Determinants of sovereign bond yields: the role of fiscal and external imbalances

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The rise in sovereign bond yields observed in the so-called "periphery" euro area countries from 2008 onwards can potentially be attributed to significant and rising levels of external government liabilities coupled with already high levels of public debt. The results of our estimations show that this combination of factors better explains the increase in risk premiums than fiscal variables alone. In particular, deterioration in net international investment positions to below a threshold of –50% of GDP most likely prompted an abrupt revision of market expectations. Investors appear to impose a greater penalty on countries with a "twin deficit", that is countries with both fiscal and external deficits. One implication that can be derived from this is that periphery countries could reduce the risk premiums on their public debt by bringing their external balances back to more sustainable levels.

The outbreak of the 2008 financial crisis led to a significant widening of the differentials between euro area sovereign bond yields. Investors appeared to discriminate against "periphery" countries more than could be justified by fiscal factors alone.

The hypothesis we aim to test here is that the surge in sovereign bond yields for periphery countries was not simply the result of fiscal weaknesses caused by a deterioration in public finances in most euro area economies after the 2008 crisis. Rather, it can also be attributed to a marked and rapid worsening of periphery countries' external imbalances, as evidenced by the sharp deterioration in their net international investment positions (NIIP [1]) compared with the relative stability of NIIPs in core countries.

Debt and NIIP: a non-linear impact on sovereign bond yields?

According to the existing economic literature, trends in real long-term interest rates are determined by variables reflecting economic conditions in that particular country (such as GDP or inflation) or the state of public finances (public debt or fiscal balances), or by financial variables such as the term structure of bond yields. According to the latter theory, time-varying risk premia are attributable to domestic macroeconomic variables, and more specifically to fiscal variables. Over a long-term horizon, a standard determinant used in the literature is the stock variable, i.e. the debt-to-GDP ratio, and we have therefore chosen to focus on this in our study.

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[1] A country's net international investment position shows its net assets or liabilities vis-à-vis other countries. A negative position means that inflows of foreign capital (mainly in the form of debt or equity investments) have exceeded outflows to other countries.

One aspect not covered extensively in the literature, however (see Arslanalp and Poghosyan, 2014), is the role played by NIIPs. We postulate that a favourable NIIP helps to keep a country's sovereign bond yields at lower levels than would be implied by fiscal variables alone. In the event of a financial crisis, therefore, a country's sovereign credit risk could increase considerably if, for example, the government used external borrowing to bail out private banks.

In line with Ben Salem and Castelletti Font (2016), this *Rue de la Banque* attempts to explain the divergences between the observed paths of long-term interest rates and debt-to-GDP ratios, first by directly introducing the NIIP, and second by testing whether debt has a non-linear impact via the NIIP. Chart 1 illustrates the justification for this choice: in major advanced countries such as France, Germany and Japan, sovereign bond yields remained relatively low and indeed continued to decline, despite a deterioration in these countries' internal and/or external balances. In euro area periphery countries, however, borrowing costs surged between 2008 and 2012, and to a greater extent than could be expected on the basis of fiscal variables alone.

To estimate the significance of NIIPs (*A*) and public debt (*D*) as long-term determinants of sovereign yields (*r*), we specify the long-term relationship between these variables ($\beta'Z_{it}$) as follows:

$$\beta' Z_{it} = r_{it} - \beta_1 D_{it} - \beta_2 A_{it} \\ - \beta_3 D_{it} * \beth_{A_{it}<\gamma} - \beta_4 r_{it}^s$$

Real short-term rates (*r*^{s}) take into account structural changes that occurred over the period, such as changes in the rate of inflation or the introduction of the euro, and which led to a downward revision of expectations regarding the future path of long-term interest rates. The introduction of a dummy variable $\beth$ which amplifies the impact of debt when the threshold γ is exceeded, is based on the European Commission's macroeconomic imbalance procedure (MIP). The MIP aims to prevent and correct macroeconomic imbalances by establishing a scoreboard of 11 indicators, and setting thresholds for each one, beyond which countries are subject to increased monitoring.

The thresholds for public debt and the NIIP are set respectively at 60% and –35% of GDP. However, in our estimations, γ is set at –50% for the NIIP. This reflects empirical evidence as well as our data, which appear to show that sovereign bond yields react to a higher net liability position than that defined in the MIP. The long-term

C1 Trends in sovereign yields and their long-term determinants
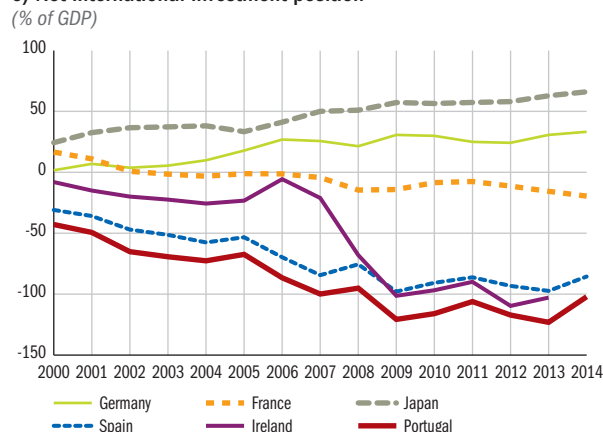
a) Sovereign bond yields (10 years)
(%)
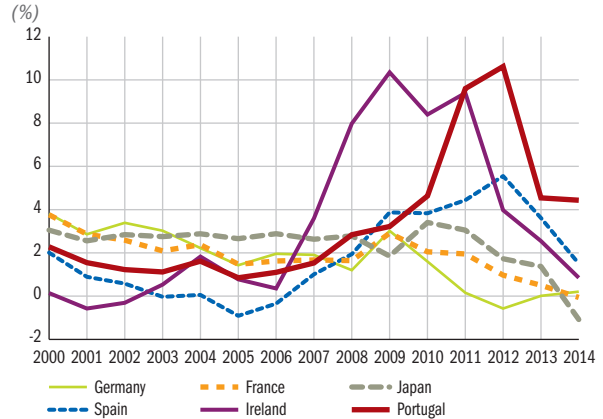
b) Public debt
(% of GDP)
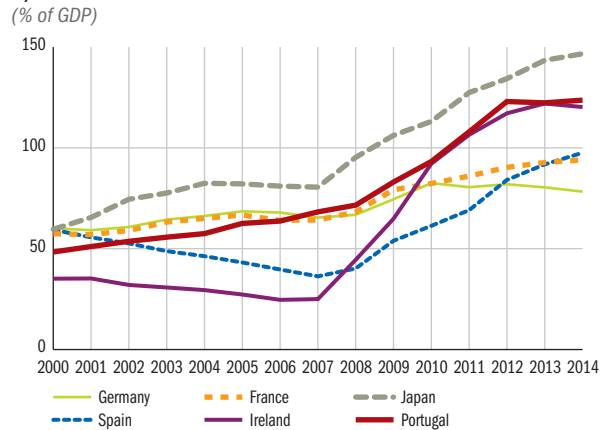
c) Net international investment position
(% of GDP)

Source: Ben Salem and Castelletti Font (2016).

relationship between the variables is integrated into an error-correction model where the short-term dynamic is described by changes in inflation, real short-term rates, GDP and public debt.

"Flight-to-quality» versus *"penalisation of twin deficits"*

We use annual data for the period 1980-2013 for 22 countries of the Organisation for Economic Co-operation and Development (OECD[2]). Table 1 shows the coefficients estimated by the model when the cointegration relationship excludes the debt-NIIP interaction variable (standard model), and when all variables are taken into account (baseline model).

As the table shows, the coefficients estimated using the standard model are similar to those found in the recent literature on the subject, for example Pogoshyan (2014). However, the specification in the baseline model is more suitable than that used in the standard model, notably because the return to long-run equilibrium is more rapid, and the Bayesian information criterion (BIC) is lower. [3]

The baseline model also distinguishes between the impact of an increase in public debt under two different scenarios: first, when a country's external imbalance is at a level deemed "very high" by investors, and second when it remains at a level regarded as "normal". If an economy has no external imbalance (or only a limited imbalance), a 1 percentage point increase in its debt-to-GDP ratio will lead to a rise of just 1.6 basis points in its sovereign bond yield (i.e. coefficient β_1 estimated using the baseline model).

In contrast, if a country has suffered a significant decline in competitiveness, indicated by a rise in its net external liabilities to over 50% of GDP, a 1 percentage point increase in its debt-to-GDP ratio will push its sovereign yield up by nearly two additional basis points, resulting in a final impact of 3.4 basis points (1.6+1.8, i.e. the sum of the coefficients β_1 and β_3 estimated using the baseline model).

The results show that a significant and rapid deterioration in a country's NIIP is seen as a differentiating factor by investors. Thus, public finance variables alone are insufficient to explain the dynamics of sovereign bond yields. External imbalances play an equally important role, and notably help to explain the surge in sovereign yields during the recent financial crisis. This explanation is not inconsistent with the idea that fiscal weakness is to blame, but suggests that investors also take concerns about private sector solvency into account.

According to these results, investors impose a greater penalty on countries with a "twin deficit", that is countries with both fiscal and external deficits. As the majority of euro area periphery countries saw a sharp rise in public debt in the period before the crisis, largely due to a loss of competitiveness, the latter factor played a comparable role to fiscal factors in determining long-run interest rates.

To test the robustness of the results, we estimate the model over the years 1986-2013, in order to exclude the period of high inflation in the early 1980s, after which price growth stabilised at around 1.9%. This change in period does not affect the estimated coefficients. We also verify that the NIIP threshold of −35% is not binding, and find that the coefficient at this threshold is not significant.

T1 Baseline estimations

	Standard model	Baseline model
Long-run coefficient		
Debt-to-GDP	0.014***	0.016***
Real short-term rates	0.715***	0.707***
Debt-to-GDP*(NIIP<-0.50)		0.018***
Short-run coefficient (change)		
Error-correction residual	-0.560***	-0.57***
Debt-to-GDP ratio	0.055**	0.054**
Inflation	-0.307***	-0.302***
Real short-term rates	0.184***	0.165**
GDP	0	0.001
Constant	0.174	-0.066
BIC	**1 271.7**	**1 269.8**
Observations	561	561
Countries	22	22

* p<0.10, ** p<0.05, *** p<0.01, where p is the empirical probability that the model will incorrectly reject the null hypothesis.
Source: Ben Salem and Castelletti Font (2016).

Debt and NIIP: contributions to movements in sovereign bond yields

We then go on to examine the model's ability to reproduce the path of euro area sovereign bond yields from the 2008 crisis onwards. Chart 2 shows the dynamic simulations obtained using the baseline model, and compares them with the observed levels of long-term interest rates for a sample of countries representing the euro area's core members (flight-to-quality) and its periphery (twin deficits). The "in-sample" simulation corresponds to the forecasts for 2008-13, calculated using coefficients estimated over the entire period (1980-2013). The "out-of-sample" simulation, meanwhile, corresponds to the forecasts for 2011-13, calculated using parameters estimated over the period 1980-2010.

The results of the baseline model are particularly satisfactory, both for the in-sample and out-of-sample simulations. The in-sample simulation tracks the observed values very closely, which is particularly relevant since the period was characterised by unusual movements in long-term interest rates that even the most recent empirical literature has difficulty explaining. By way of example, the baseline model replicates fairly accurately the sharp rise in long-term interest rates in periphery countries such as Spain, Ireland and Portugal. It also successfully captures the downward trajectory in long-term interest rates in the larger countries, such as Germany, France and Japan, all of which benefited from a "flight-to-quality" effect.

As expected, the out-of-sample forecasts are of lower quality, although they do still track the observed values reasonably closely. For periphery countries, the simulation again shows a jump in long-term interest rates, although it fails to fully capture the scale of the rise, especially in the case of Portugal. For Germany and France, the simulated trajectory is fairly accurate. However, for Japan, there are sizeable errors.

C2 Actual and estimated sovereign bond yields (baseline model)

(in %)

a) France   b) Germany   c) Japan

d) Spain   e) Portugal   f) Ireland

Actual — IS ···· OOS ····
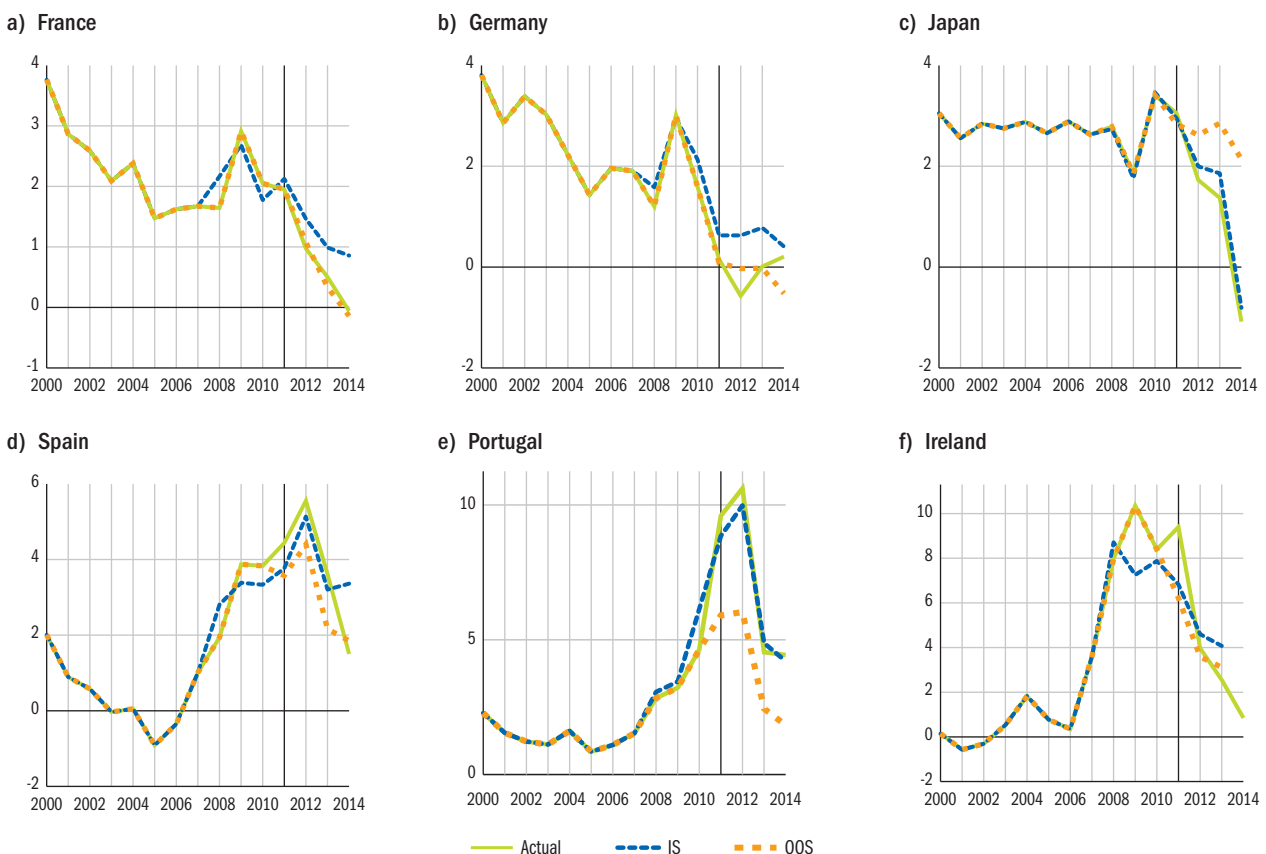
Source: Ben Salem and Castelletti Font (2016).
Notes: IS = In-sample; OOS = Out-of-sample; 2011 = beginning of the OOS simulation.

Conclusion

Our results suggest that, although fiscal imbalances in euro area periphery countries certainly played a role in determining their long-term interest rates, the surge in sovereign yields after 2008 can be better explained by taking external debt into account. The rise in these countries' external liabilities was a major driver behind the abrupt revision of market expectations. One implication that can be derived from this is that adjusting domestic demand and restoring competitiveness would help to make public debt more sustainable in euro area periphery countries.

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