario Draghi on 26 July 2012 promising 'to do – within its mandate - whatever it takes' and the ECB's Outright Monetary Transactions initiative of summer 2012 so far have helped to cap Spanish and Italian bond yields, which had increasingly been factoring in the risk of a disorderly break-up of monetary union. Under the

[5] These include non-standard measures such as longer and more frequent liquidity support operations, the Covered Bond Purchase Programme, and the Securities Markets Programme, described, for example. by Lenza et al. (2010) and Eser et al. (2012). Evidence on the effectiveness of the SMP is discussed in De Pooter et al. (2013) and Eser and Schwaab (2013).

OMT, ECB intervention in a particular sovereign debt market can take place provided the government concerned accepts strict conditions.

The weakness of the euro area is illustrated by recession entering its sixth quarter in 2013Q1. Problems of competitiveness, excessive government debt, excessive private debt, and housing market crises, spilling into banking systems have been especially prominent in the countries at the periphery. Figures 2a and 2b illustrate the problems of competitiveness relative to Germany. Figure 2a shows that compared to 2001, Greece, Spain and Italy had shown the worst deterioration among the peripheral economies by 2011, with a deterioration in unit labour costs relative to Germany of between 24 and 30%, and Greece by far the worst performer since the mid-2000s. Spain and Portugal have improved more than Italy since 2008, but the star performer is Ireland which by 2011 matched Germany's unit labour costs on a base of 2001, with a dramatic fall in unit labour costs since 2008. Not surprisingly, this performance has been reflected in growth of exports, and improved overall economic growth. Since 2011, relative unit labour costs have fallen sharply in Spain, Portugal and Greece.

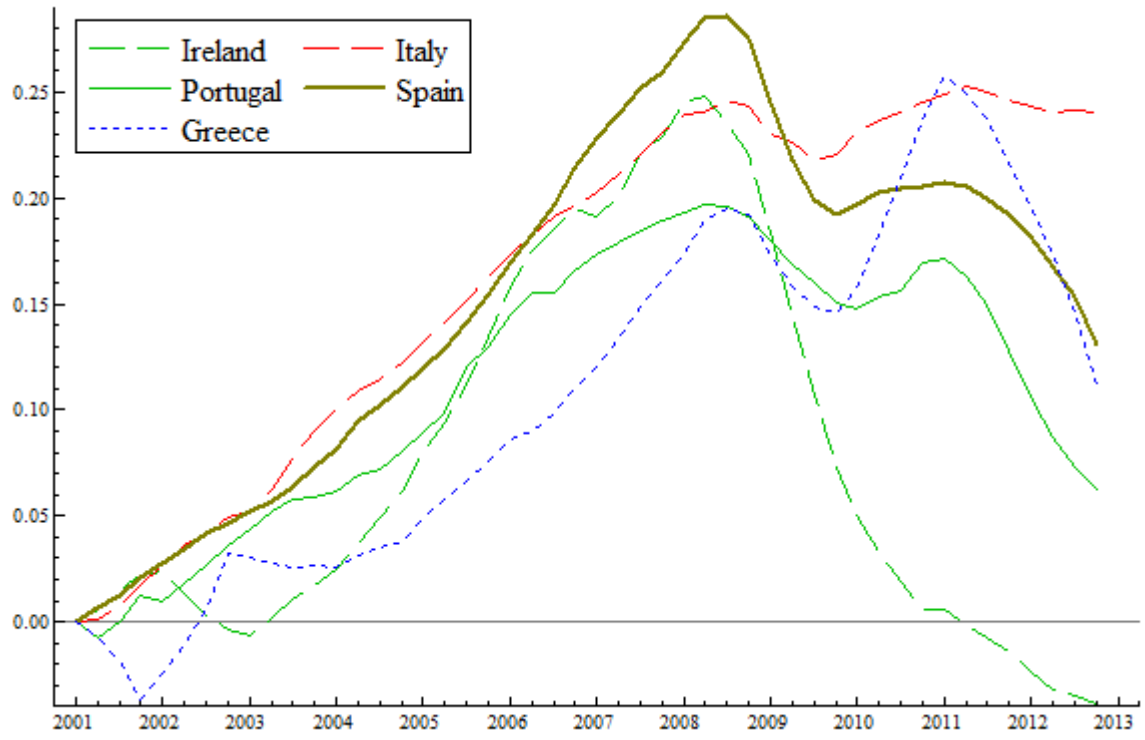

Figure 2a: relative log unit labour costs, periphery, 4-quarter moving average

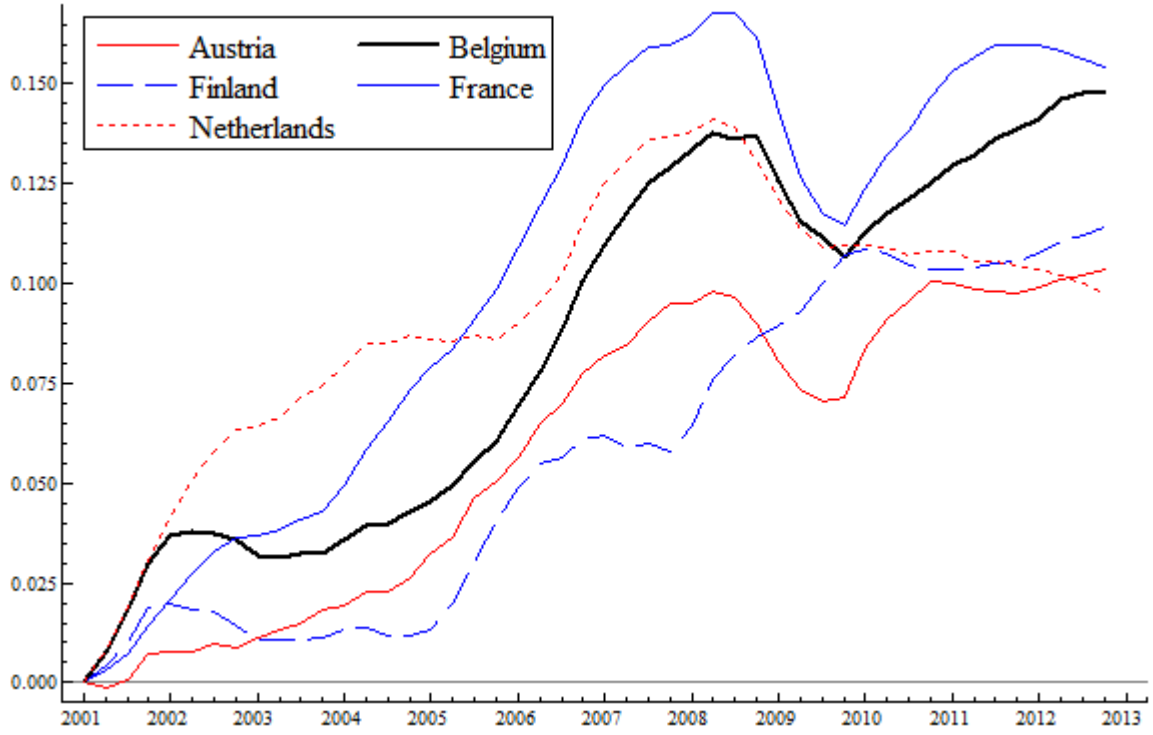

Figure 2b: relative log unit labour costs for eeuro area core, 4-quarter moving average

Figure 2b shows that among the core euro area economies none have matched German performance in keeping down unit labour costs, with France and Belgium the worst performers. Finland and the Netherlands have lowered their relative unit labour costs since 2008, and like Austria have experienced only a 10% deterioration compared to 2001. It should be noted, however, that there is nothing sacred about the 2001 benchmark, an issue to be discussed below.

Figure 3a shows government debt as a ratio to GDP relative to Germany for the euro area periphery. This demonstrates the low levels experienced in Ireland and Spain in the period before the global financial crisis and the subsequent sharp deterioration, as the crisis in property markets and banking systems strained the public finances. Public debt to GDP had for long been high in Italy though the deterioration since 2008, as economic growth and tax revenue slowed and funding costs rose, has been quite modest. In Greece, public debt had long been high, though initially disguised from public scrutiny by statistical fraud, and escalated rapidly from 2008, as the economy collapsed and governance failed.

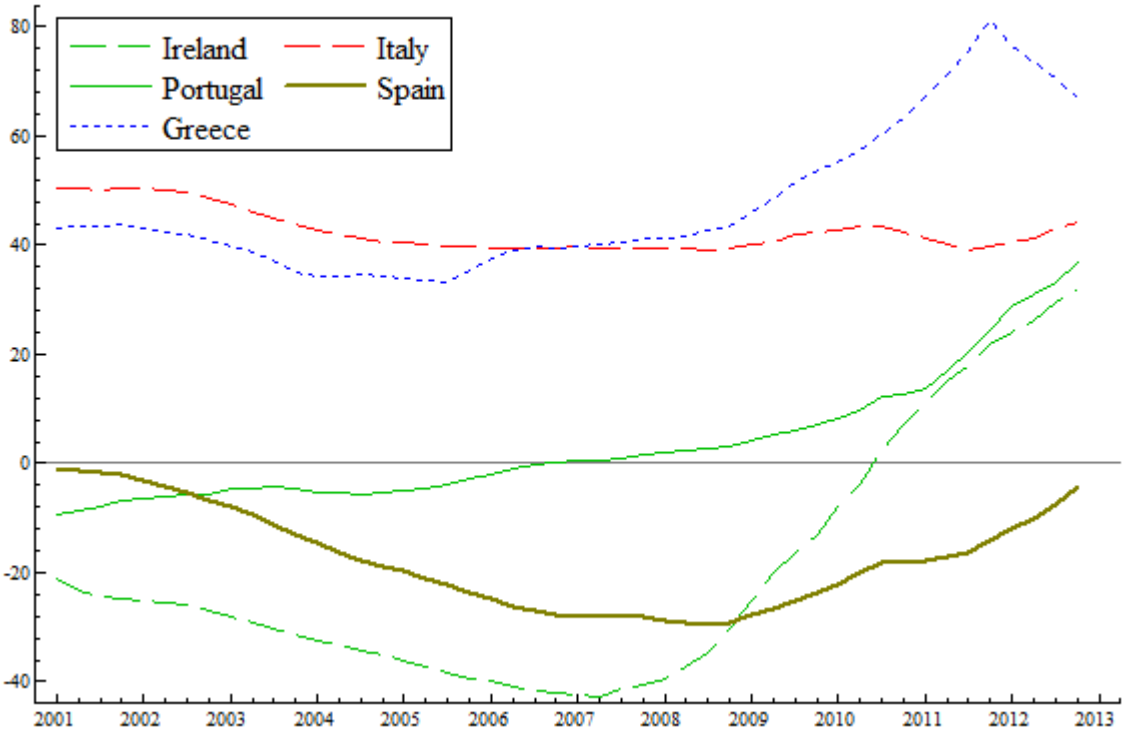

Figure 3a: relative gross government debt to GDP ratios for euro area periphery, 4-quarter moving average

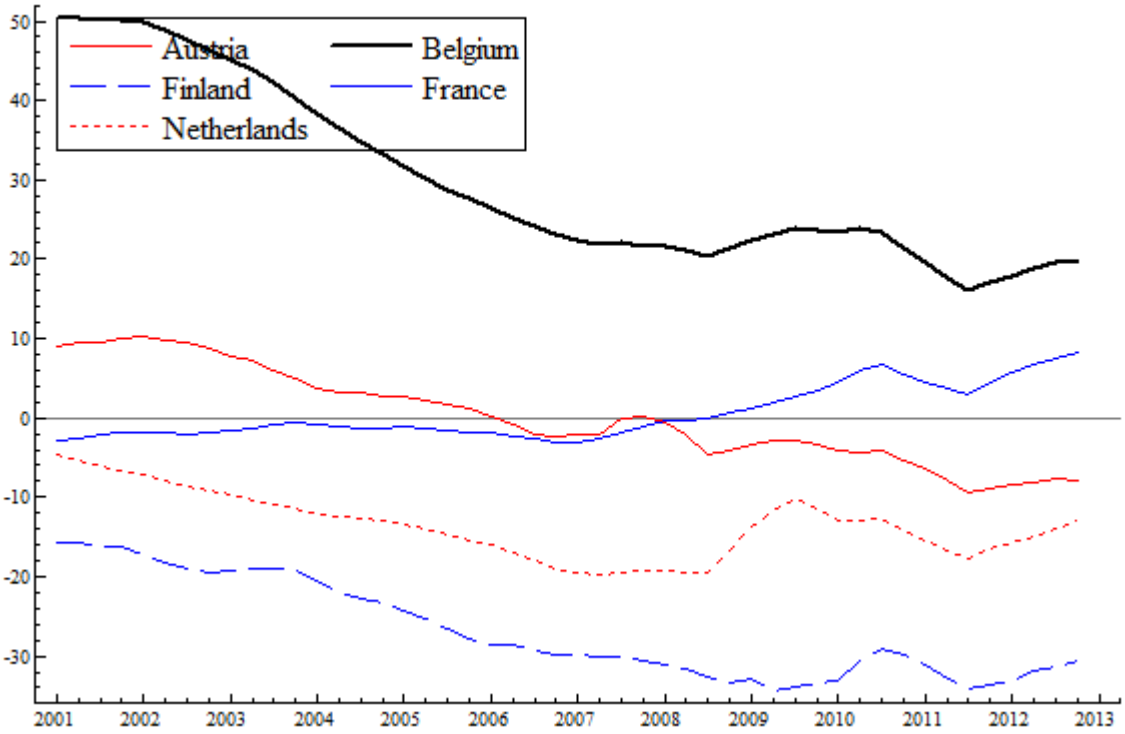

Fig 3b: relative gross government debt to GDP ratios for euro area core, 4-quarter moving average

Figure 3b shows public debt to GDP relative to Germany for the core euro area economies where Belgium has the highest debt levels, though the ratio relative to Germany has been moderating.

Private debt to GDP ratios relative to Germany are shown in Figures 4a and 4b. Ireland holds the record, with a ratio of around 200% relative to Germany. Portugal is next, closely followed by Belgium at around 120%. Spain and the Netherlands have around 100%, while the countries with the most restricted mortgage markets, Italy and Greece, have private debt ratios close to Germany's. Finland at 60% and France and Austria at around 40% are in an intermediate zone. The graphs also indicate that from the early 2000s to 2011, all countries experienced a rise relative to Germany in ratios of private debt to GDP.

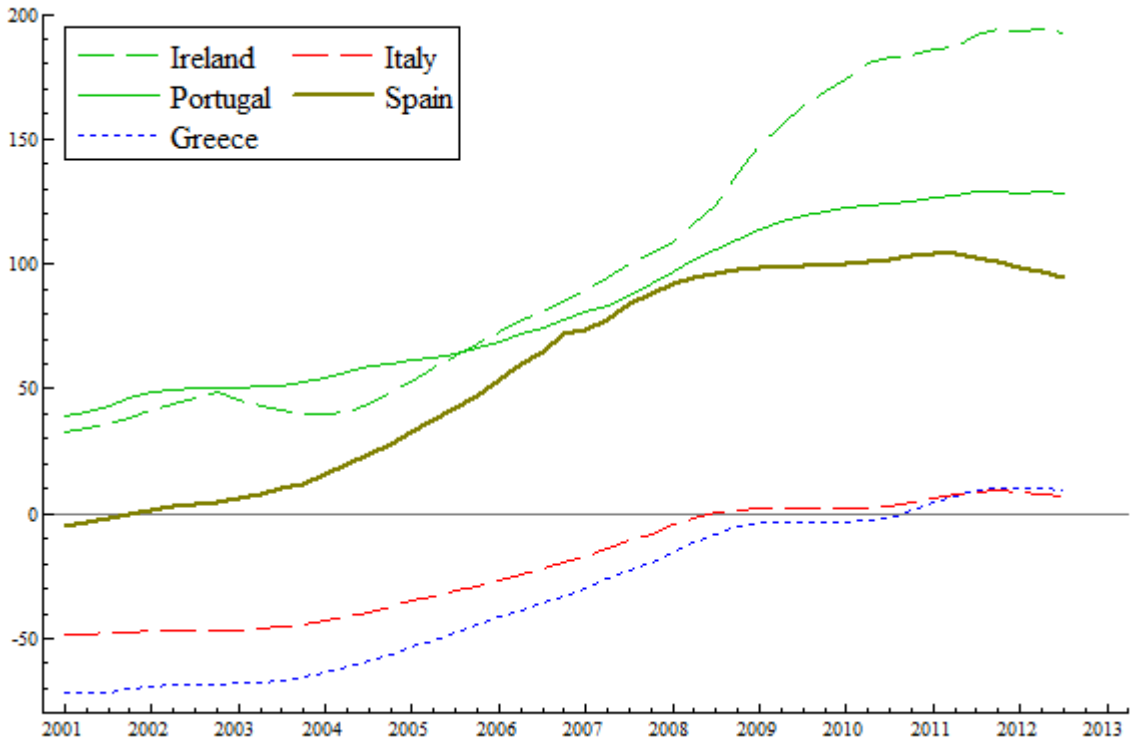

Figure 4a relative private debt/GDP for euro area periphery, 4-quarter moving average

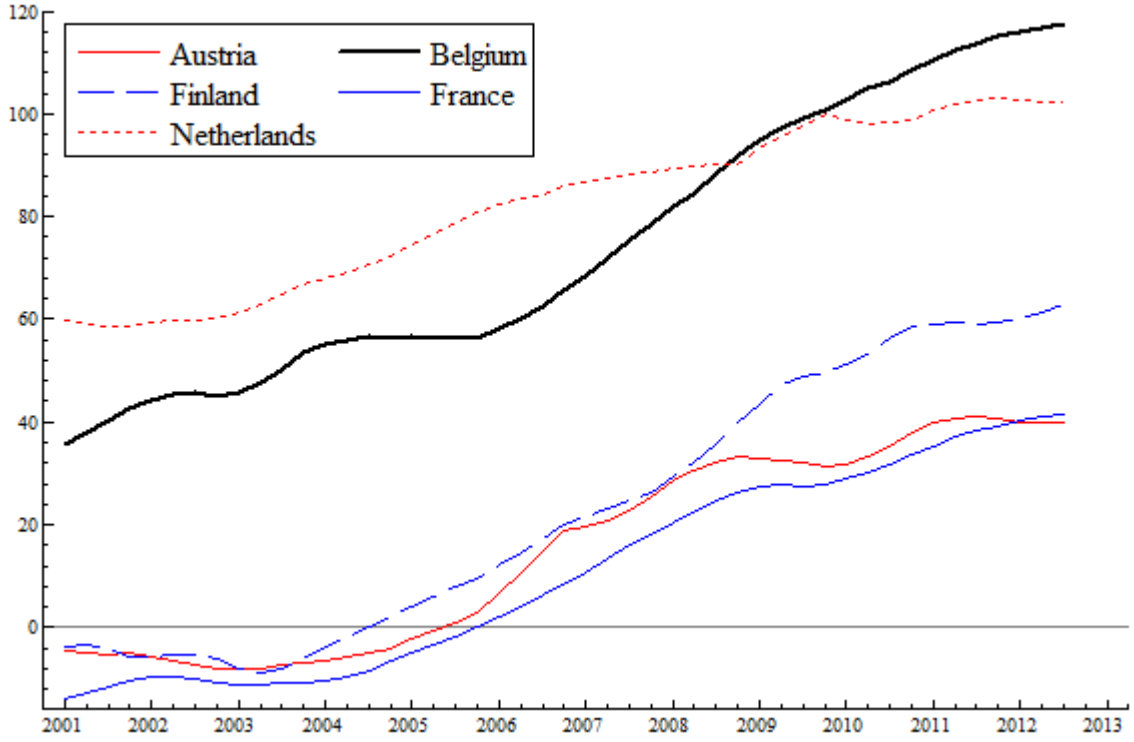

Figure 4b relative private debt/GDP for euro area core, 4-quarter moving average

Associated with rises in private debt, house prices in some countries rose more than in others. In Germany, the index of nominal house prices reported by the OECD drifted down a little from its 2000 level, only regaining the 2000 level in 2010-11. Figure 5a shows the nominal house price index for the periphery and Figure 5b for the core. From the 2007 or early 2008 peaks, the declines have been sharpest in Ireland, followed by Spain, Greece and the Netherlands. Ireland had the largest credit expansion and the largest building boom relative to the size of the economy, see Lyons and Muellbauer (2013), followed by Spain. The hangover from previous over-building has been a major factor depressing house prices in Ireland and Spain. The decline in house prices in Greece is more likely to have been associated with the collapse of economic activity and the rise in domestic interest rates. The implications of mortgage delinquencies and negative equity on the balance sheets of banks lending to Irish and Spanish developers and households have been all too obvious. In turn, attempts to rescue failed banks have led to great pressures on government balance sheets, while the decline in economic activity fed by this negative turn of the financial accelerator has increased government deficits.

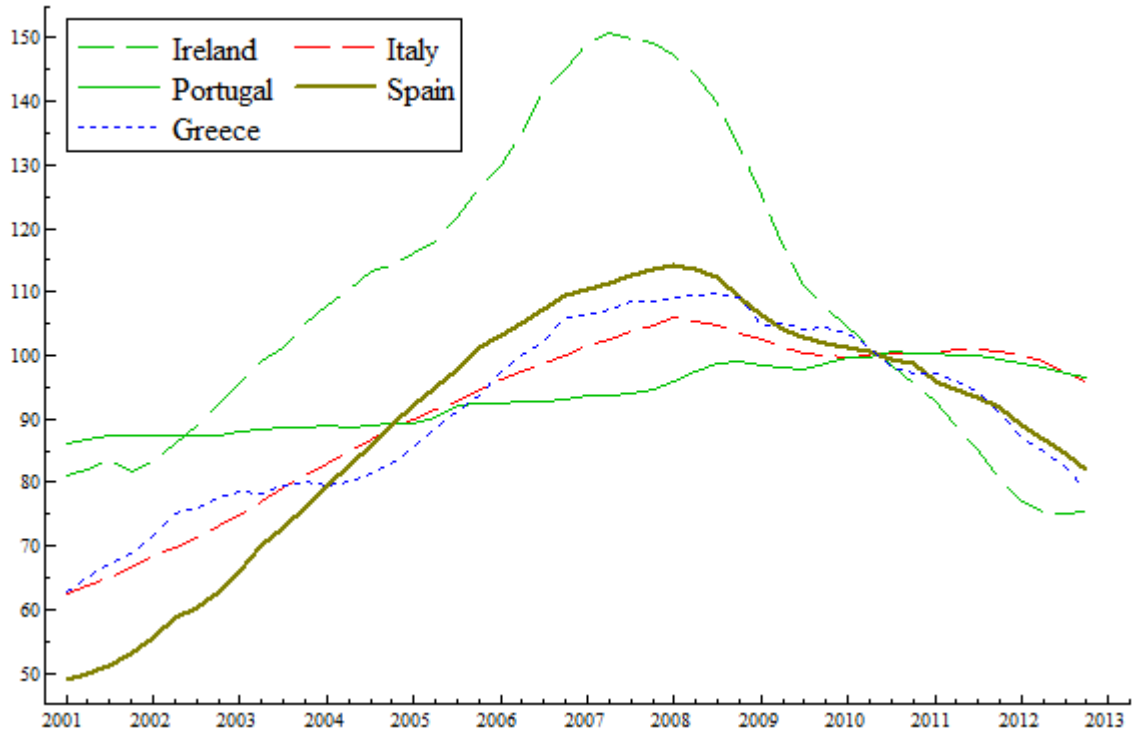

Figure 5a: house price indices for euro area periphery, base 2010

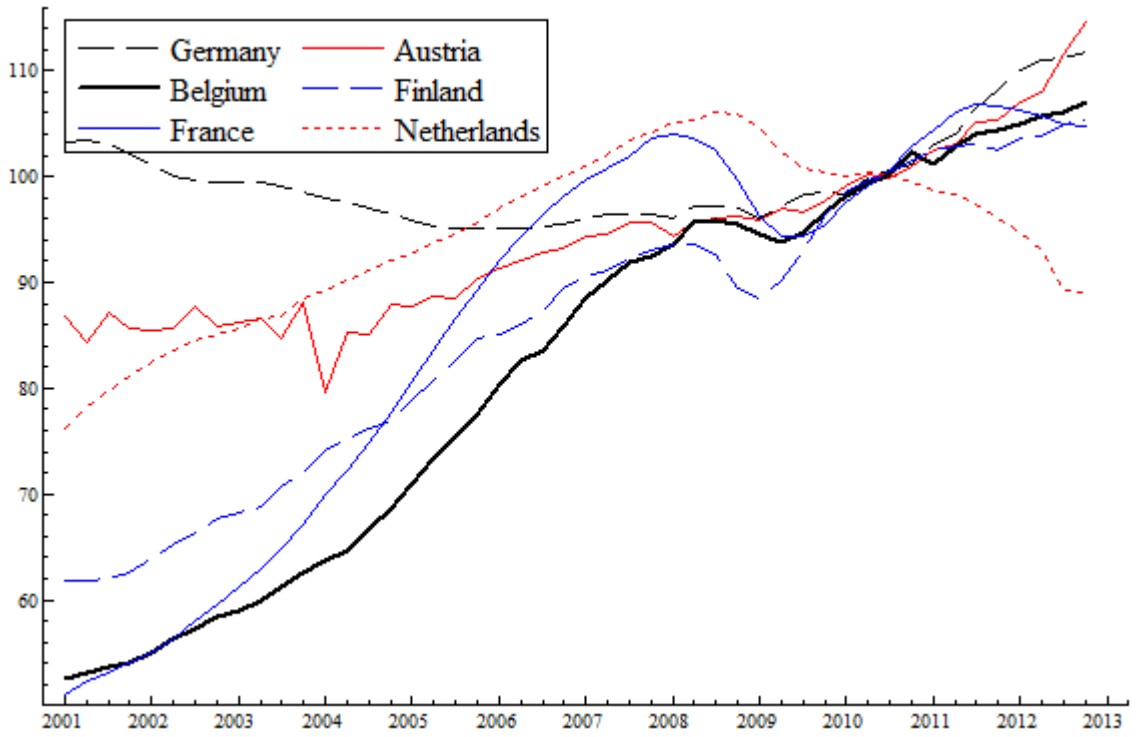

Figure 5b: house price indices for euro area core, base 2010

Since worsening competitiveness and rising private and public debt levels show up in increasing current account deficits to GDP ratios, one can ask whether these ratios might be a good summary indicator driving sovereign yield spreads. Current account to GDP ratios on the euro area periphery are shown in Figure 6a, with Spain's deficit almost 10% in 2007 and Greece's almost 15%. Portugal's deficit averaged around 10% for the decade of the 2000s. Italy's, however, was far more moderate, only reaching 2.5% in 2010, while Ireland's deficit showed the most dramatic improvement from over 5% to zero between 2008 and 2010.

For Spain, the rise in private debt came from a mix of corporate and household borrowing, closely connected with the boom in property prices and construction. In Portugal, increased borrowing was mainly through rising corporate and public indebtedness, and in Greece, mainly the latter. The collapse of domestic demand since 2008 is a key factor in the improvement in the current account to GDP ratios in most of the periphery. However, improving competitiveness in Spain, Portugal, Greece and especially in Ireland, see Figure 1a, have also contributed. While a collapse of domestic demand will reduce the current account deficit, the associated rise in government debt to GDP ratios will raise yields. This is one reason why the current account to GDP ratio relative to Germany is unlikely *by itself* to drive yield spreads.

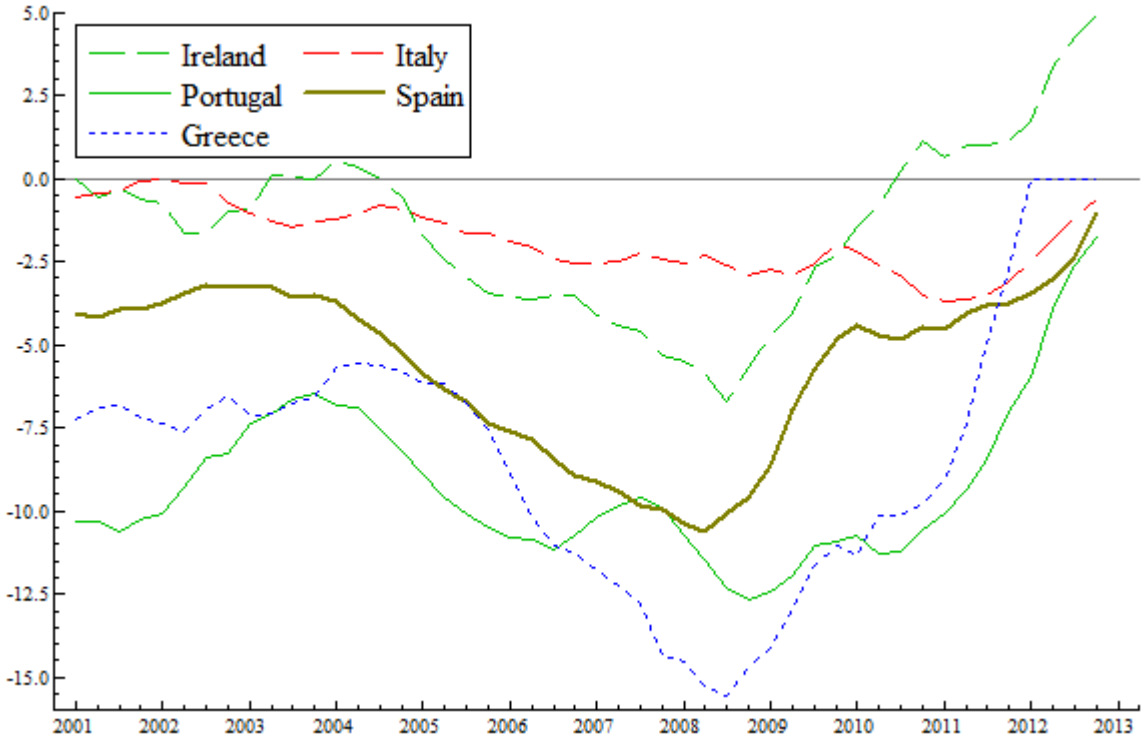

Fig 6a: current account/GDP for euro area periphery, 4-quarter moving average, %

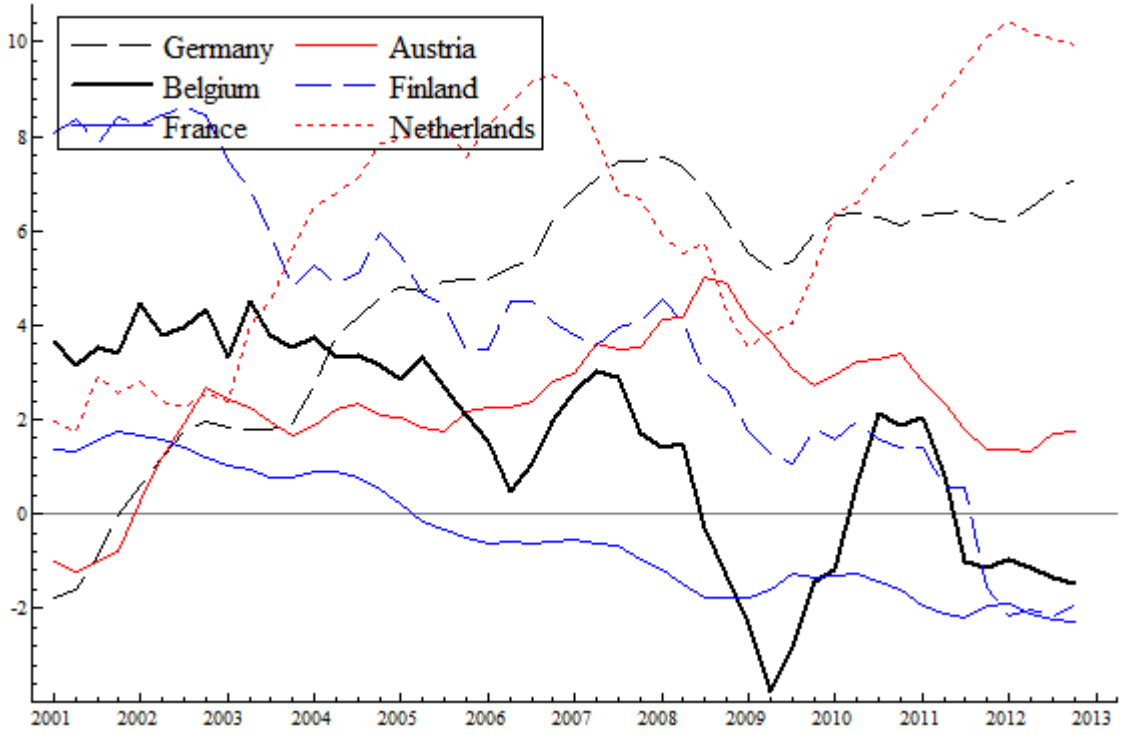

Fig 6b: current account/GDP for euro area core, 4-quarter moving average, %

Surpluses in the German current account to GDP ratio are shown in Figure 6b. They contrast with deficits in Spain and Italy in Figure 6a. The German picture reflects improving relative competitiveness and very moderate rises in private and public debt to GDP ratios, though as shown in Figure 3a, public debt to GDP actually fell in Spain from the late 1990s to 2007 on the back of strong, private debt-fuelled economic growth.

A key design flaw in the euro area was not building incentives for fiscal probity, convergence of competitiveness and macro-prudential policies into the central architecture and recent reform attempts have tried to address some of these issues.

The new Fiscal Compact Treaty

The 1992 Maastricht Treaty and 1997 Stability and Growth Pact (SGP) shared concerns over high public debt/GDP, but new is:

1) a specified time frame for reducing public debt below 'safe' ceiling (set at 60 percent of GDP) - the excess above the ceiling is supposed to be eliminated at an average rate of one twentieth each year.

2) A new system based on structural budget balances correcting for cyclical and one-off items. In contrast, the SGP had set the maximum deficit at 3% of GDP but failed to adjust for cyclical effects and lacked discipline for countries below 3%. The old system had encouraged tax cuts in overheating economy and extra austerity in downturns.

3) Unlike the SGP, the rules are better anchored locally. The Fiscal Compact requires fiscal rules are written into domestic legislation, with constitutional backing. It also requires the creation of national independent monitoring agencies. Cross-national monitoring (with the underlying threat of sanctions) by the European Commission and the other member countries is a second line of defence.

The 2011 'six pack' reforms

These took a wider perspective on excessive imbalances that pose a threat to macroeconomic stability. A scorecard of indicators is monitored, including current account balance, net international investment position, credit growth, house price indices and competitiveness (inflation, real exchange rate, export market share). A country experiencing severe imbalances should undertake policy interventions to mitigate such imbalances. There is also a growing, if belated, interest in roles for national-level macro-prudential policies to 'lean against the wind' in relation to excessive capital inflows and excessive credit growth.

In a wider reform agenda, most progress has been made on banking union, with the ECB taking over the prudential supervision function from 2014, though major disagreements remain on the resolution regime and how resolution is to be funded.

3. Econometric models of euro area sovereign spreads

There is a large literature on modelling sovereign bond yields or spreads, in recent years focused on Credit Default Swap (CDS) data. Pan and Singleton (2008), Ang and Longstaff (2011) and Longstaff, Pan, Pedersen, and Singleton (2011) all underline that a common factor structure underlies sovereign bond yields. Much of the literature is concerned with high frequency CDS term premia, and usually more interested in modelling common factors than in explaining spreads between countries in terms of country-specific macro-economic fundamentals. In Ang and Longstaff (2011), modelling weekly CDS data for May 2008 to

January 2011, the term-structure data are used to identify systemic and country-specific credit shocks and these are related to financial market data. No attempt is made to link country-specific credit shocks to fiscal or other economic fundamentals for that country. Augustin (2012) surveys the recent literature.

The papers that are perhaps closest in spirit to the econometric model discussed below are Bernoth and Erdogan (2012) and the IMF study by Caceres et al (2010). Bernoth and Erdogan study quarterly 10-year yield spreads for 10 euro area countries from 1999 to 2010 using a time varying coefficient model. Their economic fundamentals are sovereign debt/GDP and (projected 12 months ahead) deficit/GDP. The IMF study models daily 10-year spreads defined as the yield difference between a particular country's 10-year bond and the rate on a 10-year fixed rate euro swap in the private sector. German sovereign yields, regarded as the safest in the euro area, always trade below those of the swap yields since the latter is subject to counterparty risk. The latter increased sharply around the time of the Lehman Bros default in 2008. The econometric model for the 10-year spread, estimated separately for each country on daily data for February 2007 to February 2010, has four drivers, in addition to the lagged dependent variable. These are an index of global risk aversion, a measure of distress spill-overs or contagion from other countries and two fiscal variables, the ratios to GDP of the government's deficit and debt. A GARCH model describes the evolution of the variance of the residual. Risk aversion generally has a negative effect on spreads, presumably because it increases counterparty risk perceptions. The coefficients on all four drivers are quite heterogeneous and only half of the ten countries exhibit significant debt to GDP ratio. Apart from Germany and France, the contagion measure accounts for half or more of the variation in the spreads in the 2008 to 2010 period.

An IMF team, Schaechter et al (2012) examined fiscal vulnerabilities and risks in a somewhat wider perspective. They suggest that gross funding needs and the maturity structure of debt could matter in the short run. Longer term, they note that primary deficits and high debt levels can become unsustainable if not corrected. The scale of the fiscal adjustment required to achieve certain debt targets can be used as an indicator for this type of vulnerability and they suggest two measures to help gauge the medium and long-term adjustments needs.[6] They also note that vulnerability to adverse growth and interest rate

[6] The first indicator targets a given *level* of debt to be reached in a given period of time; the second indicator specifies the required primary balance to stabilize the *path* of the debt-to-GDP ratio. These

shocks are important aspects of the risks countries face, but do not discuss competitiveness and labour and product market reforms in this context.

Market perceptions of default risk are also important, including for the measurement of contagion. Regarding CDS data, they note that "Caution is needed when interpreting high-frequency financial market indicators and they should only be viewed as a relative assessment of countries' sovereign default risk". It remains a little unclear how these data are to be used if they are themselves also influenced by fiscal and other economic fundamentals.

Favero and Missale (2012) model weekly data on yield spreads for ten euro area economies, acknowledging the importance of time-varying parameters, non-linearity and contagion. They use the US Baa-Aaa corporate yield spread as a proxy for risk appetite. Their fundamental drivers are biannual European Commission forecasts of government deficits and debt to GDP ratios but they cannot find significant linear effects for most countries given that panel restrictions for the system are rejected. Their paper does not provide useful information on the relevant weights on the fundamental economic drivers of yield spreads. The formulation presented in the present paper, in contrast, imposes panel restrictions once a limited form of heterogeneity is allowed for, and finds highly significant effects for a more comprehensive set of fundamental drivers.

Since the emphasis of the present paper is on economic fundamentals, data on which are largely at quarterly frequencies, quarterly data on spreads in 10-year sovereign bond yields relative to Germany for other euro area countries are used. Greece is omitted since the market did not have a realistic assessment of its fundamental data until 2010.[7] Ireland and Portugal are included up to the quarters preceding their bailouts which occurred in 2010Q2 and 2010Q3 respectively. Since then, the terms of the rescue packages supervised by the 'troika' of the IMF, European Commission and the ECB will have strongly affected Irish and Portuguese spreads.

As we saw, spreads were detached from potential underlying risks and growing imbalances until around 2007 and then took some time before they can be said to fully reflect these. They over-reacted subsequently, pricing fears of a disorderly euro area break-up, and were strongly affected by contagion from crises in Greece and elsewhere.

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indicators can take into account long term projections of the rise in entitlement spending due to ageing populations.

[7] Its 2009 budget deficit was revised up in January 2010 from 3.7% of GDP to 12.7% and accounting irregularities were exposed in an EU report.

The model, based on an equilibrium correction framework, therefore needs to deal with structural change, and with a rising attentiveness to long-run fundamentals after the financial crisis began in 2007Q3. It seems plausible that there were two phases in this awakening to full attentiveness: a first phase beginning in 2007Q3 and a second phase beginning in the second half of 2009 with full attentiveness being reached by the end of 2010. The first phase is linked with the drying up of money markets, initially triggered by losses in money market funds, partly invested in sub-prime linked securities. The second phase resulted from increasing worries about sovereign debt in countries such as Greece. The two phases are handled by a linear combination of two dummy variables making a smooth transition from zero to one between mid-2007 and the beginning of 2009 and from then to the last quarter of 2010. Figure 7 illustrates the estimated form of the attention function.[8]

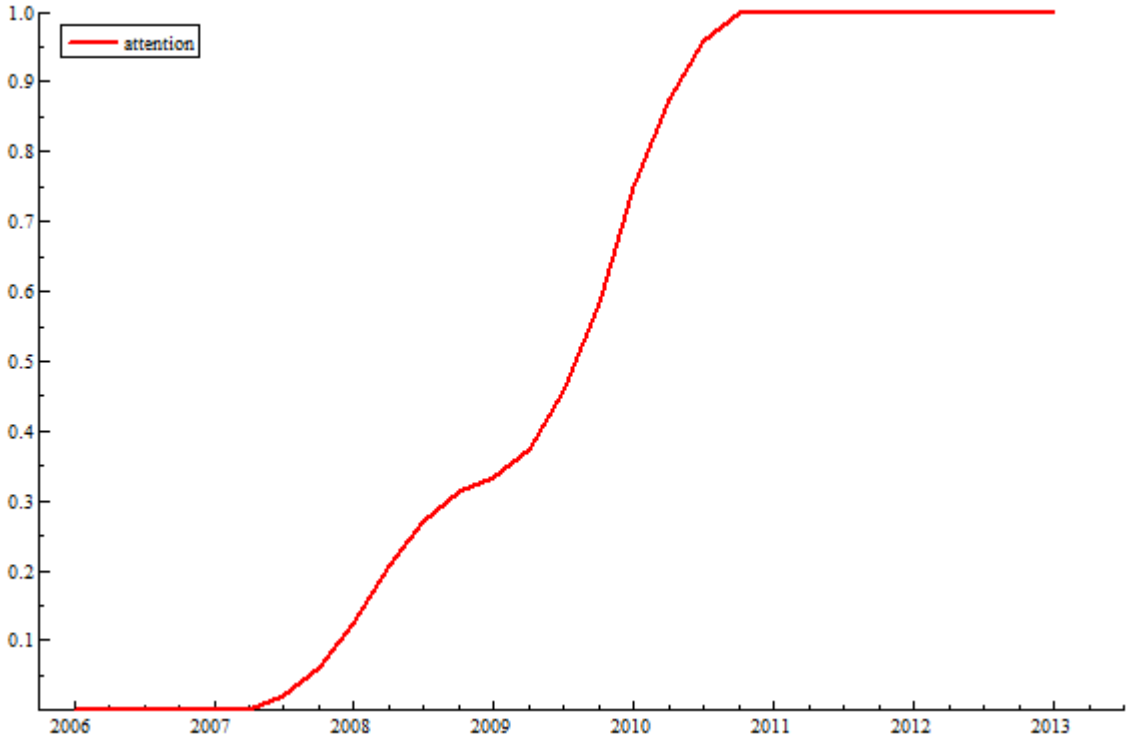

Figure 7: estimated attention indicator

[8] Reis (2006) has suggested a model for evolving attentiveness in response to the magnitude of variations in fundamentals. In the euro area sovereign debt context, there were also structural factors which explain the shift from inattention to full attention. Variations in degrees of attention are likely to be relevant for asset pricing in other contexts also.

Secondly, the model needs to incorporate contagion and potential over-reaction or amplification. The model does this in two ways: by introducing sensitivity to global risk appetite and by use of dummy variables to capture euro area-specific 'alarm'. The model thus includes a time-varying scale factor consisting of 'attention' plus 'alarm' which amplifies the scalar function of the basic economic drivers of each country's long-run spreads relative to Germany. The alarm function would be influenced both by stated policy of the ECB and other euro area policy makers and by ECB interventions in the sovereign bond markets.

The general form of the equation for the deviation y_{it} from Germany's yield of country i's 10-year government bond yield, is the following:

$$\Delta y_{it} = a_{1i}\Delta y_{it-1} + a_1 \Delta global\ risk\ appetite_t + \alpha(attention_t)(f(x_{it})\ amplification_t - y_{it-1}) + \text{dummies} \qquad (1)$$

The first term in equation (1) captures potential persistence in shocks to specific country spreads. The second term captures the typical flight to the safety of German bonds when global risk appetite falls, which seems to have operated even before the global financial crisis. In the third term, the parameter α measures the speed of adjustment when 'attention' reaches its limit of one. The function of economic fundamentals, discussed further below, is represented by $f(x_{it})$. This function is amplified by the term

$$amplification_t = (attention_t + alarm_t + a_2 \Delta alarm_t). \qquad (2)$$

Here, $(attention_t + alarm_t)$ represent the more persistent elements of this amplification. Since the model is formulated for the quarterly change in yield spreads, the term $(a_2 \Delta alarm_t)$ captures short–term noise due to shifting risk perceptions. The lagged level of yield spreads y_{it-1} captures equilibrium correction. The 'long-term' solution for the yield spreads can therefore be defined by

$$y_{it} = f(x_{it})(attention_t + alarm_t) \qquad (3)$$

The estimated value of the term $attention_t + alarm_t$ is pictured in Figure 8, which also shows a plot evaluated when the index of global risk appetite is zero. The scale and volatile nature of the amplification is evident, with a more than three-fold exaggeration of the underlying fundamentals at the end of 2011. Global risk appetite is shown in Figure 9.

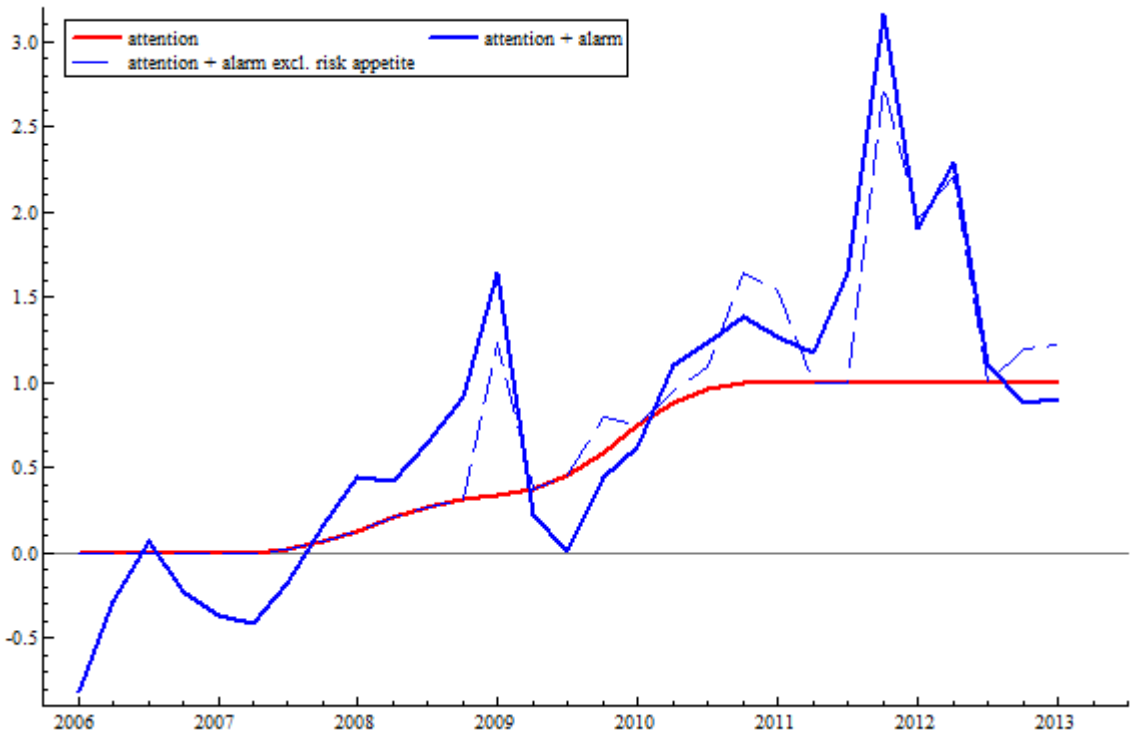

Figure 8: the estimated values of attention, attention plus alarm, and attention plus alarm evaluated at zero global risk appetite.

Figure 9: Credit Suisse index of global risk appetite

Since *attention* equals one from 2010Q4 and with a steady state value of *alarm* at zero, in a post-2010 steady state, we would have

$$y_{it} = f(x_{it}) \qquad (4)$$

The function *f(x)* contains both a liquidity element linked to the size of each country's sovereign bond market relative to Germany's and economic factors based on the divergences from Germany of key economic fundamentals.[9] To model the size-liquidity element, define the proportionate deviation in bond market size relative to Germany as $s_i = (S_g\text{-}S_i)/\,S_g$ where S represents the size of the bond market at the end of 2007 and the g subscript is for Germany. Then the size-illiquidity premium of country i should be proportional to s_i.[10] Figures 1a and 1b show that in 2008Q4 to 2009Q2 spreads were wider in countries with smaller bond markets such as Ireland, Finland, Austria and Portugal than in large countries such as France. This temporary spike in the illiquidity premium is allowed for by interacting s_i with dummy variables for 2008Q4, 2009Q1 and 2009Q2.[11]

The function of economic fundamentals is specified as follows:

$$\begin{aligned} f(x_{it}) = b_{0i} + b_1 s_i + s_i\, g(dummies\ for\ 2008Q4\ to\ 2009Q2) + b_3\, rulcma_{it-2} \\ + b_4\, rgdebtma_{it-2} + b_5(rgdebtma_{it-2})yma_{it-1} + b_6 posrgdebtma_{it-2}^2 \\ + b_7\, rpdebtma_{it-2} + b_8 asymhp_{it-2} + b_9(shift)asymhp_{it-2} \end{aligned} \qquad (3)$$

Here, the zero-subscripted term is a country-specific fixed effect set to zero for all countries except Belgium and Portugal.[12] The first term captures the size-illiquidity premium

[9] Size is only one determinant of liquidity, as measured, for example by bid-ask spreads, see Fleming (2001). Darbha and Dufour (2013) analyse the contribution of this and other measures of liquidity to explaining yield spreads. Pellizon et al (2013) examine the links in both directions between spreads and liquidity.

[10] The values of *s* are as follows: Austria -0.83, Belgium -0.68, Finland -0.94, France 0.06, Greece -0.73, Ireland -0.95, Italy 0.57, Netherlands -0.70, Portugal -0.88, Spain -0.63.

[11] This works well, but in Ireland, in 2008Q4 and 2009Q1 and Italy in 2008Q4 additional dummies are needed as their liquidity crisis was worse than that implied by the size of their bond markets.

[12] Belgian yields appear to benefit from a small discount, given the economic fundamentals, perhaps because Brussels is the centre of EU government. Portugal's premium may be related to the

associated with small bond markets and the second, the temporary illiquidity spike in 2008Q4 to 2009Q2. The third term of equation (3) is the effect on bond yield spreads of relative unit labour costs, whose normalisation is discussed below. The fourth term is the effect of the relative government debt to GDP ratio. In the fifth term, the government debt to GDP ratio is weighted by the lagged four-quarter moving average of the yield spread. This captures the self-reinforcing effect of relatively high funding costs on the budgets of highly indebted governments and hence on next period's yields. The sixth term is a non-linear function of the government debt to GDP ratio. The variable $posrgdebt$ is zero if relative debt/GDP is negative and takes the value equal to the relative government debt/GDP if this is positive. This variable is then squared to capture the disproportionate effect on spreads of very high relative debt/GDP ratios. An alternative way of capturing this non-linearity is to take positive values of relative debt/GDP in excess of 20%, with the variable otherwise zero. This fits almost as well, but the threshold of 20% is a little arbitrary.[13]

The seventh term captures the effect of the relative private debt to GDP ratio. Countries with high levels of corporate and household debt to GDP potentially face greater risks in their financial systems, while the private sector is more constrained in generating revenues to service government debt.

The eighth term, an asymmetric measure of house price developments, represents the effects of housing market booms and busts on banking systems and hence on governments' contingent liabilities, as well as on the wider economy. Ireland and Spain are the most prominent examples of this. The asymmetric house price measure is constructed as follows: take the nominal depreciation of log nominal house prices in country i at time t relative to 2007Q3; if there has been no such depreciation, the variable is zero. Then take the difference relative to Germany. Such nominal depreciations capture the effect of negative equity, a key long-run driver of mortgage default, see Aron and Muellbauer (2012). Finally weight by the nominal appreciation in country i of log nominal house price between 2003Q1 and 2007Q3, Germany's being essentially zero over this period. This implies that countries with the biggest house price booms before the bust are more vulnerable, other things being equal. An alternative weighting scheme of using the growth in private debt to GDP in the 2003Q1 to

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widespread perception of a bloated and poorly managed public sector. Inclusion of its premium gives parameter estimates similar to those obtained when Portugal is excluded from the system of equations.

[13] The recent controversy over Reinhart and Rogoff's claim that government debt to GDP ratios of over 90% pose a growth threat illustrates the danger of taking particular thresholds.

2007Q3 period produces broadly similar results, but fits less well. Finally, the last term measures a moderation of this effect from 2012Q3 as the result of moves to banking union and Mario Draghi's promise that the ECB would 'do what it takes' to prevent a break-up of the euro area.[14]

The use of data lagged two quarters takes realistic account of lags in the release of national accounts and house price data, while the restriction to 4-quarter moving averages smoothes irregularities and measurement errors in the data. It should also minimise the effect of data revisions on the economic indicators, since such revisions are less pronounced at longer lags. A check on whether annual changes in the key variables in equation (3) add anything to the explanatory power of the model found that they did not. Analogously, the government deficit to GDP ratio is not significant when added to this model.

Finally, a comment is necessary on the normalisation used for the unit labour cost measure. Published unit labour cost indices are indexed to be 100 in some base year, e.g. 2005. But there is no reason to suppose that this is an appropriate reference year. Ideally one would like a reference point representing some kind of steady state relative to Germany. One can use a model of the current account to GDP ratio relative to Germany to estimate the relevant normalisation. The current account to GDP ratio depends strongly on relative unit labour costs, though it is also affected by the growth rate and changes in the public and private debt to GDP ratios. The country fixed effects from such a model, scaled by the long-run coefficient on relative unit labour costs provide an estimate of the appropriate normalisation to be applied to unit labour costs, see Muellbauer (2013) for details. Portugal and Spain are the countries at one extreme and the Netherlands and Finland are at the other: the former, especially Portugal, were already quite uncompetitive relative to Germany in the base year, while the last two were relatively competitive.

The model is estimated[15] as an equation system on quarterly yield spreads for 2003Q1 to 2013Q1 for nine countries: Austria, Belgium, Finland, France, Italy, Netherlands, Spain, Ireland and Portugal, but time dummies are used for observations on the last two countries

[14] This is measured by interacting the asymmetric house price measure with a dummy, $\boldsymbol{SD_{2012Q3}}$, which is zero in 2012Q2, and rises linearly in steps of 0.25 to reach one in 2013Q2. This dummy assumes continuing progress in banking union negotiations.

[15] Seemingly unrelated regression (SUR) is used because of its robustness. Maximum likelihood is not robust to multiple iterations when the covariance matrix is large relative to the number of observations.

from the quarter of their rescues onwards. This means that effectively data on Ireland and Portugal are only used up to the pre-rescue quarter.

Parameter estimates for the system are reported in Table 1 below. Identification comes both from the cross-section and the time variation in the data, given that only two fixed effects are incorporated in the model. Lack of residual correlation in all nine equations is evidence in favour of correct specification. Only limited parameter stability tests are possible, given structural change is a crucial part of the model up to 2011. However, dropping the last four observations produces parameter estimates very similar to those for the full sample. Finally, the economic story and simulations of what spreads would have been if sovereign debt markets had focused on the fundamentals are coherent and plausible.

According to Table 1, the steady state illiquidity effect based on market size suggests a discount of 16 basis points for Italy[16], the largest market, and a premium of 28 basis points for Ireland, the smallest. With a coefficient on relative competitiveness of 2.55 (t=15.0), a deterioration of relative log unit labour costs of 0.25 (approximately 28 percent in the level), costs 64 basis points in a higher spread. The long-run effects of higher government debt of GDP enter linearly and non-linearly and in interaction with lagged yields and are best illustrated visually in Figure 10. Figure 10a for the periphery countries makes clear what an outlier Greece represents, with a spread against Germany of around 12% in 2013Q1 imputed on the basis of government debt, though one element of this is the excess burden of higher interest rates in the previous year, given its high debt levels. It is important to note the fact that Greek data were not part of the model on which this conclusion is based: this out-of-sample simulation therefore supports the plausibility of the estimated model. In contrast to Greece, the 2013Q1 imputed Italian spread on the basis of government debt alone is around 1.8% while Ireland's is 1.3%, Portugal's is 2.4% while Spain's is minus 0.1%.

[16] Of course, Italian yields never fall below German yields because Italy's worse macro-fundamentals overwhelm this small size effect.

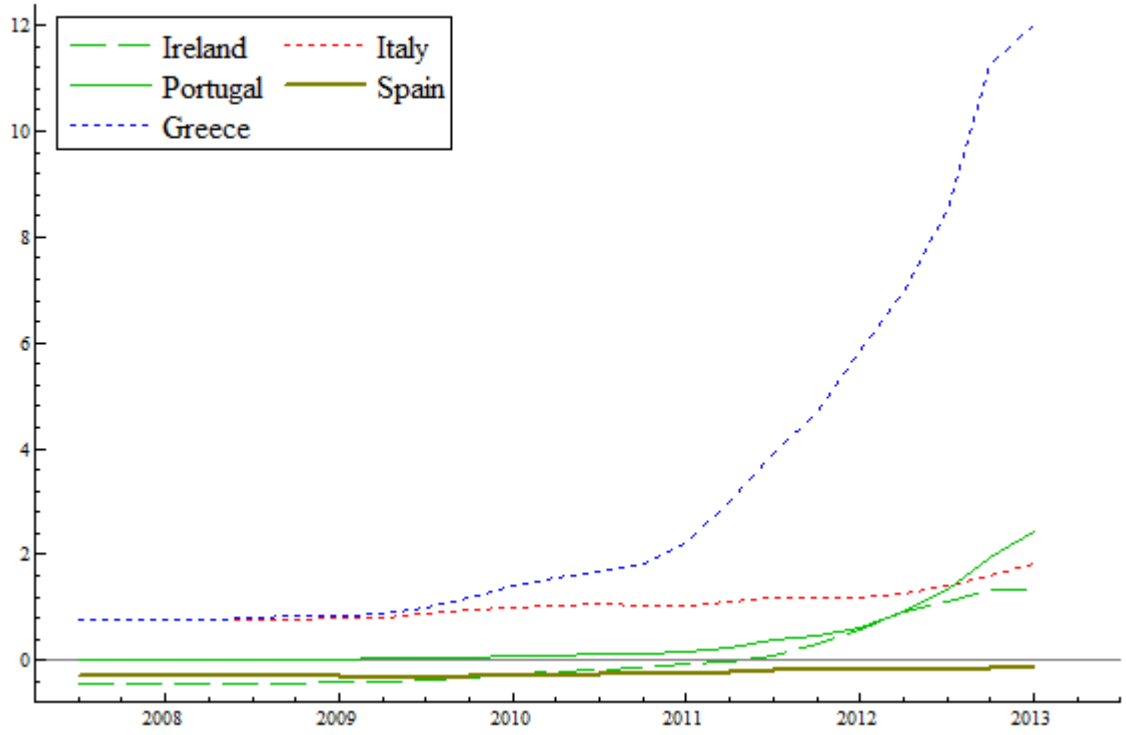

Figure 10a: contribution of government debt/GDP to fundamental spreads, periphery.

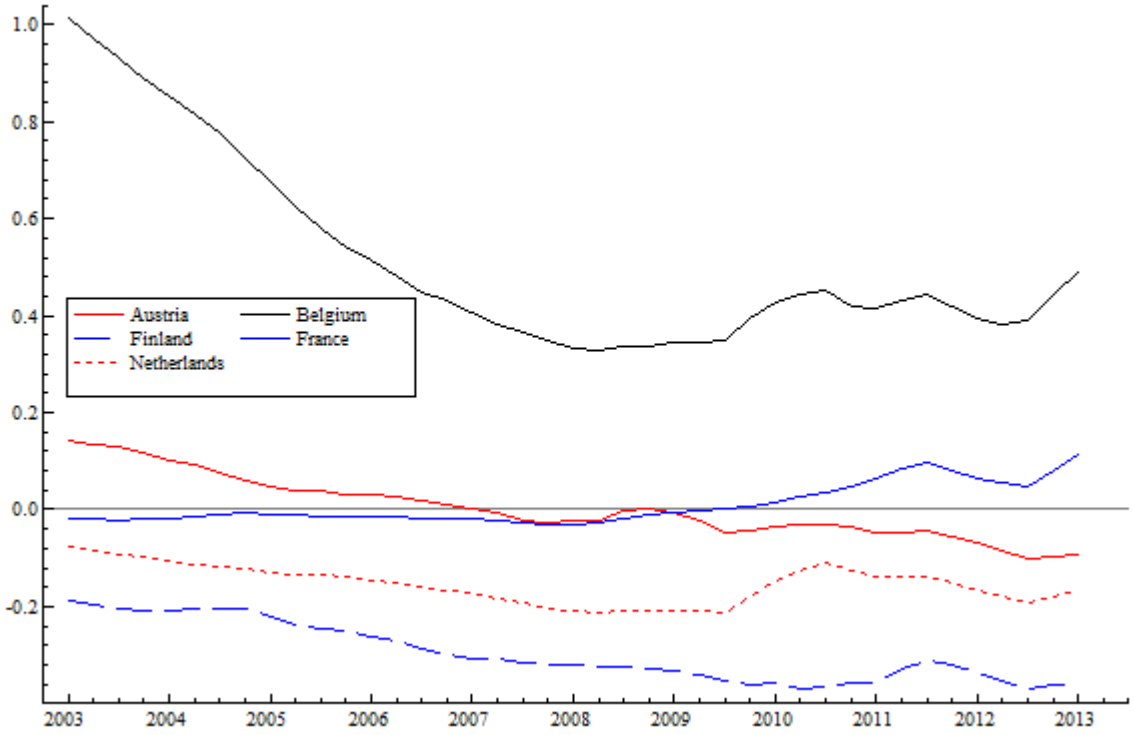

Figure 10b: contribution of government debt/GDP ratios to fundamental spreads, core.

In the core euro area, Finland, Netherlands and Austria have imputed discounts on account of lower government debt levels than Germany. The fact that in all cases, actual spreads and the fundamental spreads were positive is due to a mix of other factors such as worse competitiveness, higher private debt to GDP ratios and lower liquidity. Belgium had an imputed spread due to government debt of 0.5% in 2013Q1.

These estimates, especially for Spain and Ireland, suggest that the focus of policy and of market participants on government debt alone would be seriously mistaken. This becomes particularly clear from the next three terms whose coefficients are reported in Table 1. It is impossible to explain high spreads in Ireland and Spain without reference to banking problems linked to the property market bust following the earlier boom. The measure described above based on asymmetric movements in house prices is highly significant though there is evidence that starting in 2012Q3 the effect was reduced, probably because of progress to banking union, the OMT initiative and Mario Draghi's public commitment. The estimates suggest a reduction of about 25% in the coefficient on the asymmetric house price measure by 2013Q1. The overall imputed effect on spreads, taking this reduction into account, for Ireland in 2013Q1 is 6.6% , for Spain is 2.3% but only 1.3% for Greece and 0.17% for the Netherlands, though liable to rise further as house price declines have continued.

The final element in the economic fundamental spread is the relative ratio of private debt to GDP. According to the estimates, a 100% private debt ratio excess relative to Germany (exceeded by Ireland, Portugal and Belgium and neared by the Netherlands and Spain) would contribute 0.37 percentage points to the overall fundamental spread. Though quantitatively considerably smaller than the impact of public debt on spreads, with a t-ratio of 8.1, the effect is strongly significant.

An encompassing model which also includes a weighted average of the ratio to GDP of the current account surplus/deficit in recent years suggests that the latter is not an adequate summary statistic of the economic fundamentals. By omitting competitiveness from the model, it is possible to obtain plausible magnitudes of an effect from the current account/GDP ratio with only a small deterioration in the fit of the model. All the other variables in the model remain strongly significant, though with somewhat reduced

Table 1: parameter estimates for 9-country system of 10-year sovereign yield spreads[17]

Variable	*Parameter*	2003Q1-2013Q1
Fixed effect	b_{0i}*(Belgium)*	**-0.41**** **(0.072)**
Fixed effect	b_{0i}*(Portugal)*	**1.04**** **(0.16)**
rel. size	b_1	**-0.28**** **(0.050)**
$logrulcma_{t-2}$	b_3	**2.55**** **(0.170)**
$rdebtma_{t-2}$	b_4	**0.0108**** **(0.0015)**
$(debtma_{t-2})ryima(-1)$	b_5	**0.0068**** **(0.00077)**
$(posrdebtma_{t-2})^2$	b_6	**0.00017**** **(0.000045)**
$asymmhp_{t-2}$	b_7	**-25.8**** **(1.29)**
$(asymmhp_{t-2})SD_{2012Q3}$	b_8	**8.7**** **(1.82)**
$rpdebtma_{t-8}$	b_9	**0.0037** **(0.00045)**
Speed of adjustment	α	**0.35**** **(0.021)**

[17] The temporary illiquidity effects for 2008Q4 to 2009Q2 are not reported as they are not relevant for later periods. The coefficient a_2 from equation (2) is estimated at 0.69 (t=6.6). ** indicates significance at the 1% level and * significance at the 5% level.

alarm function		
$grap_t$	c_1	**-0.120**** **(0.0117)**
$D2009Q1_t$	c_2	**0.90**** **(0.12)**
$D2009Q4_t$	c_3	**0.21**** **(0.043)**
$D2010Q2_t$	c_4	**0.07** **(0.042)**
$D2010Q3_t$	c_5	**0.13*** **(0.046)**
$D2010Q4_t$	c_6	**0.64**** **(0.085)**
$D2011Q1_t$	c_7	**0.54**** **(0.072)**
$D2011Q4_t$	c_8	**1.74**** **(0.166)**
$D2012Q1_t$	c_9	**0.96**** **(0.087)**
$D2012Q2_t$	c_{10}	**1.20**** **(0.093)**
$D2012Q4_t$	c_{11}	**0.19**** **(0.055)**

$D2013Q1_t$	c_{12}	0.22* (0.072)
Diagnostics	***s.e.*** ***R-squ.***	***DW***
Austria	**0.062 0.853**	**2.05**
Belgium	**0.070 0.927**	**1.84**
Finland	**0.053 0.737**	**2.04**
France	**0.062 0.798**	**1.66**
Ireland	**0.108 0.977**	**2.04**
Italy	**0.065 0.977**	**1.73**
Netherlands	**0.054 0.705**	**1.94**
Portugal	**0.083 0.990**	**1.98**
Spain	**0.055 0.979**	**1.82**

magnitudes of the estimated marginal effect of government and private debt, since these are already partly reflected in the current account to GDP ratio. In terms of interpretation and policy conclusions, it is preferable to have clear estimates of the influence of competitiveness rather than bury it in the current account to GDP ratio.[18]

The panels of Figure 11 show, for each country, a plot of the fundamental or structural yield spread against the actual from 2003Q1 to 2013Q1. Let us take each in turn.

Austria's spread reflects an illiquidity premium owing to its small market size and has been relatively stable, though it has drifted up as a result of some deterioration in competitiveness and a rise in relative private debt to GDP ratios. In 2013Q1 the actual bond yield spread was close to but slightly below the estimated fundamental, with the difference largely attributable to the temporary rise in global risk appetite. The market over-reaction in

[18] An attempt was also made to check whether the World Bank's Doing Business indicators might be useful in explaining spreads. The fixed effect for Belgium needs to be eliminated for plausible identification. It is then possible to find a significant effect but with a considerable reduction in the competitiveness and private debt coefficients. The former makes sense since the World Bank measures should be strongly related to product and labour market competiveness, so that the policy implications of this version of the model would be very similar.

pushing spreads to unwarranted levels in 2009 and 2011-12 is plain to see, but the low level of spreads before 2008 was also an effective market distortion.

The gap between the estimated fundamental and the actual spread before 2011 was even more pronounced for Belgium, which was less affected by liquidity problems in 2009 than was Austria. The decline in the fundamental spread from 2003 to 2007 is mainly attributable to a fall in Belgium's government debt to GDP ratio relative to Germany's while the subsequent rise was mainly caused by the deterioration in relative competitiveness. It seems plausible that if Belgium had actually incurred a funding premium of the level shown in the early 2000s, then government debt might well have been reined in even more purposefully. In 2013Q1, Belgium's actual spread was a little below the estimated fundamental.

Finland, despite incurring a size-illiquidity premium, had low and sometimes negative fundamental spreads before 2010, not so far from actual spreads. The main reason was its low and falling government debt ratio compared with Germany. The rise in the spread since 2009 is mainly accounted for by the levelling out of the government debt to GDP ratio, a rising private debt to GDP ratio and the fall in competitiveness between 2008 and 2010. In 2013Q1 the actual spread was slightly below the estimated fundamental.

France shows a steady rise in the estimated fundamental spread from 2003 to the present. This was mainly due to worsening relative competitiveness and also to a rising private debt to GDP ratio, and since 2009, a slight deterioration in its relative government debt ratio. In 2013Q1 the actual spread was close to the estimated fundamental.

To calibrate the fundamental spread for Greece, which was not part of the estimated model, it is assumed that its fixed effect is the same as that of Portugal. Both had bloated and mismanaged public sectors, though the Greek situation was certainly worse. Using Portugal's fixed effect, the estimated fundamental spread for Greece would have been around 2% from 2003 to 2007, rising to around 3% by the end of 2009. The subsequent rise in the estimated fundamental is due to multiple factors: the collapse of GDP, so raising government debt to GDP ratios, the very fact of high interest rates feeding into debt service ratios, and by 2013Q1, a 1.3% contribution from the property market decline. Had funding costs for Greece been 2% more than Germany's up to 2007, with the prospect of worse to come as a consequence of the rising debt ratio, history could surely have turned out differently. The Greek government would have had a strong incentive to control the growth in public debt,

while the knock-on effects of higher government bond yields on private sector borrowing rates would almost certainly have reduced the rise in property prices, and hence the subsequent fall.

The fundamental spread for Ireland was close to zero in 2003-4, with a government debt ratio better than Germany's roughly offsetting the illiquidity premium due to Ireland's small debt market size. The estimated fundamental then drifts up as competitiveness deteriorated and as the private debt to GDP ratio rose. Only in 2009 does the housing market decline begin to feed into higher spreads: by 2013Q1, it accounted for a 6.6 percentage points rise in the fundamental. This illustrates a limitation of the model which does not contain risk factors of *future* property market declines with banking sector consequences, except perhaps by extrapolating declines already under way. However, constructing such a model is not easy. As Muellbauer (2012b) notes, simple overvaluation measures based on house price to income ratios are quite misleading and the IMF's regular estimates of degrees of overvaluation turned out to have poor forecasting performance, except in the case of Ireland. Poor lending quality and a building boom, resulting in an oversupply of property, are major factors for a property market crisis, in addition to high house price to income, private debt to income and debt service ratios. It would be better to develop a single property market risk indicator for inclusion in a sovereign spreads model by modelling housing markets than by attempting to build a range of factors into the spreads model.

There is a closely related reason for suspecting that the model might be overstating Ireland's fundamental spread from 2011. Part of the bank losses due to the property market collapse were eventually taken on the Irish government's balance sheet, which the asymmetric house price indicator helps predict.[19] Once this occurs, there could be an element of double counting between government debt/GDP and the asymmetric house price indicator.

A simple way of fixing this problem is to replace the asymmetric house price indicator by its 4-quarter changes over the previous two years so that there is no permanent effect. This results in substantially lower estimated fundamental spreads for Ireland and a sharper decline in 2012 to a level of around 2.74% in 2013Q1, see Appendix Figure A11.6. The remaining parameters of the model are similar to those shown in Table 1, except for a fall in the coefficient on the quadratic in the government debt to GDP ratio. The fit of the equations for Spain and Ireland improve, while the remaining equations fit a little less well.

[19] As is confirmed by a 9-country forecasting model for sovereign debt/GDP.

A *forward looking* risk indicator for Ireland would by now have turned round as housing has become cheap, minimising the risk of further declines. The fundamental spread for Ireland implied by a model incorporating such a risk indicator would probably have shown larger rises up to 2007 and would by now have declined more than the estimated fundamental shown in Figure 11.6.

The estimated fundamental spread for Italy was around 0.75% up to 2006 and then rose steadily to 2.5% in 2013Q1, mainly as a result of worsening relative competitiveness. The relative government debt ratio, though bad, has not been on a worsening trend. The last piece of the rise was driven by the high debt service ratio incurred as a result of the over-reaction of spreads in 2011 and 2012. This should moderate, given the decline in actual spreads from 2012Q3. However, the fact that competitiveness in Italy has not improved since the beginning of 2011 in the way that it has in Spain and Portugal, is a concern.

For the Netherlands, the estimated fundamental spread was below 10 basis points up to 2006. It then rose to around 25 basis points between 2009 and the end of 2011, as the decline in the government debt ratio (already below Germany's) came to an end and stopped offsetting the rise in the rise in the private debt ratio. From 2012Q1, the fundamental spread rose rapidly to close to 60 basis points in 2013Q1. Since the fall in house prices in the Netherlands appears to be continuing, and their rise from 2003 to 2007 was substantial, the model suggests further rises in the fundamental spread are to come. The market had, however, not yet caught up, by 2013Q1. Of course, one should not exaggerate: the fundamental spread is still low and the risk of a housing market collapse on the scale of Spain's is negligible. However, there are risks to parts of the banking system. In February 2013, SNS Reaal NV, the country's fourth largest bank, was nationalised because of a deteriorating property loan book with loans in Spain as well as the Netherlands.

For Portugal, the estimated fundamental spread rose from around 2% in 2003 to 3% just before Portugal came under the troika programme. The rise was mainly due to the deterioration in competitiveness to 2008 and rising public and private sector debt ratios. On the latter, Portugal is the most exposed economy in the euro area next to Ireland.

Spain's estimated fundamental spread rose from around 0.4% in 2003-4 to just over 1% by end-2009 mainly the result of declining competitiveness and a rising private debt ratio. Then, as the property market decline set in and banking problems began to appear, with the government debt ratio rising (albeit from a level better than Germany's), the spread rose to

3.27% by 2013Q1, despite improvements in competitiveness. Whether a forward looking property risk measure would have turned round by now, as it would likely have done for Ireland, is questionable, with a more sluggish house price adjustment than Ireland's. A fundamental estimated spread near the level in the quarter before Portugal was bailed out, and probably increasing, does not augur well for Spain's policy not to request assistance under the OMT programme. However, there is a possibility that Spain's fundamental spread could be slightly over-estimated for reasons similar to those for Ireland discussed above. The alternative model, mentioned above, in which changes replace the level of the asymmetric house price indicator, results in a 2013Q1 estimated fundamental spread of 2.54%, see Appendix Figure A11.10, rather than the 3.27% illustrated in Figure 11.10.

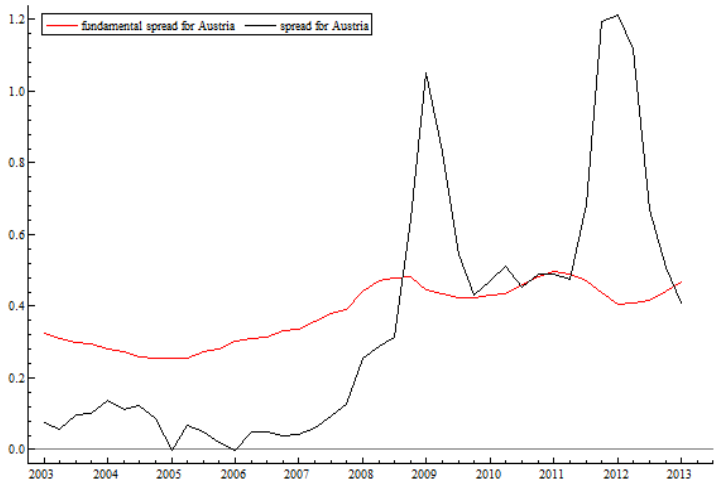

Figure 11:1: actual and fundamental yield spreads for Austria

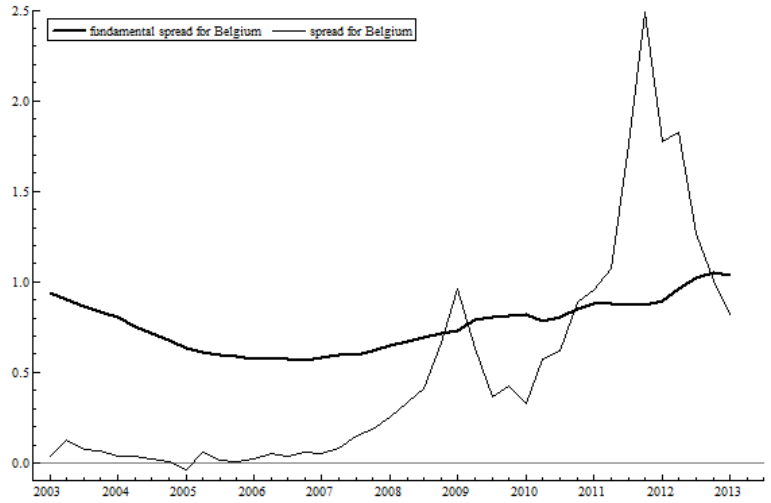

Figure 11:2: actual and fundamental yield spreads for Belgium

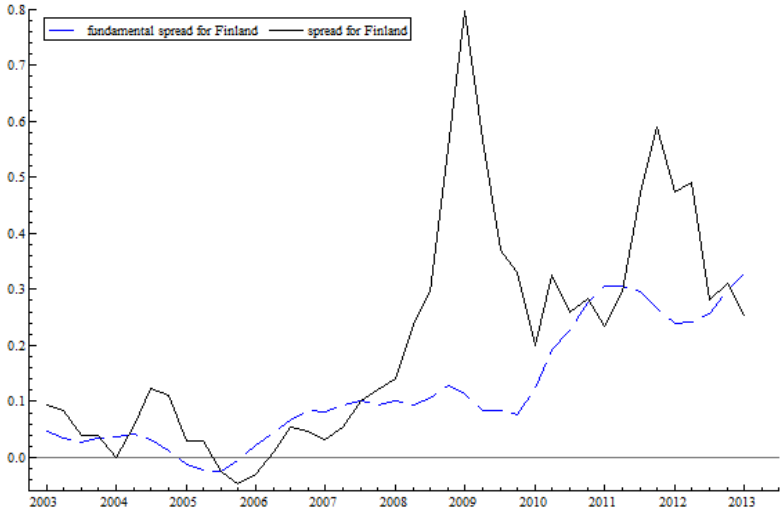

Figure 11:3: actual and fundamental yield spreads for Finland

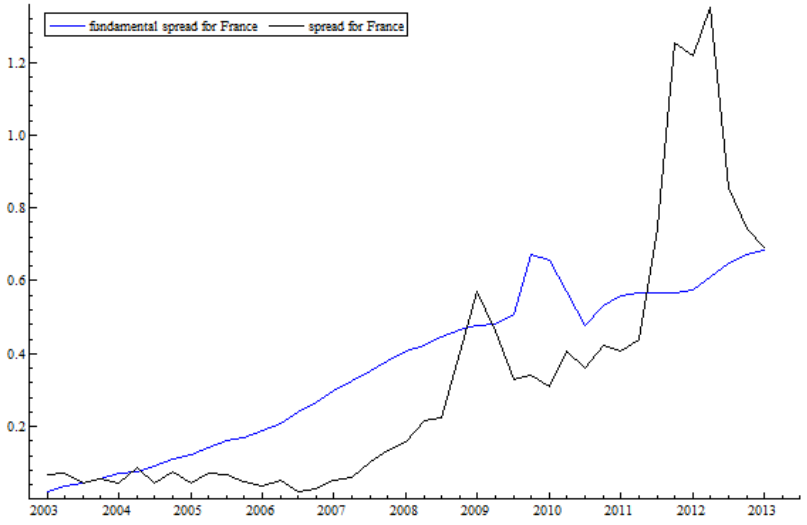

Figure 11:4: actual and fundamental yield spreads for France

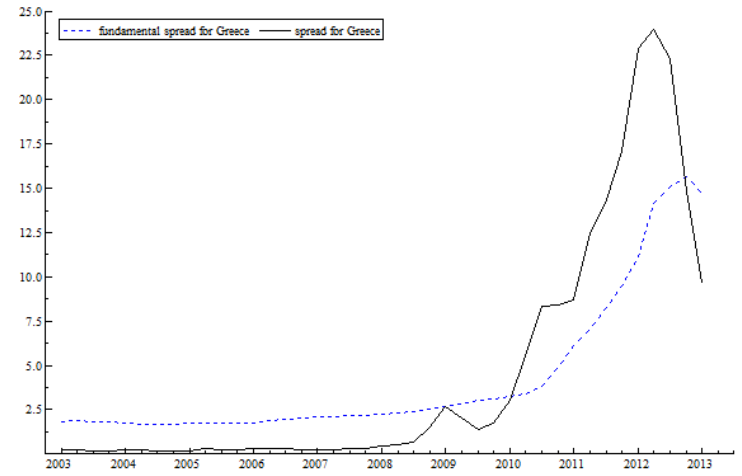

Figure 11:5: actual and fundamental yield spreads for Greece

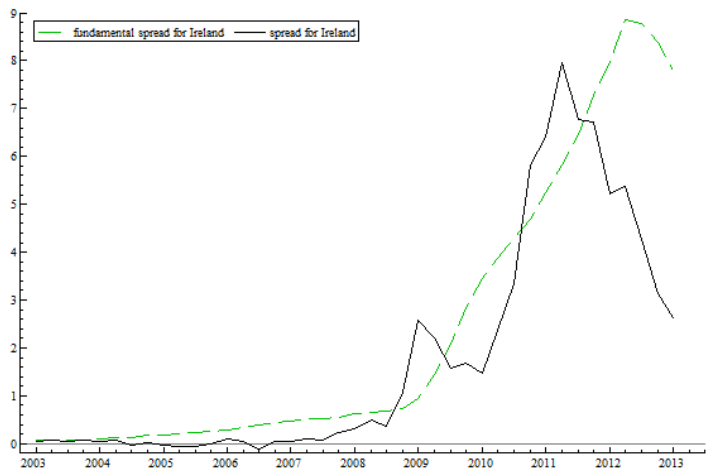

Figure 11:6: actual and fundamental yield spreads for Ireland

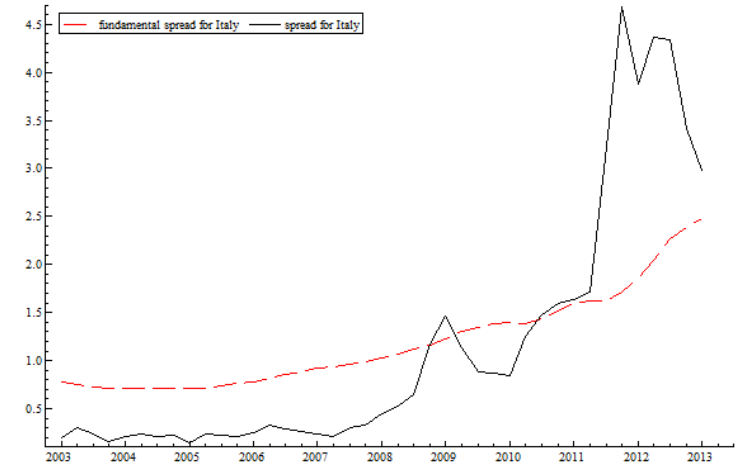

Figure 11:7: actual and fundamental yield spreads for Italy

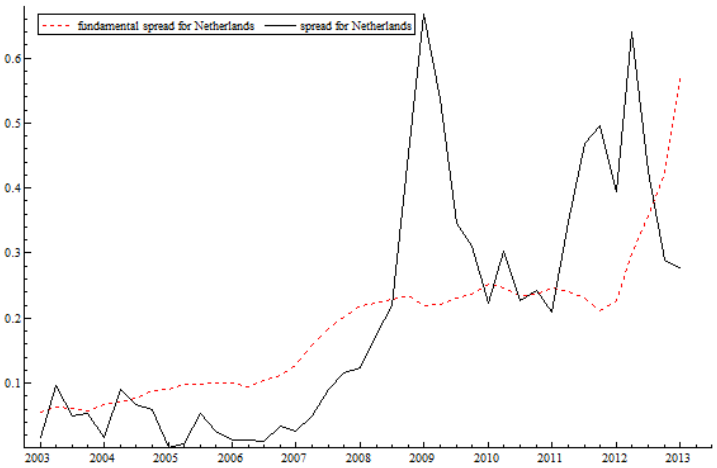

Figure 11:8: actual and fundamental yield spreads for the Netherlands

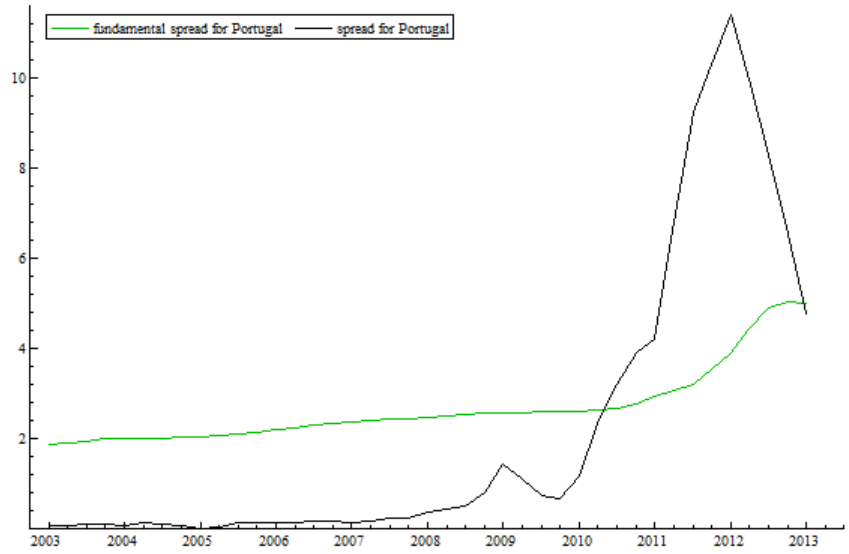

Figure 11:9: actual and fundamental yield spreads for Portugal

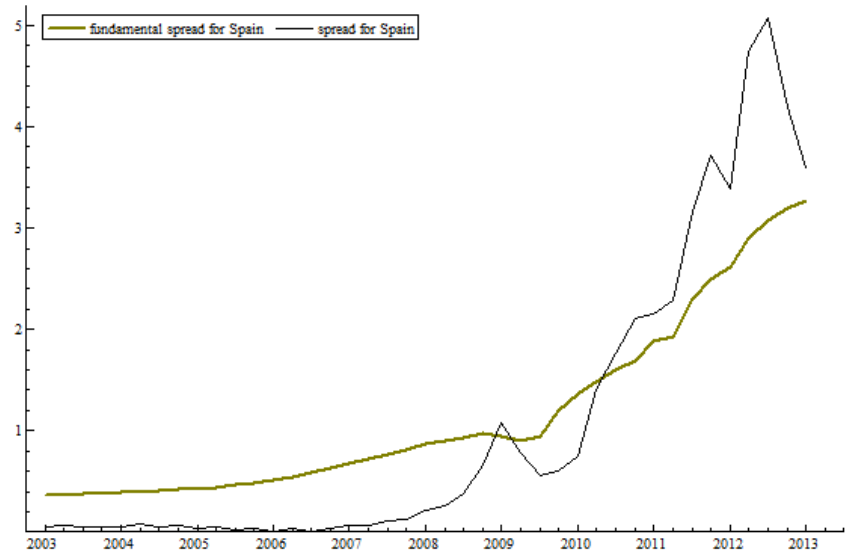

Figure 11:10: actual and fundamental yield spreads for Spain

One can ask whether the econometric model is robust enough to draw such strong conclusions about fundamental spreads. The model assumes that the market reached full attentiveness by 2010Q4. Small variations backwards or forwards from this date do not much change the model predictions. However, the amplification function incorporates the index of global risk appetite. If this were to be permanently higher than the value of zero assumed for the steady state, then fundamental spreads would all be a little lower. Furthermore, as acknowledged above, the model omits a forward looking property market risk indicator, though once house prices start to decline, particularly from a high level, the effect is incorporated. There is also parameter uncertainty which suggests the model estimates need to be treated as approximate. However, the interpretations of the data look very plausible. The estimated weights could therefore serve as an excellent starting point for political negotiations over weights in a commonly agreed formula for the risk premium.

4. Implementing Euro-insurance bonds

Euro-insurance bonds would be issued by a Euro area debt management agency with the volume issued set by the sum of the funding requirements of the member states. The maturity profile of Euro-insurance-bonds issued each year would be set by the debt management agency, taking advantage of investor preferences revealed in the market. Individual countries would have no control over the maturity profile of their new debt obligations. The collective maturity profile would set the debt repayment schedule of each country, given each country's new debt issue.

As explained in the introduction, countries with weak fundamentals would pay a higher interest rate on their euro-insurance-bond issue to the euro area debt-management agency, effectively acting as a central insurance fund. The spread implied for 10-year government bond yields could be set according to the fundamentals formula estimated in the previous section, possibly scaled up or down slightly depending on the view taken of the steady state level of global risk appetite. However, assuming that the average maturity of new euro-insurance bonds is less than 10 years, and hence with a lower average yield, the spreads calculated on the basis of 10-year bond yields would be too high. They should be reduced by the ratio of the average yield on the whole Euro-insurance-bond issue over all maturities to

the yield on the 10-year Euro-insurance bond. This could be based on the previous quarter's ratio.[20]

For outside investors, all euro-insurance bonds of a given maturity would trade at the same price. Euro-insurance bonds would be issued only for new borrowing, including refinancing of expiring existing debt. This means that the contingent liabilities of each government are built up gradually, better matching the gradually rising insurance fund. While Greece, Ireland, Portugal and Cyprus remain under full scale bailout programmes, they would not come under the scheme.

Insurance companies usually demand an 'excess', with those insured covering the first part of any accident costs themselves, to protect against moral hazard, or offer a discounted premium in return for an excess. In the same way, in a world of euro-insurance-bonds, countries could post collateral with the central insurance fund – the euro area debt management agency- in the form of gold and foreign exchange reserves. Since overall risk for each country should be proportional to the risk spread times the size of the Euro-insurance-bond debt issue, it would make sense for the required collateral to be proportionate to the same measure of overall risk. Fortunately, Italy which has relatively short debt maturities and a large debt and so large refinancing needs, also has relatively large gold reserves.

In the event of a future default or debt write-down by a member state, the build-up of payments in the insurance fund, plus the collateral, would be available to cover the countries underwriting the joint Euro-insurance-bond issue. This would negate German fears of a 'transfer union'. In the unlikely event of such funds being insufficient, the cost over-run could be added to each country's share in the collective debt, in proportion to their GDP. Germany would not be singled out for unfair burden-sharing.

A crucial aspect in the design of Euro-insurance-bonds concerns setting the risk premia based on a formula that weights observable economic fundamentals. Four main drivers of the spreads between 10-year bond-yields on sovereign debt for different euro area governments were suggested by empirical analysis of yield spread data since 2003. The first is relative competitiveness. Growth prospects and hence the ability to finance debt service, would be much improved with better competitive positions. A second is the relative ratio of

[20] For the initial issue, the ratio calculated for Germany could be taken as the starting point.

government debt to GDP which has both a linear and a non-linear effect, so that countries with very high debt levels have disproportionately higher spreads. The third factor is the relative private sector debt to GDP ratio, as high private sector debt limits the ability of governments to raise revenue, and high debt levels are a contributing factor to financial crises. Finally, a measure based on house price declines weighted by their earlier rise, captures the impact of property market collapses, such as Ireland's and Spain's, on banking systems and public finances.

Risk premia guided by the weights on fundamentals empirically derived in Section 3 would eliminate market panics but still incentivise southern governments to reform their labour markets, reduce impediments to productivity growth, improve tax collection and expenditure control and encourage macro-prudential policies.

While setting up the debt management agency and its governance structures could take a year, a short-term solution in the form of a one year Euro-insurance-treasury-bill, with similar risk spreads and collateral requirements, could be managed by an existing institution such as the ECB, cooperating with the European Financial Stability Facility. However, since by summer of 2013, previous panics about euro area break-up had not returned, actual spreads are probably not so far from fundamentals, so that the need for such a temporary solution is currently low.

One may ask the following question: given apparent German intransigence on the principle of any form of Eurobond, however carefully designed, why not just struggle on with present policies? One problem with ECB intervention in individual sovereign bond markets is how the ECB is to make the judgement that market yields have deviated far enough from fundamentals to warrant intervention. This is a question to which the analysis in Section 3 provides probably the best currently available answer. For example, on the basis of those estimates, the Italian and Spanish yield spreads in 2013Q1 would have warranted modest intervention, particularly for Italy, and much stronger intervention in 2012. Whether the ECB then would also be making a political judgement about signals to the newly elected Italian government is another question.

However, the Euro-insurance bond structure is much to be preferred to struggling on with present policies because of the vast cost saving to the euro area government collective. The total sum paid to outside investors in euro area sovereign bonds is inflated by the high yields paid on Italian and Spanish bonds. Euro-insurance bonds should trade at yields close

to those at which German bonds trade under non-panic market circumstances. They would benefit from an extra liquidity discount because of the huge scale of the market. This should compensate for the initial lack of familiarity of the product which might slightly raise yields. In time, it is likely that the cumulative sums put aside in the insurance fund would generate a surplus that could be returned to European tax-payers in the form of a lower over-all debt service burden.

One can ask a counter-factual: suppose this system had been in place say since 2005, by which time euro area imbalances had come to be widely commented on, how large would the insurance fund by now have become? The question is artificial since behaviour would have been altered by these risk premia and moreover assumes that political agreement on the risk factors and their weights would have come up with the above formulation. It is also complex, since to answer it one needs detailed time series data on the maturity structure of each country's sovereign debt and yield curve data. Some very rough calculations suggest a figure of the order of 150-300bn euros. This compares favourably with the paid in capital of the European Stability Mechanism of around 200bn euros at the end of 2012.

5. Comparisons with Alternatives and Conclusions

The wrong type of Eurobond could be a disaster: moral hazard writ large, see Gros (2011), which is the main reason given by German politicians and the Bundesbank for opposing the concept. A Berlusconi-led Italy able to borrow on the same terms as Germany would worry many. The German Council of Economic Advisors put forward a 'Redemption Fund' form of Eurobond with a corset of rules, a time-table for debt reduction and punishments -plus one new idea, which I have borrowed for my proposed Euro-insurance-bonds: to use each country's gold and forex reserves to guarantee the first 20% of Euro-insurance-bonds issued in the event of default. But there are no risk spreads in this German proposal, which works through rules and punishments rather than incentives. Rules and punishments do not have a great reputation in the euro area context given the experience of the Stability and Growth Pact.

Euro-insurance-bonds have the following advantages. The first is fiscal decentralisation, helping to overcome the democratic deficit which is a major obstacle to greater euro area political union and fiscal centralisation. Individual governments would

choose their own fiscal policies subject to the appropriate risk spreads and subject to transparency and supervision. The second is the incentive for structural reforms[21], clear to governments and their electorates. This clarity is something the market lacks. The volatility of market-driven spreads can make it very uncertain to governments and electors whether, on undertaking reforms, they will garner the rewards in reduced funding costs. Recent research on the responsiveness of demand for petrol to the price suggest that there is far greater responsiveness to price rises due to permanent and predictable tax rates than to price rises due to fluctuations in the price of crude oil, Scott (2012). This suggests that clear, stable and long-run links between policies and funding costs will magnify the incentives. Thirdly, funding costs which are not subject to the vagaries of the market break the vicious feedback loop between banks and sovereigns. Fourthly, the role of competitiveness, private debt and property market crises in determining risk spreads implies less of a focus on fiscal austerity. Fifth, Euro-insurance-bonds are not a 'transfer union' feared by Germany, since risk-spreads are paid into a common insurance fund, gold and foreign exchange reserves act as collateral and there is collective underwriting, proportional to GDP. Finally, Euro-insurance bonds should, in the long-run, lower the cost of government in the euro area as a whole, with benefits that could be distributed in proportion to GDP or in proportion to each country's debt issue.

The first point above regarding fiscal decentralisation and subsidiarity needs expansion. There is general case in favour of central authorities setting prices or shadow prices and then permitting individual decision makers to make their decisions subject to these constraints, rather than imposing quantitative regulations on each or trying to make and impose these individual decisions at the central level. Setting risk insurance premia centrally is a kind of supranational intervention, but a much weaker one, since without Euro-insurance bonds, each country would in any case be paying risk premia determined in the market. Some would argue that the status quo prevailing in 2013 represents an even greater degree of subsidiarity. But this rests on the sustainability of the OMT. Not only is this under challenge in the German courts, but it is untested, as Spain has not yet asked for intervention under the OMT.

[21] Gruener (2013) makes some useful complementary suggestions on how to make structural reforms more politically palatable, for example, by combining labour market reforms which increase the profit share with product market reforms that reduce it, and by measures to compensate losers.

An important aspect of the proposal is that it applies only to new borrowing, in contrast to several of the alternatives discussed below. As noted above, this means that potential liabilities for the underwriting economies are initially low, while the insurance fund is small, and only grow as the insurance fund grows. However, the spill-over effects on existing sovereign bond prices and hence on bank balance sheets are likely to be large. This is because the ability to roll over expiring existing debt is then eased by a stable and fairly predictable risk spread and there would therefore be little incentive to default on existing debt. Indeed, the formula for the risk-spreads could even be adapted to sharply increase the spread in the event of a default on previously issued sovereign debt, or countries defaulting on such debt could simply be excluded from further access to the Euro-insurance-bond market.

One potential difficulty with the proposal concerns data revisions and data manipulation. The scope for data manipulation is certainly less than it was, given the lessons drawn by Eurostat after the Greek fiasco and far greater transparency and accountability required under the new Fiscal Compact. The scope is also reduced by a formula with four data elements: government debt/GDP, private debt/GDP, unit labour costs and house prices. The problem of data revisions is reduced by the use of lagging, moving average forms of the indicators. However, there is no problem in building in a claw-back feature in the formula so that current risk spreads incorporate an adjustment for data errors that have come to light, say within a two-year window.

Some critics will argue that risk spreads would hamper growth in periphery economies already in deep recession. Others will argue that spreads need to be at crisis levels to properly incentivise fiscal policies. The latter critics would even oppose the ECB's OMT programme which has brought some stability to the market since mid-2012, though not enough in itself to bring the euro area out of recession.

The European Commission green paper on Eurobonds (Sept. 2011) raises a legalistic point: "…the German Constitutional Court ruling of 7 September 2011 prohibits the German legislative body to establish a permanent mechanism, '*which would result in an assumption of liability for other Member States' voluntary decisions, especially if they have consequences whose impact is difficult to calculate'*." This one reason why Euro-T-bills or short term bonds which would not be 'permanent' could be an interim step and have been favoured by, for example, Olivier Blanchard. He writes in the April 2012 IMF World Economic Outlook:

"*Turning to policies aimed at reducing risks, the focus is clearly on Europe. Measures should be taken to decrease the links between sovereigns and banks, from the creation of euro level deposit insurance and bank resolution to the introduction of limited forms of Eurobonds, such as the creation of a common euro bill market.*" In 2012, the European League for Economic Cooperation (Boonstra, 2012) proposed a 2-year EuroT-bill with risk spreads.

Other alternatives

The Delpla and von Weizsacker (2010, 2011) blue bond/red bond proposal is a kind of financial engineering reminiscent of CDOs on mortgage backed securities –they propose safe 'blue' bonds and less safe 'red' tranches of bonds. However, as De Grauwe (2011) points out, it is far from clear that overall funding costs would fall. Moreover, the less safe forms would be likely to be subject to liquidity risk and prices could be highly volatile.

Philippon and Hellwig (2011) suggest EuroT-bills with a common rate. The only stick to deal with 'mis-behaving' countries would be to exclude them from the Euro T-bill market at the roll-over stage. But this 'all or nothing' incentive is too crude and the definition of what constitutes 'mis-behaviour' begs all sorts of questions.

Brunnermeier et al (2011) have proposed what can be regarded as an extended version of the Delpla-von Weizsacker blue bonds/red bonds. Under this proposal, a European Debt Agency (EDA) would buy up national sovereign bonds on the secondary market (up to a limit of 60 percent of GDP in each case) in fixed proportions across countries. But servicing national debts would remain a domestic responsibility. The EDA would be funded by the issuance of two tranches of bonds: European Safe Bonds (ESBies) and European Junior Bonds (EJBies) - the latter having the primary exposure in the event of defaults on the underlying portfolio of national sovereign bonds.

One concern is whether this would be big enough to help Italy. With around 25% of Italian debt due to be refinanced in the next 2 years, this looks like a bucket bailing out a swimming pool. The existence of safe senior bonds requires that the risky junior tranche be large enough to act as a loss absorber. Suppose this system had existed at the beginning of 2010 and had been calibrated to the then perceptions of risks. It seems doubtful that it could have prevented the rise in spreads that has taken place since. The junior tranche could

involve such risk amplification that it could be a very unattractive proposition and suffer liquidity problems and excess volatility like the Delpla-von Weizsacker 'red bond'.[22]

To conclude, given the six-point case made above in their favour, Euro-insurance-bonds or conditional Eurobonds applied to new borrowing rather than existing debt should be popular: while their market spreads are high, the countries that benefit should happily accept a risk-spread formula that cuts their costs of borrowing. The Fiscal Compact Treaty should be regarded as complementary rather than a substitute for Euro-insurance bonds.

Germany is the blockage: a common German view seems to be that maximum bond spreads are needed to force good behaviour on the untrustworthy Southern politicians. German brinkmanship almost 'sank the ship' in 2011Q4 – the ECB saved the day. German public opinion seems not to grasp the enormous benefits the Euro has brought the German economy: the counterfactual of how German exporters would fare with a highly valued Deutsche Mark seems a theoretical abstraction. Yet German political power over the euro area is illusory: France and others less inclined to fiscal centralisation and ever closer political union could call the German bluff, given that the 30-40% currency appreciation that would follow from a German exit would be very damaging for German exports and employment. One wonders which countries would voluntarily stick with Germany and adopt the DM? Would Austria and the Netherlands do so?

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[22] Favero and Missale (2012) make somewhat similar points: "The introduction of ESBies may actually harden the conditions at which Member States borrow for two reasons. First, in order to succeed, the bond re-packaging must create value which incidentally requires that preferences toward risk be polarized with some investors willing to hold the junior tranche. Since the re-packaging changes the relative supply but not the total amount of bonds in the market, the price of national bonds must fall, their yield must rise, to accommodate in investors' portfolios a higher value of the two EDA securities, unless additional demand for national bonds is crowded in, which is unlikely in view of the assumed preferences of investors. Secondly, the preferential treatment that the ECB should grant to ESBies in repo and discounting operations, coupled with a call for banking regulators to assign a zero-risk weight only to the safest national bonds, would reduce the quality and the demand for national bonds issued by weaker Member States."

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Data sources

10-year sovereign yields %: OECD MEI data base, quarterly averages.

Unit labour costs for the business sector, excluding agriculture, index base 100 in 2005: OECD Statistics, quarterly. 2011-12 updates based on whole economy unit labour cost indices.

Quarterly growth rate of real GDP %: OECD MEI data base.

Current account to GDP ratio %: OECD Statistics, quarterly.

Government surplus to GDP ratio: Eurostat, quarterly.

General government debt to GDP ratio: Eurostat, quarterly.

Private debt to GDP ratio: Eurostat, quarterly.

House prices: OECD data base.

Credit Suisse index of global risk appetite: Fixed Income Division, Global Strategy Research, Credit Suisse.

Appendix: Figures for alternative spreads model, replacing the asymmetric house price indicator by 4-quarter changes at t-1 and t-5.

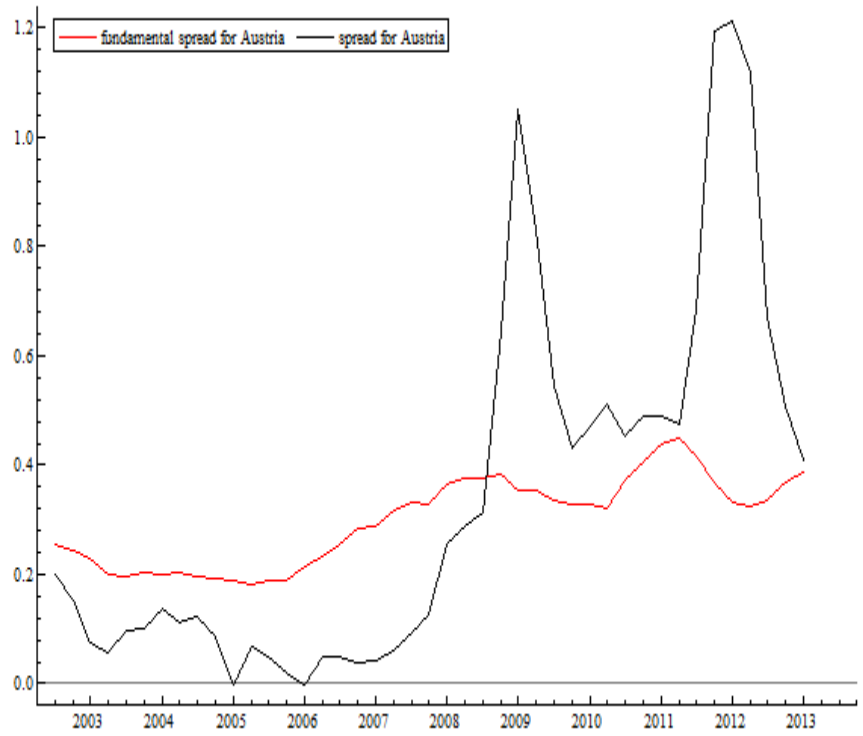

Figure A11:1: actual and fundamental yield spreads for Austria

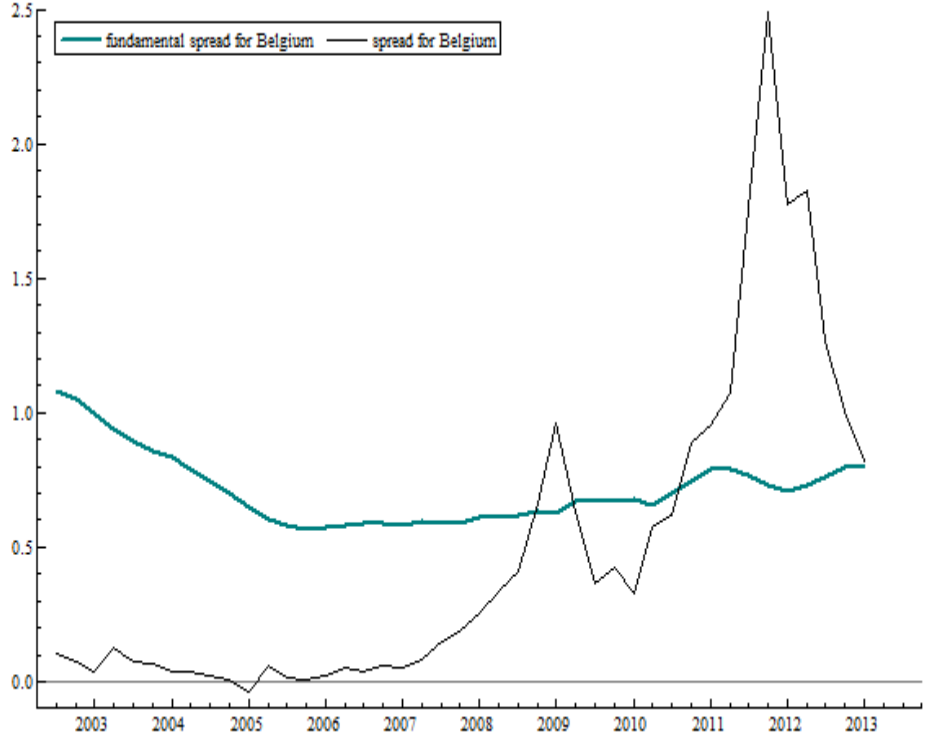

Figure A11:2: actual and fundamental yield spreads for Belgium

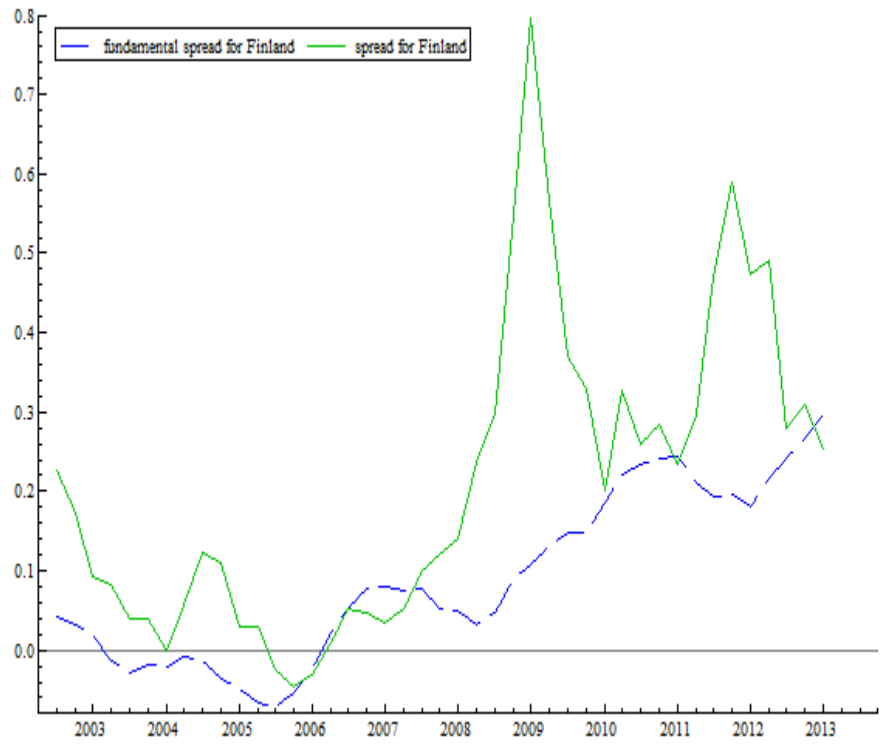

Figure A11:3: actual and fundamental yield spreads for Finland

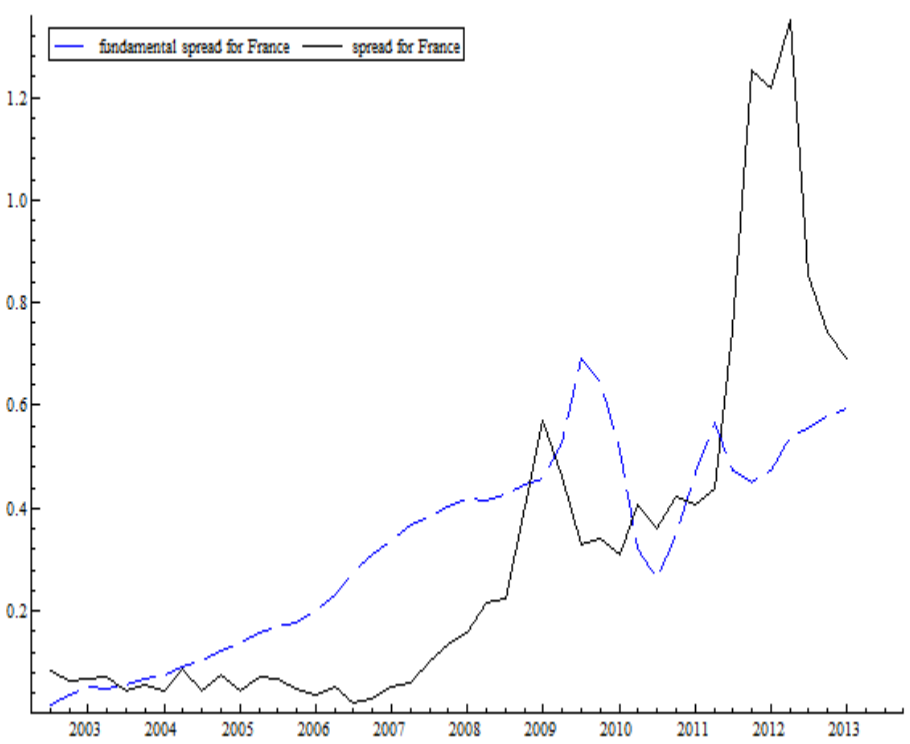

Figure A11:4: actual and fundamental yield spreads for France

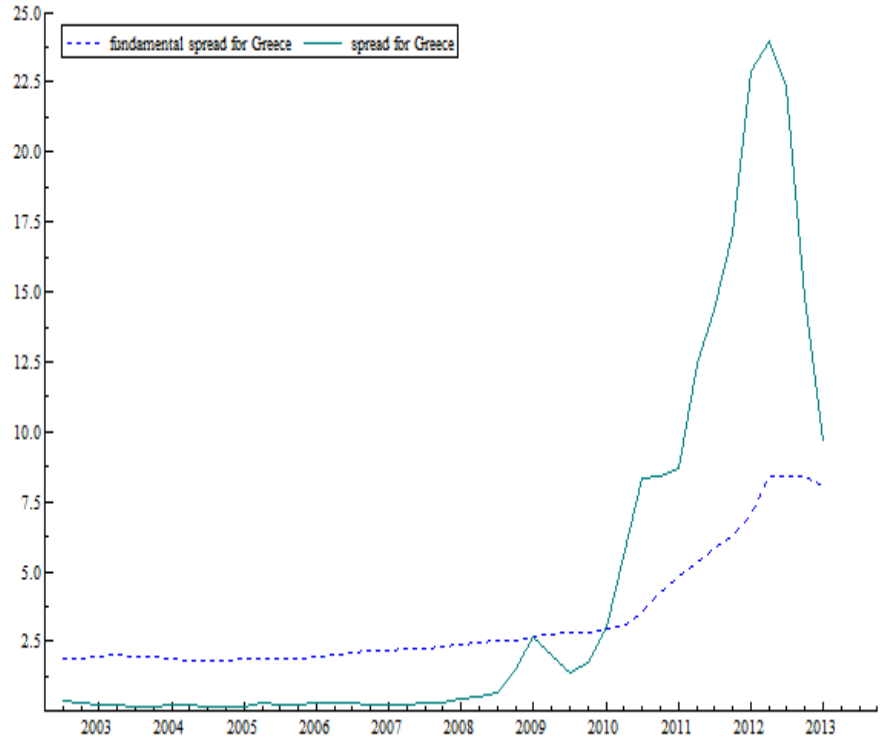

Figure A11:5: actual and fundamental yield spreads for Greece

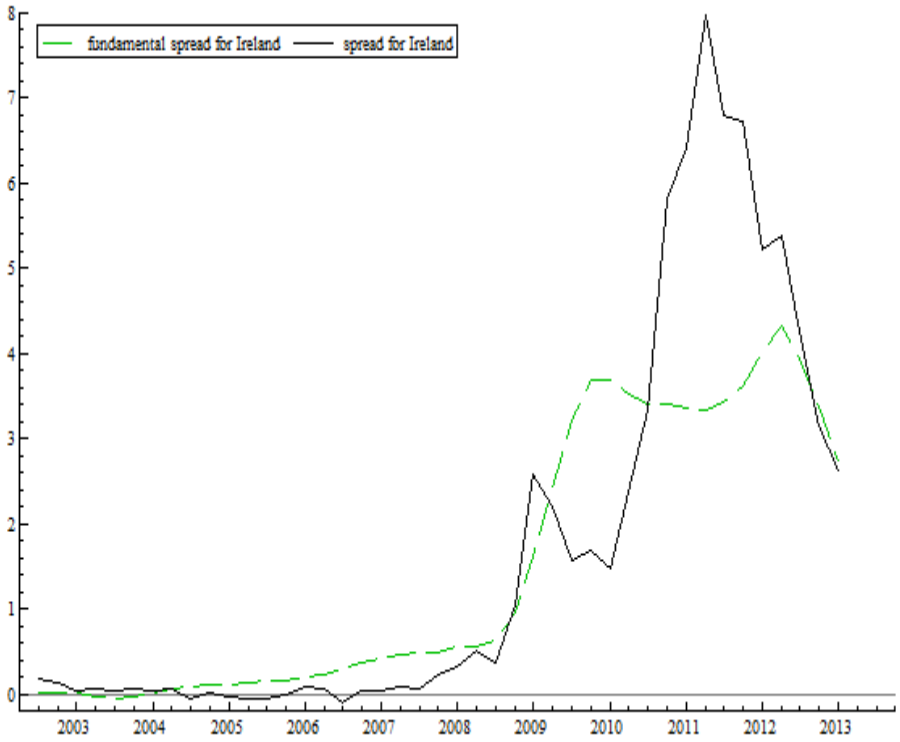

Figure A11:6: actual and fundamental yield spreads for Ireland

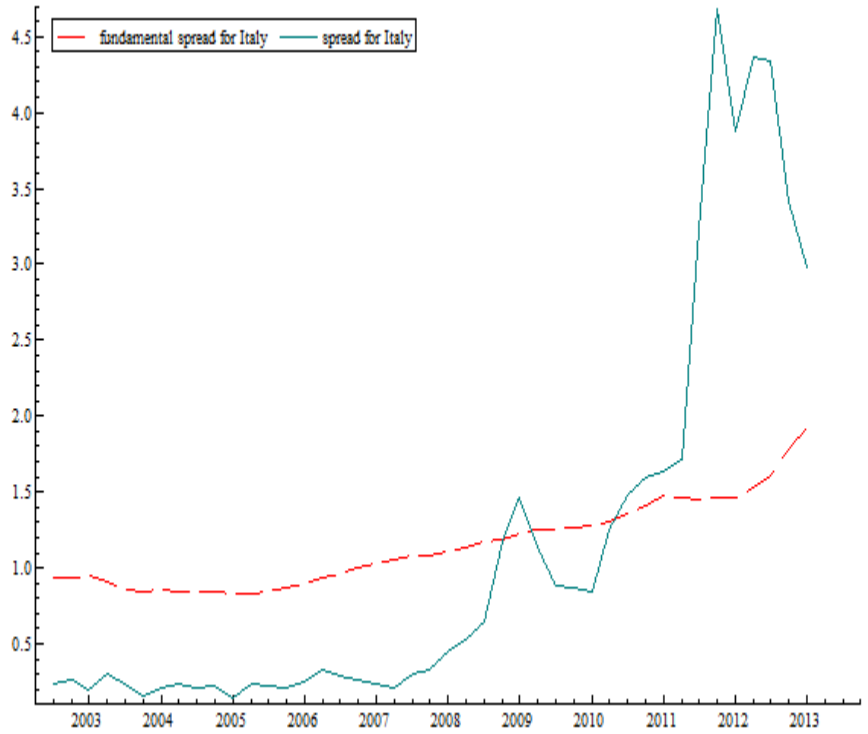

Figure A11:7: actual and fundamental yield spreads for Italy

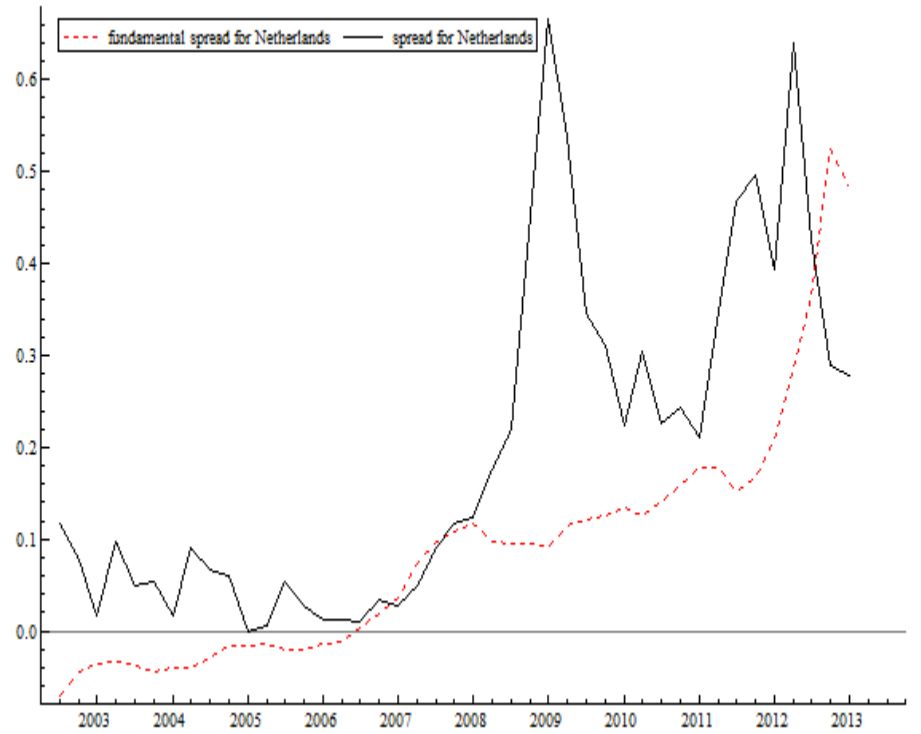

Figure A11:8: actual and fundamental yield spreads for the Netherlands

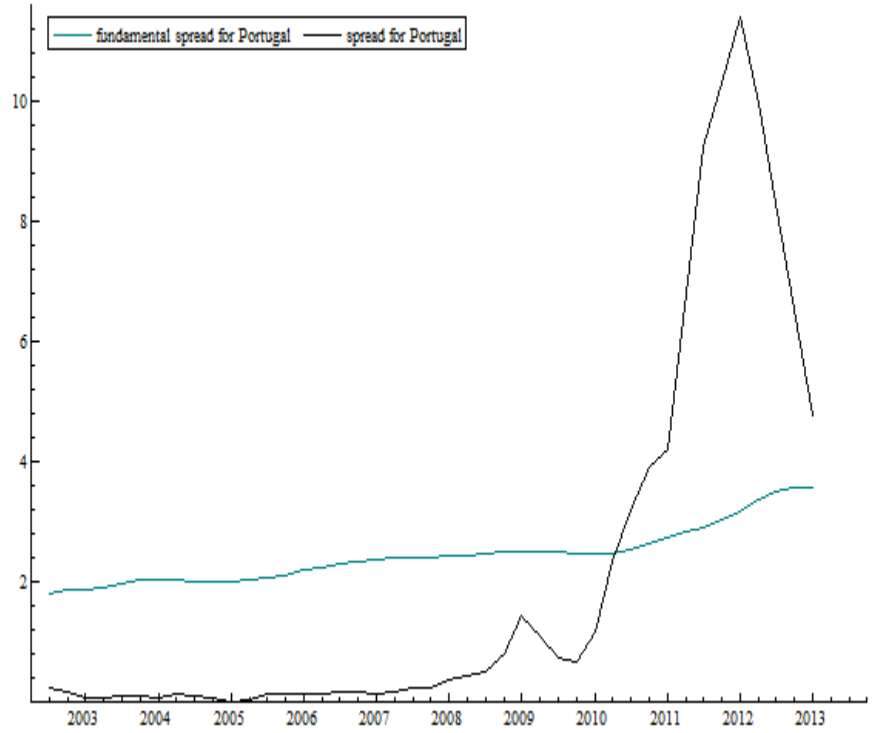

Figure A11:9: actual and fundamental yield spreads for Portugal

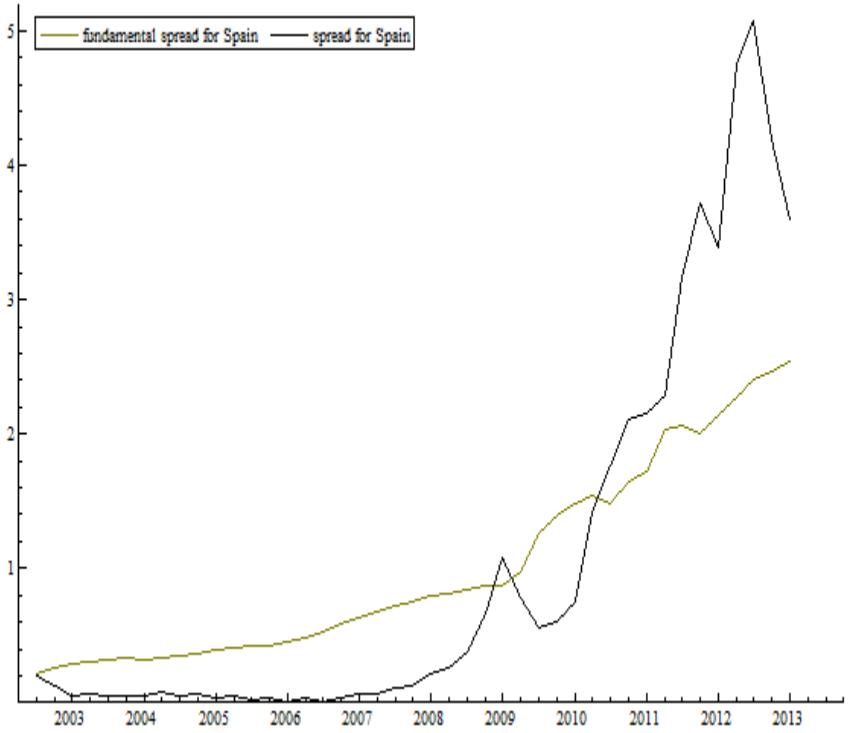

Figure A11:10: actual and fundamental yield spreads for Spain