Economic fundamentals and Eurozone sovereign spreads: will the good news continue?[1]

Spreads between government bond yields in the Eurozone periphery and Germany have fallen to the lowest levels in 3 to 4 years. There are two major factors behind this. The first is 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.This has been successful in eliminating fears of an imminent Eurozone break-up. The second factor is the improvement in economic fundamentals in the periphery countries, particularly in Ireland, Spain and Greece.

Previous econometric work on the role of economic fundamentals at the country level has focused almost entirely on government debt and government deficit to GDP ratios. The true fundamentals have been obscured by market panics and by the fact that markets really only took full account of these fundamentals from the end of 2010.Before the middle of 2007, markets ignored the build-up of stresses between Eurozone countries. Once amplification of perceived risks by market panics and the shift from inattention to full market attention are taken into account, a far more nuanced picture emerges of what country fundamentals really matter for sovereign spreads.

In addition to excessive government debt, deteriorating competitiveness, excessive private debt, and housing market crises spilling into banking systems, have been especially prominent in the countries at the periphery. In Ireland and Spain, declining relative unit labour costs and the fading of the housing crisis have recently been important in narrowing spreads against Germany. The econometric model also suggests that good news on relative growth and inflation help narrow spreads.

Prospects for further narrowing of spreads for Greece and especially for Spain look good. Once the current bout of falling spreads is over, the underlying picture suggested by the estimated model is less good for Ireland, Italy and Portugal and for the euro area core economy, France. In all four cases, the government debt to GDP ratio has been deteriorating, and for France and Italy, competitiveness has not improved significantly. For France, another factor is the rising level of the private debt to GDP ratio. For Ireland, scope is limited for the effect on the spread of further improvements in competitiveness and housing market recovery.

Introduction

Interventions by the European Central Bank (ECB) and progress to a euro area banking union have greatly reduced the risks that feedback loops between high sovereign debt yields and banking problems could blow apart monetary union. The two longer-term

[1] This article is based upon a paper by Professor John Muellbauer FBA, Oxford Nuffield College and INET@Oxford. John Muellbauer acknowledges support from the Open Society Foundation and Oxford Martin School via the Institute for New Economic Thinking at the Oxford Martin School. Much of the work on the article was done while the author held a visiting Wim Duisenberg Fellowship at the ECB.

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, and was foreshadowed by Draghi's celebrated 26th July speech, helped to cap Spanish and Italian bond yields. The banking union agreement, though far from perfect, was finally signed off by the European Parliament on April 15 with an overwhelming majority.

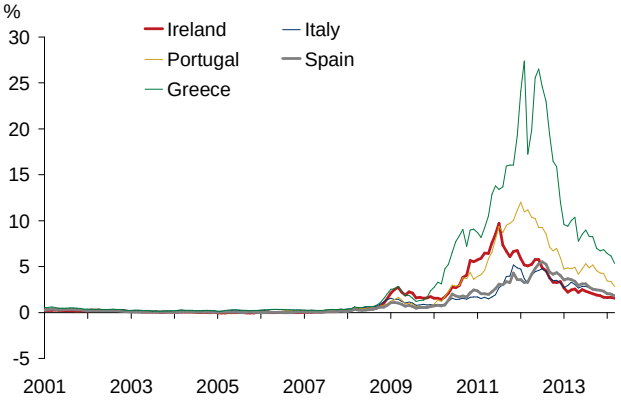
Combined with improvements in economic fundamentals in some of the economies at the Eurozone periphery and good levels of global risk appetite, 10-year yield spreads relative to Germany reached 3 to 4 year lows in March 2014, see Figure 1. Ireland exited its Troika-supervised programme in December 2013 and had already successfully re-entered conventional government bond markets in March 2013. Portugal is due to exit in June 2014 and had already issued new 10-year bonds in May 2013.Greece re-entered bond markets with a successful issue of 5-year bonds in April 2014.The question is how much further is this fall in spreads likely to go?

Economic background

The economic background was outlined in the January 2014 precursor of this article, Muellbauer (2014). To summarise, sovereign debt yield spreads for the first seven years of monetary union failed to signal growing imbalances and risks. As Figure 1 demonstrates, spreads 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. 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.

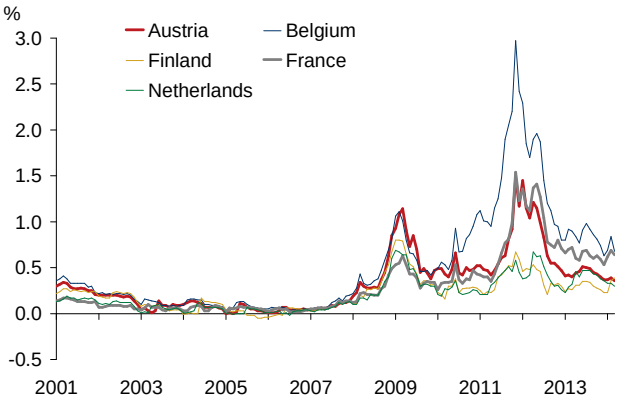
The ECB, and especially the European Commission and member states, failed to appreciate underlying differences in credit, housing and labour market institutions and to track rising divergences. Constâncio (2013) argues that European financial integration and the associated explosion of cross-border banking 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 Cyprus. The induced growth encouraged wage inflation and made these economies uncompetitive.

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



Source : Haver Analytics

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



Source : Haver Analytics

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. 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 succeeded in capping Spanish and Italian bond yields, which had increasingly been factoring in the risk of a disorderly break-up of monetary union. Under the OMT, ECB intervention in a particular sovereign debt market can take place provided the government concerned accepts strict conditions.

Muellbauer (2014) summarises the key points of the new Fiscal Compact Treaty and the 2011 'six pack' reform, important elements, together with banking union, of the policy reforms that have occurred. It also graphs the underlying differences in country economic fundamentals in competitiveness, ratios to GDP of government and private debt, current account to GDP ratios and housing price developments. For competitiveness, Spain, Ireland and Italy had by 2008 experienced the largest increase on a 2001 base in unit labour costs relative to Germany. Since then relative unit labour costs have fallen most in Ireland, followed by Spain, but have hardly budged in Italy. Relative unit labour costs in Greece peaked in 2011 and like Portugal's only fell thereafter.

Government debt as a ratio to GDP relative to Germany was low in Ireland and Spain in the period before the global financial crisis but then deteriorated rapidly, 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 Italy avoided a property market crisis. 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.

Regarding private debt to GDP ratios relative to Germany, 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.

From the 2007 or early 2008 peaks, the declines in housing prices 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, 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 was more associated with the collapse of economic activity and the rise in domestic interest rates.

Worsening competitiveness and rising private and public debt levels show up in increasing current account deficits to GDP ratios. Spain's deficit peaked at 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.

Previous 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 are 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. The coefficients on all four drivers are quite heterogeneous and only half of the ten countries exhibit a 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.

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 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.

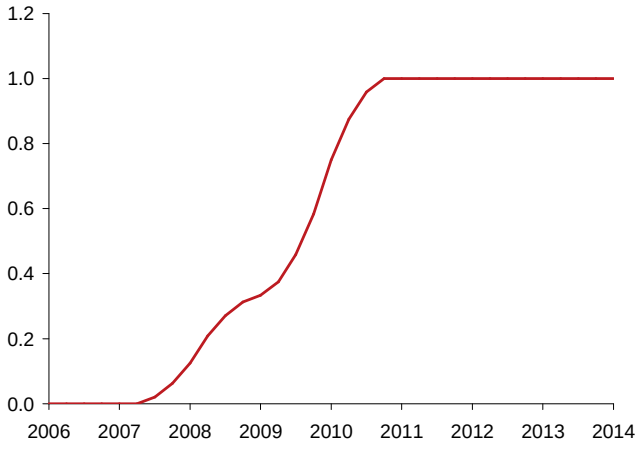
A new econometric model

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 modelled. Greece is omitted since the market did not have a realistic assessment of its fundamental data until 2010. Ireland and Portugal are included up to the quarters preceding their bailouts which occurred in 2010Q2 and 2010Q3 respectively. Thereafter, 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. Since Ireland exited the bailout programme in December 2013, it is included again for the 2014Q1 observation.

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.

The model 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 2 illustrates the estimated form of this attention function.

Figure 2: Rising attentiveness



Secondly, the model needs to incorporate 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.

In the long run, the deviation y_{it} from Germany's yield of country i's 10-year government bond yield, is given by a function of economic fundamentals $f(x_{it})$ multiplied by an amplification term, where

$$amplification_t = (attention_t + alarm_t + a_2 \Delta alarm_t) \quad (1)$$

Here, $(attention_t + alarm_t)$ represents the more persistent elements of this amplification. The 'long-term' solution for the yield spreads can therefore be defined by

$$y_{it} = f(x_{it})(attention_t + alarm_t) \quad (2)$$

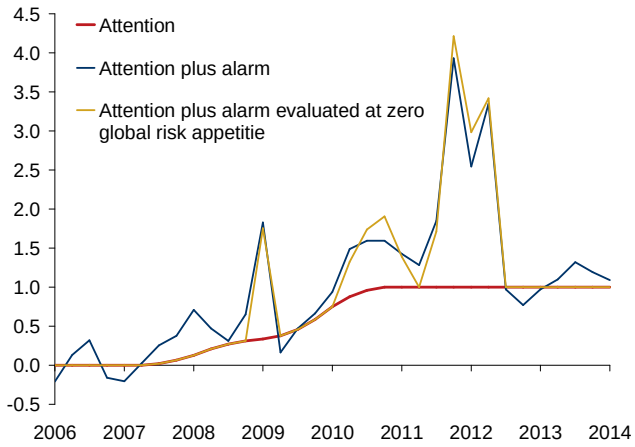
Since attention equals one from 2010Q4 and with a steady state value of alarm at zero, in a post-2010 steady state, we have

$$y_{it} = f(x_{it})$$

Yield spreads do not adjust instantly to the long-run solution but a slightly augmented partial adjustment model for the quarterly change in spreads captures the dynamics well[2]. The speed of adjustment is around 25% per quarter so that around 70% of the adjustment is complete after one year.

The estimated value of the term $attention_t + alarm_t$ is pictured in Figure 3, 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.

Figure 3: Estimated values of attention terms



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[3]. To model the size-liquidity element, define the proportionate deviation in bond market size relative to Germany as $S_i = (S_g - S_i)/S_g$ 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^4 . 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 with dummy variables for 2008Q4, 2009Q1 and 2009Q2[5].

The function of economic fundamentals is specified and estimated as follows:

$$f(x_{it}) = b_{0i} - 0.18 s_i + s_i g(dummies\ for\ 2008Q4\ to\ 2009Q2) + 1.70\ rulcma_{it-2} + 0.0098\ rgdebtma_{it-4} + 0.00041\ posrgdebtma^2_{it-4} + 0.0042\ rpdebtma_{it-8} - 17.8\ asymhp_{it-1} + 13.4\ (shift)\ asymhp_{it-1} - 0.049 \Delta_4\ rgma_{it-2} + 10.8\ \Delta_4\ rinfl_{it-1} \quad (3)$$

[2] The model also incorporates some other short-term factors. These are the lagged change in spreads, the change in global risk appetite, the change in the US 10-year to 1-yeargovernment bond spread and some country time-dummies, including for the 2008 liquidity crisis and for the periods Ireland and Portugal were under their bailout programmes

[3] Size is only one determinant of liquidity, as measured, for example by bid-ask spreads, see Fleming (2001)

[4] 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

[5] 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

Here, the zero-subscripted term is a country-specific fixed effect set to zero for all countries except Belgium and Portugal[6].The second term captures the size-illiquidity premium in a steady state associated with small bond markets (around 18 basis points for Ireland, for example) and the third, the size-related impact of the temporary illiquidity spike in 2008Q4 to 2009Q2. The fourth term of equation (3) is the effect on bond yield spreads of relative unit labour costs, whose normalisation is discussed below. A 10% decline in relative unit labour costs results in a 17 basis points long-run decline in the yield spread. The fifth term is the relative government debt to GDP ratio and the sixth a non-linear function of this variable. 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. To illustrate, the recent 50% excess of Italy's government debt to GDP ratio against Germany's contributes around 1.3 percentage points to Italy's yield differential. France's recent excess of around 12% contributes only 13 basis points to France's spread.

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. A 100 percentage points higher private debt to GDP ratio than Germany's adds 42 basis points to the spread.

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 the depreciation has been more than 0.075 (i.e. 7.5% in the house price level), define an indicator variable to be one; otherwise it is zero. Such nominal depreciations capture the effect of negative equity, a key long-run driver of mortgage default, see Aron and Muellbauer (2012). The product of this indicator variable and a declining weighted average[7] of annual rates of change of house prices going back four years is a housing stress indicator. Finally, weight by the nominal appreciation in country i of log nominal house price between 2003Q1 and 2007Q3.This implies that countries with the biggest house price booms before the bust are more vulnerable, other things being equal. The ninth term measures a moderation of this effect from 2012Q3 to 2013Q3 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[8]. To illustrate, in 2012Q2, this asymmetric house price effect contributed 1.5 percentage points to Spain's spread, down to 0.4 percentage points in 2014Q1. In 2012Q2, the 3.3 percentage points contribution for Ireland, was down to 22 basis points in 2014Q1, both from the moderation due to European policy reforms and the stabilisation and then beginning recovery in Ireland's housing market.

The last two terms capture the effect of better relative growth and lower relative inflation on spreads. If the moving average of the relative annual rate of growth of GDP, *rgma*, minus its value one year earlier rises by 1 percentage point, the country's yield spread declines by 5 basis points. Finally, a decline of relative annual consumer price inflation of 1 percentage point compared with its level one year earlier lowers the spread by 11 basis points.

The fit of the model is good. The t-ratios for the coefficients reported above range from 4.3 for the size effect to 25 for the speed of adjustment, and between 7 and 11 for the debt and competitiveness effects. The

[6] Belgian yields appear to benefit from a small discount of around 0.5%, given the economic fundamentals, perhaps because Brussels is the centre of EU government. Portugal's premium of about 0.9% may be related to the 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. The absence of country fixed effects for the other countries means that country differences in the economic fundamentals well capture the longer-term yield differentials

[7] The weights are 1 on the annual rate observed at t-1, 0.7 on the annual rate observed at t-5, 0.7 squared on the rate at t-9 and 0.7 cubed on the rate at t-13

[8] This is measured by interacting the asymmetric house price measure with a dummy 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

equation standard errors range from 53 to 62 basis points, apart from Portugal, where it is 80 basis points.

The use of national accounts data lagged two quarters (or more) takes realistic account of lags in the release of national accounts data, while the restriction to 4-quarter moving averages smoothes irregularities and measurement errors in such data. It should also minimise the effect of data revisions on the economic indicators, since such revisions are less pronounced at longer lags. House price data and consumer price index data, which are typically unrevised or revised by very little are used at a lag of one quarter[9]. 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[10] 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. 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 2001, while the last two were relatively competitive.

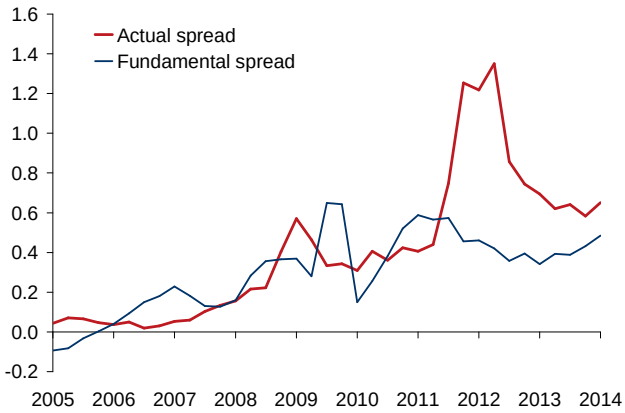
The model is estimated[11] as an equation system on quarterly yield spreads for 2003Q1 to 2014Q1 for nine countries: Austria, Belgium, Finland, France, Italy, Netherlands, Spain, Ireland and Portugal, but time dummies are used for observations on the last two countries for the duration of their participation in their bail-out programmes.

Some implications of the estimates

The panels of Figure 4 compare the fundamental estimated long-run spreads with the actual spreads for the euro area periphery countries and for France from 2005 onwards. They also decompose the estimated fundamental spreads into the five main factors: competitiveness, government debt/GDP, private debt/GDP, news about growth and inflation and the asymmetric house price factor.

Taking countries in alphabetical order, the upper panel of Figure 4a suggests that actual spreads for France had not yet fully adapted to the lower level implied by the estimated fundamental, taking the average spread for 2014Q1. However, the late April 2014 spread for France at 0.48 is almost exactly in line with the fundamental. The trend of the fundamental is up and the reasons can be seen in the lower panel of Figure 4a. The ratios of government and private debt to GDP are deteriorating and competiveness has only slightly improved. A slight cyclical improvement in 2013 helped to bring down the spread but this is probably only a temporary factor.

Figure 4a: Comparing actual & fundamental spreads for France



[9] CPI data are published monthly, with a relatively short lag and in many countries information about the state of the housing market is also updated monthly. Switching to a two-quarter lag for house prices results in almost identical estimates

[10] In this study the OECD's data on whole economy unit labour costs are used

[11] 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

Figure 4a: Composition of fundamental spread for France

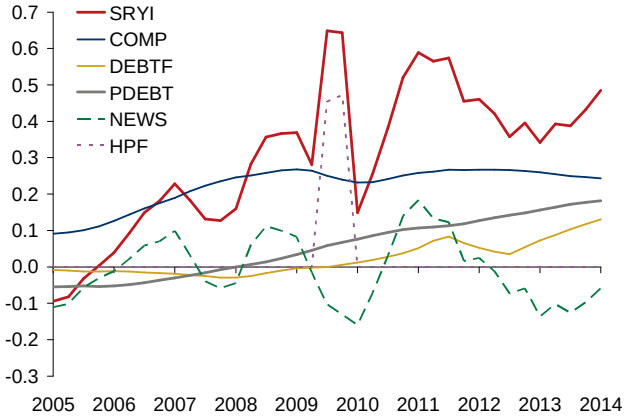


Figure 4 – Key:
SYRI – fundamental spread
COMP – competitiveness
DEBT – government debt/GDP
PDEBT – private debt/GDP
NEWS – effects of change in growth and inflation rates
HPF – asymmetric house price dynamics

Greece was excluded from the model. To generate an estimated fundamental spread, the same premium as Portugal has been assumed, though a premium twice as large would be even more plausible. On the former assumption, the average 2014Q1 yield spread was still above the fundamental shown in Figure 4b, though the late April spread of 4.44% was not far above the estimated fundamental. It is encouraging that the implications of the model for Greece are as accurate as this, even though the model was estimated on non-Greek data. The lower panel of Figure 4b suggests that the Greek bailout, by reducing government debt, had a notable effect on the fundamental spread, but the recent deterioration of debt/GDP from this lower level casts a negative shadow on prospects. It is possible that a sharp improvement in GDP could change the outlook. Greece's improved competitive position has certainly helped. There is also a small housing market effect as falling house prices cause problems for the banking system, but this has at least now stabilised.

Figure 4b: Comparing actual & fundamental spreads for Greece

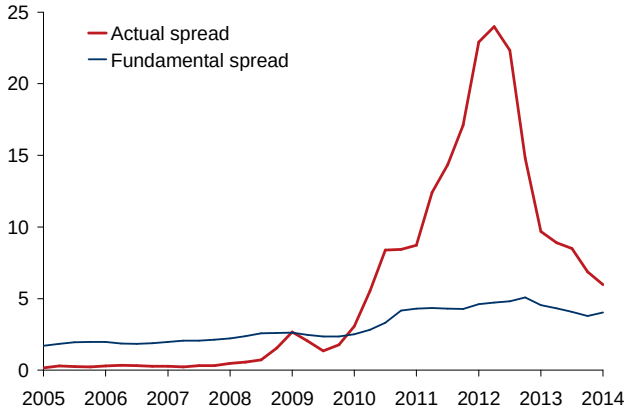
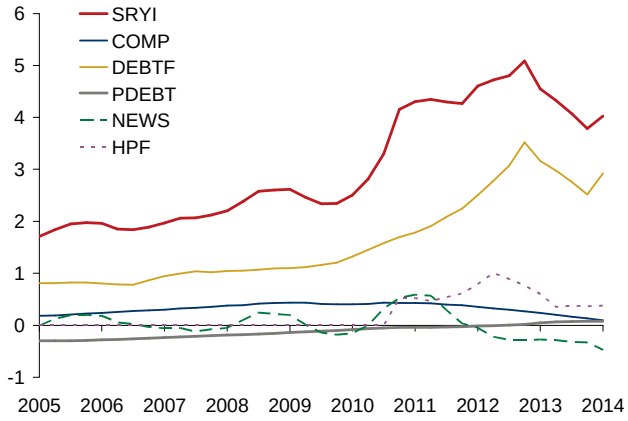


Figure 4b: Composition of fundamental spread for Greece



For Ireland, the estimated model illustrated in Figure 4c suggests that yield spreads have fallen below fundamentals, particularly on late April information. Since Ireland was excluded from the model while it was under its bailout regime, this may reflect a limitation of the model. The model suggests that European policy and the improvement in the Irish housing market have had a large effect, almost 3 percentage points from the 2012 peak, in bringing down the Irish spread. It is conceivable that the model understates the full effect[12].However, the second panel suggests that Ireland's deteriorating government debt to GDP ratio is likely to limit further spread reductions,

[12] Loan to value ratios for Irish mortgages were almost certainly higher than Spain's with even more negative consequences for banks. Hence the model estimates, heavily influenced by Spanish data, may have understated both the deterioration and the subsequent improvement in the housing market effect for Ireland

despite the continued benefits of greatly improved competitiveness.

Figure 4c: Comparing actual & fundamental spreads for Ireland

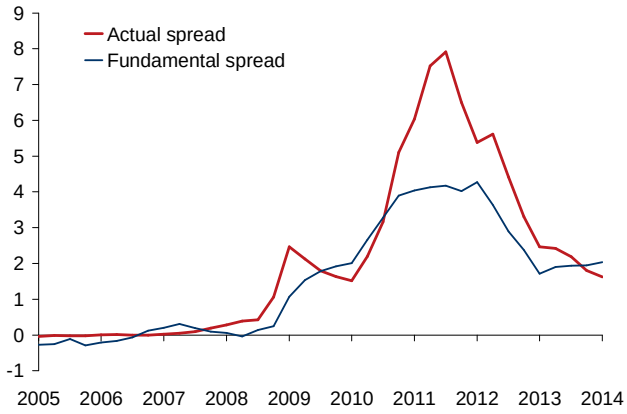
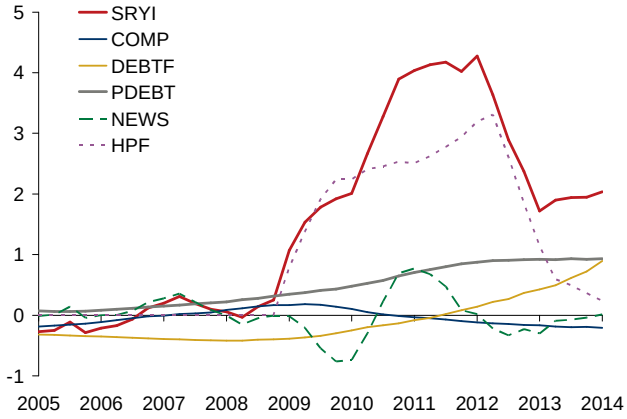


Figure 4c: Composition of fundamental spread for Ireland



For Italy, as for France, the model suggests, see Figure 4d, that the average spread in 2014Q1 had not fully fallen to the lower fundamental, but the late April spread of 1.56% is almost exactly in line with the fundamental. The decomposition in the lower panel of Figure 4c, suggests that a deteriorating government debt to GDP ratio is the main factor in the upward trend in the fundamental. An upward drift in the private debt to GDP ratio relative to Germany's also makes a small contribution, while lack of progress in competitiveness means there is no compensating offset. Recent falls in house prices could also pose a slight problem, though with low levels of loan to value ratios, this is unlikely to cause serious problems in the banking system, at least not through household defaults.

Figure 4d: Comparing actual & fundamental spreads for Italy

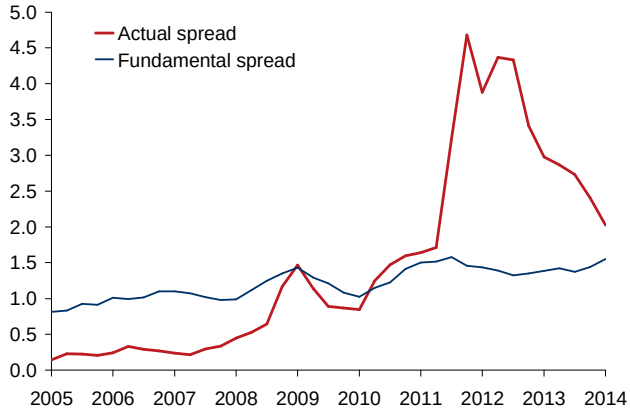
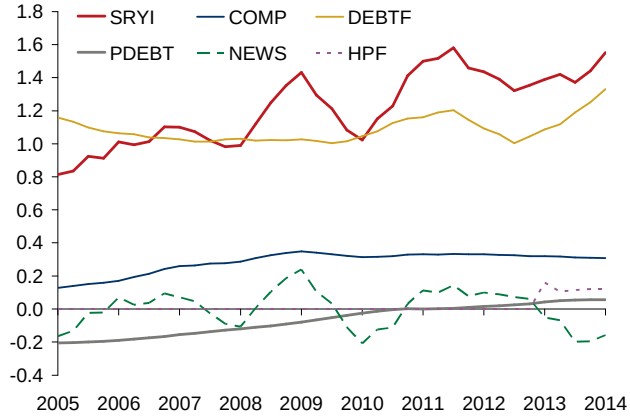


Figure 4d: Composition of fundamental spread for Italy



For Portugal, see Figure 4e, the actual average spread in 2014Q1 had almost fully adapted to the underlying fundamental, and on late April data, had overshot on the downside. One needs to be cautious in reading too much into this as Portugal has been excluded from the model from 2010Q3. However, the rising ratio of government debt to GDP relative to Germany illustrated in the lower panel of Figure 4d implies an upward trend in the estimated fundamental. This does not augur well for continuing falls in the spread.

Figure 4e: Comparing actual & fundamental spreads for Portugal

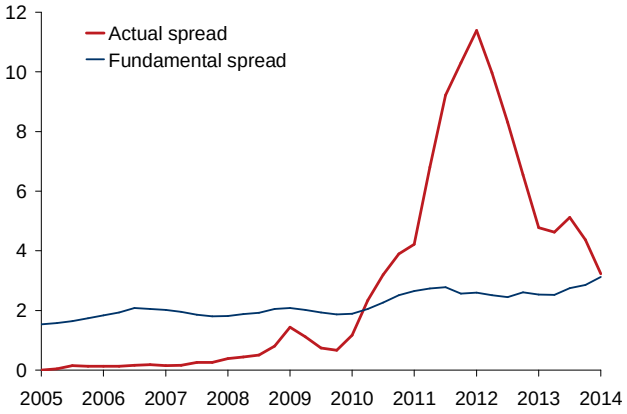


Figure 4f: Comparing actual & fundamental spreads for Spain

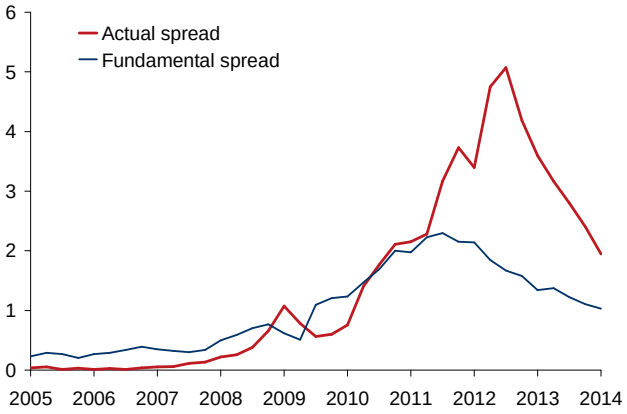


Figure 4e: Composition of fundamental spread for Portugal

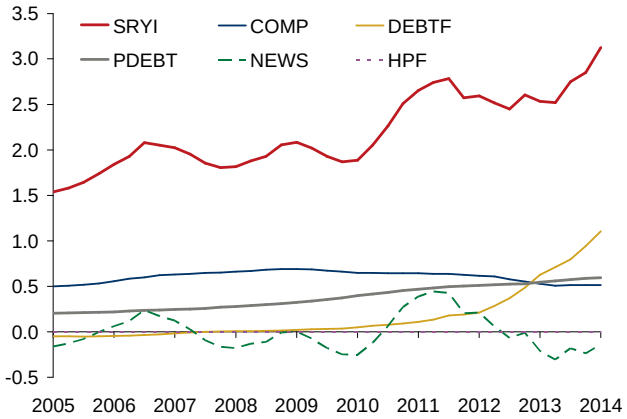
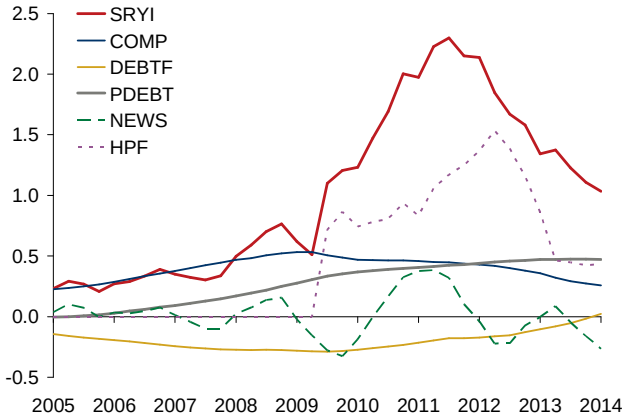


Figure 4f: Composition of fundamental spread for Spain



For Spain, see Figure 4f, even on a late April spread of 1.53%, the actual spread was above the estimated fundamental, suggesting that further falls in the spread are plausible. The lower panel of the figure implies that, while large further reductions in the fundamental spread are unlikely in the immediate future, moderate further falls are plausible. Improved competitiveness and a bottoming out of the housing market, should more than offset the opposite effect from the rising government debt/GDP relative to Germany's. Improvements in cyclical performance in 2014 would also benefit Spain's spread.

Limitations of the analysis

These conclusions need to be hedged by noting several limitations, in addition to those already mentioned. The first is estimation uncertainty: with equation standard errors of the order of 50 to 60 basis points over the full sample, including the crisis period, it is dangerous to claim too much. However, model residuals in the last two years have substantially lower standard errors. A second limitation is that the estimated fundamentals graphed above assume no change in global risk appetite or in the US long-short Treasury spread. Variations in either would cause deviations in spreads from steady state fundamentals. Thirdly, market participants may be more forward looking than implied by the model. For example, an Italian government committed to a credible reform programme might well bring down the spread below that implied by the estimates, in advance of improvements in the measured factors. Finally, it is possible that the model might have excluded relevant

factors seen by the market, such as social security obligations or real assets owned by the state not reflected in measured gross debt.

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