

Expected budget deficits and interest rate swap spreads – Evidence for France, Germany and Italy

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Abstract:

This study analyses whether expected budget deficits have an impact on interest rate swap spreads in France, Germany and Italy. We use monthly deficit forecasts from financial market participants to take the forward-looking behaviour of financial markets into account. Results of a SUR estimation show no significant impact of expected deficits on swap spreads over the whole sample period (1994-2004). However, we find an increase in market discipline for Germany and France since the signing of the Stability and Growth Pact, and for Germany also since the start of European monetary union.

Keywords: Budget deficits, interest rate swap spreads, EMU, Stability and Growth Pact

JEL-Classification: C33, E43, E62, H62

Non-technical summary

The empirical relationship between budget deficits and long-term interest rates remains unclear despite the fact that this issue has already been investigated intensely. The present paper contributes to the discussion by analysing the relationship between governmental budget balances and 10-year interest rate swap spreads for France, Germany and Italy. Interest rate swap spreads measure the government financing costs relative to high-quality private debtors' funding costs. Apart from supply and demand effects, the spread is expected to be affected by the relative default risk of the government versus the private sector. In this respect, we focus on the market disciplinary effects on public finances, ie we investigate whether financial markets respond to expected budget deficits by imposing risk premia on government bond yields.

The analysis expands the existing literature (see eg Goodhart/Lemmen 1999 and Afonso/Strauch 2004) in the following ways: Firstly, the focus is on projected future budget deficit-to-GDP ratios using Consensus Forecast data. The use of expected data rather than current data takes the forward-looking behaviour of financial markets into account. Moreover, the survey data provided by Consensus Economics reflect professional forecasters' monthly expectations and are therefore more timely than most of the previous studies. Secondly, the study concentrates on EMU countries before and after the introduction of the single currency, and thereby extends the country coverage that has focused primarily on the US as single or as benchmark country. Thirdly, we raise the question of whether market discipline has changed over time, specifically with the start of EMU and its preparations in terms of the Stability and Growth Pact (SGP).

Based on an SUR model, estimations covering the entire sample range from January 1994 until July 2004 do not show a significant influence of the predicted deficit ratio for 12 months ahead on the swap spread in any of the three countries. However, we find evidence of a structural break in the relationship with the start of EMU and the signing of the SGP. Estimation results for the corresponding sub-samples indicate that market discipline has increased in France and Germany since July 1997 (after the SGP had been signed) and for Germany also after the start of EMU in 1999. Coefficient estimates

suggest that a one-percentage-point increase in the expected budget deficit ratio decreases the swap spread – which is equivalent to a relative increase of the government bond yield versus the swap rate – by 3 to 8 basis points. We do not find evidence of a structural change in the case of Italy.

We explain these findings of an increase in market discipline with the loss of the ability to monetise public debt since 1999 as member countries lost their monetary sovereignty. Moreover, the transparency-enhancing effect of the SGP might have contributed to the increase in market sensitivity to public finances in France and Germany.

Nicht technische Zusammenfassung

Der empirische Zusammenhang zwischen Budgetdefiziten und Kapitalmarktzinsen ist trotz intensiver Forschung bisher noch nicht eindeutig belegt. Die vorliegende Studie trägt zu der Diskussion bei, indem sie die Beziehung zwischen Budgetdefiziten und zehnjährigen Zinsswapsreads für Frankreich, Deutschland und Italien untersucht. Zinsswapsreads messen die relativen Finanzierungskosten des Staates im Vergleich zu denjenigen von privaten Schuldnern hoher Bonität. Dabei wird angenommen, dass Zinsswapsreads neben Angebots- und Nachfrageeffekten vom Ausfallrisiko des Staates relativ zum privaten Sektor beeinflusst werden. Untersucht wird daher der Marktdisziplinierungseffekt auf öffentliche Finanzen, d. h. wir analysieren, ob erwartete Budgetdefizite die Finanzmarktteilnehmer dazu veranlassen, Risikoprämien auf die Renditen von Staatsanleihen zu verlangen.

Die vorliegende Untersuchung erweitert die bisherigen Studien (vgl. z. B. Goodhart/Lemmen, 1999, und Afonso/Strauch, 2004) um folgende Aspekte: Erstens stehen auf Sicht von 12 Monaten erwartete Defizite (ausgedrückt in Anteilen am BIP) im Mittelpunkt der Analyse. Sie werden aus Umfragedaten von Consensus Forecast ermittelt. Die erwarteten Defizitquoten bieten gegenüber den – in der Literatur häufig verwendeten – realisierten Defiziten den Vorteil, dass mit ihrer Verwendung das vorausschauende Verhalten der Finanzmärkte berücksichtigt werden kann, zumal sie die Prognosen professioneller Finanzmarktteilnehmer widerspiegeln. Zudem ermöglicht die monatliche Verfügbarkeit der Umfrageergebnisse eine zeitnähere Analyse als es in früheren Studien zu dieser Thematik der Fall ist. Zweitens werden in der vorliegenden Untersuchung Länder der Europäischen Währungsunion (EWU) vor und nach Einführung der einheitlichen Währung untersucht. Damit wird der Kreis der bisher untersuchten Zeitperioden und Länder erweitert, unter denen bislang die USA entweder als Einzelstaat oder als Bezugsland dominierten. Schließlich wird der Frage nachgegangen, ob sich der marktdisziplinierende Effekt über die Zeit hinweg mit Beginn der EWU oder mit der Unterzeichnung des Stabilitäts- und Wachstumspakts (SWP) geändert hat.

Die empirische Analyse basiert auf einem SUR-Ansatz. Schätzungen über den gesamten Untersuchungszeitraum von Januar 1994 bis Juli 2004 zeigen in keinem der drei untersuchten Länder einen signifikanten Einfluss der zukünftigen Defizitquote auf den Zinsswapsread. Strukturbruchtests zeigen jedoch an, dass die kausale Beziehung über die Zeit hinweg Änderungen unterliegt. So hat die Marktdisziplin seit der Unterzeichnung des SWP in Frankreich und in Deutschland zugenommen. Für Deutschland kann ebenso seit Beginn der Währungsunion im Jahr 1999 ein Anstieg der Marktdisziplin festgestellt werden. Den geschätzten Koeffizienten zufolge verursacht eine Erhöhung der erwarteten Defizitquote um einen Prozentpunkt einen Rückgang des Swapsreads (gleichbedeutend mit einer relativen Zunahme der Rendite auf Staatsanleihen gegenüber dem Swapsatz) um drei bis acht Basispunkte. Für Italien sind keine derartigen Strukturbrüche erkennbar.

Wir erklären die beobachtete Zunahme der Marktdisziplin mit dem Verlust der autonomen Geldpolitik seit 1999 in den einzelnen Ländern und damit der Möglichkeit zur Schuldenmonetisierung. Darüber hinaus ist anzunehmen, dass der SWP die Transparenz der öffentlichen Finanzen steigert und somit zu der erhöhten Sensibilität der Marktteilnehmer in Frankreich und Deutschland beigetragen hat.

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Expected budget deficits and interest rate swap spreads - Evidence for France, Germany and Italy^{*}

1 Introduction

The empirical relationship between budget deficits and long-term interest rates remains unclear despite the fact that this issue has already been investigated intensely. While some studies find that interest rates tend to increase after a rise in the deficit, others do not (see eg Engen/Hubbard 2004 and references therein). Arguably, this inconclusiveness originates from the use of different data and estimation techniques. Specifically, results seem to depend largely on whether expected or current budget deficits are used as explanatory variables (see Gale/Orszag 2003). Studies that employ expected variables usually find that an increase in the projected budget deficit (primarily expressed as ratio to GDP) is followed by a rise in expected future long-term interest rates (see eg Laubach 2003). This outcome supports Feldstein (1986), who argues that current interest rates incorporate the expected future supply of and demand for financial assets. This novel strand of the literature has focussed on the US; less work has been done for other countries. Analysing European countries is of particular interest in this respect as a regime shift has been caused by the introduction of the monetary union in 1999 and possibly also the establishment of the Stability and Growth Pact in 1997, which reflects a common framework of fiscal rules. This might have implications for the link between budget deficits and interest rates.

We contribute to the existing literature in two respects: Firstly, we use projected (12 months ahead) budget deficit data from a survey of professional forecasters which is available at a monthly frequency. To our knowledge, this is the first study using this dataset and analysing the link between deficits and interest rates on a monthly basis. Secondly, we analyse whether market discipline – defined here as the reaction of financial markets to changes in fiscal variables – has changed over time, specifically

* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the Deutsche Bundesbank. We wish to thank Jörg Breitung, Friedrich Heinemann and a number of colleagues at the Bundesbank, especially Jörg Döpke, Heinz Herrmann, Christian Upper, Jens Weidmann and Guntram Wolff for helpful comments. We would also like to thank the participants of seminars at the Bundesbank, the HWWA, the Centre for Financial Research at University of Cologne and the ECB/Banco de Portugal Latin America Workshop in Lisbon.

with the start of EMU and its preparations in terms of the Stability and Growth Pact (SGP). As survey data on deficits for EMU countries are available for France, Germany and Italy only, we focus on these countries both prior to and after the start of the monetary union. This allows us to analyse whether the disciplinary function of financial markets differs in a monetary union from countries under monetary policy sovereignty. This issue has not been studied in the literature so far. Our focus is on the relative financing costs of the government versus the private sector rather than the overall level of real or nominal interest rates. Relative financing costs are measured in this paper using interest rate swap spreads. This approach allows us to abstract away from monetary policy or business cycle effects which are likely to pertain to both government bond yields and yields of private bonds.

Our empirical analysis focuses on two questions.

- (1) Are interest rate swap spreads affected by future budget deficits expectations?
- (2) Have the introduction of EMU in 1999 or the adoption of the SGP in June 1997 changed the relationship between budget deficit expectations and interest rate swap spreads significantly?¹

The rationale for a change in market discipline after EMU is the fact that countries lose their ability to monetise public deficits once they join a monetary union. As a result financial market participants probably become more sensitive to public finances, as the likelihood of government default rises. Hence rising budget deficits might be associated with higher risk premia on government bond yields than prior to the start of EMU. Conversely, market discipline might be less important prior to joining a monetary union since countries still have the opportunity to monetise their debt.² One popular argument against the hypothesis of a stronger market discipline in a monetary union is that the belief in potential bail-outs of indebted countries might lead to a rather ineffective market discipline. Such bail-outs could occur either through credit by the ECB (eg via a purchase of government bonds) or directly through loans from other national governments or the Community. Although these scenarios are explicitly prohibited by

¹ The SGP implemented preparatory measures in terms of rules and procedures with respect to fiscal convergence.

article 101, associated with article 102 in consideration of corresponding Council Regulations and article 103 of the EC Treaty, it is often argued that these “no bail-out clauses” are not regarded by financial markets as being credible. Were financial market participants to expect countries or the ECB to prevent other member countries from defaulting outright, country specific risk premia on government bonds would be unlikely to adequately reflect the fiscal stance of an individual country.³

Our empirical set-up allows for a direct test of this hypothesis. While our results differ across countries, we find some evidence of an increase in market discipline after the beginning of EMU and the signing of the SGP. The paper is organised as follows. Section 2 briefly addresses theoretical aspects of the link between budget deficits and interest rates and reviews empirical studies on the issue. Section 3 presents the data, the empirical approach and estimation results while section 4 concludes.

2 Theory and literature

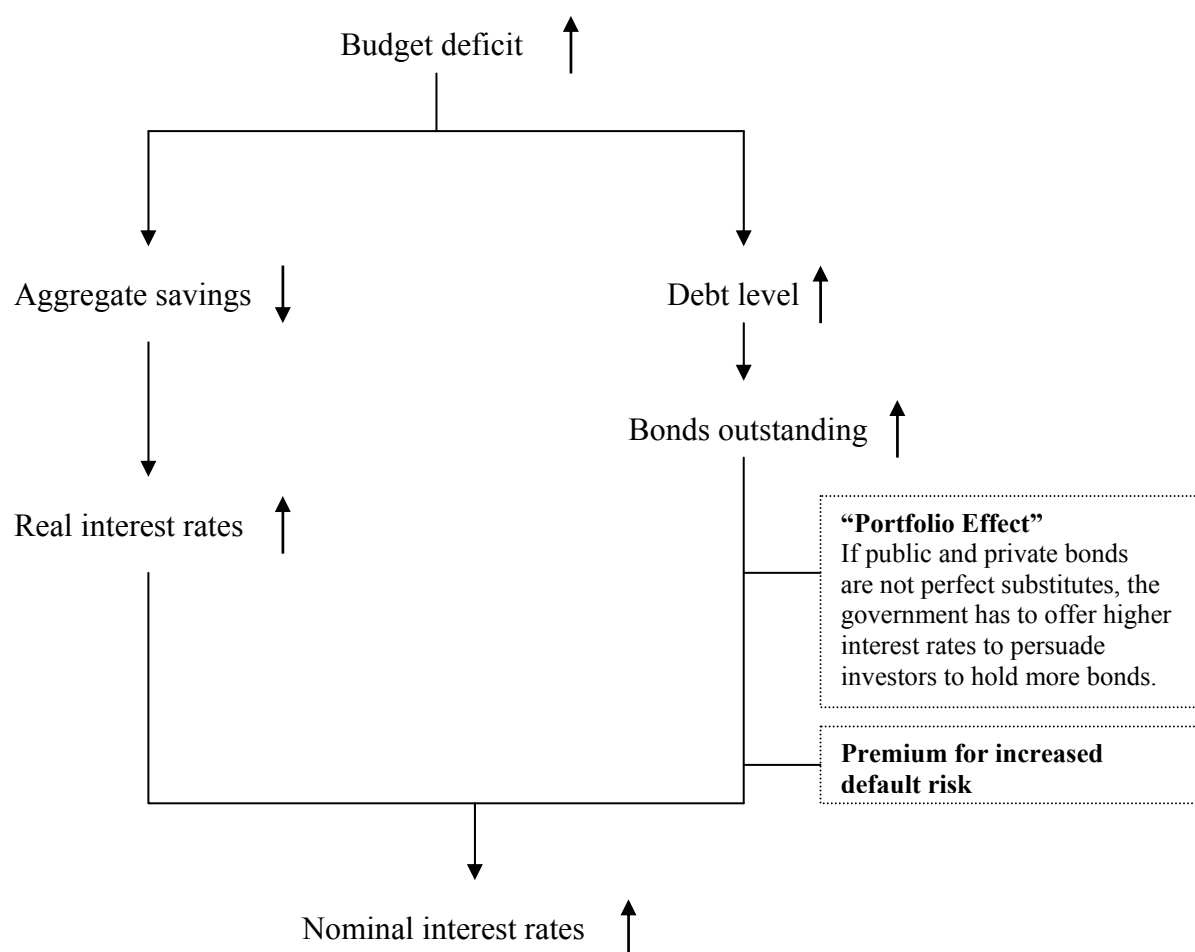
There are two lines of argument as to why budget deficits raise nominal interest rates (see Gale/Orszag 2003 and Figure 1): One channel refers to the effect that *public deficits reduce aggregate savings* in an economy provided private savings do not increase by the same amount (ie in the absence of Ricardian equivalence) and that there are no compensating foreign capital inflows. This decrease in the supply of capital should, in turn, lead to an increase in real interest rates, which affects the whole economy. Quantifying this effect is inherently difficult as the effect of the deficit has to be disentangled from other factors that influence the level of interest rates. For example, in an economic downturn expansionary monetary policy might induce a fall in long-term interest rates which might overcompensate a rise following an expansionary fiscal policy.

The other channel relies on the fact that *deficits increase the accumulated debt of the government* and thus the outstanding amount of government bonds relative to other financial assets (see Appendix A for a short insight into the theoretical relationship between debt and deficit). Assuming that public and private bonds are no perfect

² The bondholders' costs arising from the monetisation of public debt in terms of a decrease in the real bond value show up in inflation expectations rather than in default risk premia (which are the focus of our analysis).

substitutes, a higher interest rate on government bonds would be required in order to convince investors to hold these additional bonds. We call this the “portfolio effect” or “supply/demand effect”. Furthermore, as the debt level of the government increases, the default risk priced into long-term government bond interest rates might rise. While the rise in real interest rates has an impact on the overall interest rate level in an economy, the effect of outstanding bonds only affects the level of interest rates of government bonds relative to private bonds. It is this second effect of deficits that we try to measure in this paper.

Figure 1: Budget deficits and nominal interest rates



Empirical studies dealing with the effects of fiscal variables (or their change) on financial market variables can be roughly classified by their choice of endogenous

³ Instead, the EMU-wide budget deficit might affect the default risk of each country.

variables. Several of them focus on the *level of the real or nominal (long-term) interest rate* in a specific country or across a sample of countries (see eg Upper/Worms (2003); Brook (2003) and Gale/Orszag (2003) provide comprehensive surveys). One prominent example is Laubach (2003): Using long-term expectations for both budget deficits and long-term interest rates for the US (which should not be affected by business cycle or monetary policy effects) he finds that a one-percentage-point increase in the projected budget deficit raises real interest rates by roughly 25 basis points. A second strand of the literature deals with *yield differentials* in Europe with respect to Germany (eg Codogno et al (2003)). They usually find some evidence that fiscal variables other than liquidity premia explain the yield spreads. Default (or credit) risk of government bonds is analysed in recent studies that use *interest rate swap spreads* as the dependent variable (see Goodhart/Lemmen (1999) or Afonso/Strauch (2004)). A swap spread measures the relative funding costs of the government compared to the private sector. Goodhart/Lemmen (1999) find that the swap spread of a country is significantly influenced by changes in the actual debt ratio.

We extend the existing literature in the following ways. Firstly, we focus on projected future budget deficit ratios using a novel data set. We thereby take account of the argument forwarded by Feldstein (1986) that it is the projected rather than the current level of the deficit that influences long-term interest rates. Gale/Orszag (2003) demonstrate in their review of the literature that the results of the deficit-interest rate link depend crucially on whether forward-looking data are used. Secondly, our data set is monthly, which allows us to study the financial market effects of changes in the budget outlook in a more timely manner than analyses that rely on annual data.⁴ This factor seems especially important for the recent past because the markets (and the public in general) focus increasingly on news about whether a country is able to stay below the 3% ceiling imposed by the EC Treaty and enforced by the SGP. Thirdly, we extend the country coverage by concentrating on EMU countries before and after the introduction of the single currency.⁵ Fourthly, we consider a time-varying influence of the budget

⁴ There are some studies that convert yearly fiscal variables into a higher frequency. Codogno et al (2003), for example, use monthly debt/GDP data in their estimation obtained through linear interpolation of annual data.

⁵ The focus of studies on interest rate effects of public deficits has been on the US so far (see for instance Brook's (2003) survey on the literature, where 5 out of 11 listed articles were on the US as an

deficit on swap spreads, thereby taking explicitly account of potential changes that the introduction of EMU might have induced.

3 Empirical approach

3.1 Data and estimation method

The empirical set-up is based on a seemingly unrelated regressions (SUR) model using monthly data for France, Germany and Italy. The panel ranges from January 1994 to July 2004.⁶ Following Goodhart/Lemmen (1999) and Afonso/Strauch (2004), our dependent variable is the swap spread in each country.⁷ It is expressed as the difference between the fixed leg (=swap rate) of a fixed-for-floating interest rate swap and the Treasury bond yield of the same maturity – in our case 10 years. In particular, the swap rate is the interest rate paid among (AA-rated) private banks for the exchange of interest payments (fixed for floating) based on a notional amount.⁸ As changes in real interest rates and inflation expectations affect both government bond yields and swap rates, the spread between both should primarily reflect different risk premia (see Figure 2). Whereas the swap rate includes the banking sector risk premium, the Treasury bond yield incorporates the default risk of the government sector.⁹ Apart from risk premia, the spread is influenced by supply/demand effects. A widening spread reflects an improvement of the relative financial standing of the government (et vice versa).¹⁰ The

individual country). Studies dealing with EMU countries are either constrained to the period before/after the start of the EMU or analyse EMU countries together with further countries.

⁶ Our choice of countries and sample length are predetermined by the availability of forecast data for the budget deficits.

⁷ The swap spread as dependent variable allows us to ignore exchange rate risk prior to 1999, which would have been introduced if yield spreads between bonds issued by national governments in their national currencies were investigated.

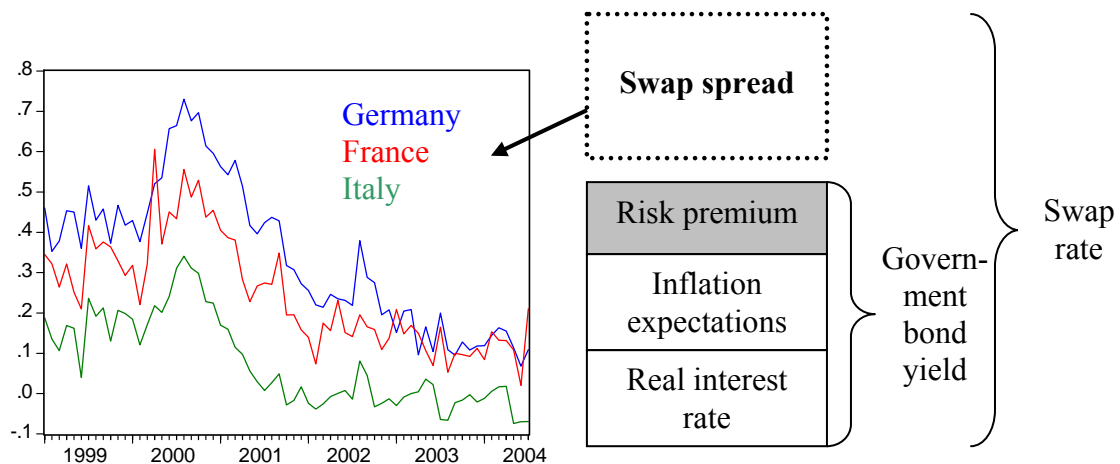
⁸ Remolona and Wooldridge (2003) report that the euro interest rate swap market is one of the largest and most liquid financial markets in the world and that the major traders tend to have credit ratings of at least AA.

⁹ The default premium of the banking sector should be much smaller in an interest rate swap than on a loan as in the former the principal is just notional (only interest payments are exchanged; see Hull 2000). There is even evidence that market participants currently consider the swap market to be virtually risk-free. He (2001) reports that the counterparty risk in swap agreements became less important over time due to the implementation of industry practices on netting and collateral arrangements (so-called Master Swap Agreement). However, in the early stages of development of the swap market in the 1990s counterparty risk is believed to have played a role (this is also reported in Apedjinou 2003).

¹⁰ Among financial market participants, changes in the swap spread are typically associated with fiscal concerns, see eg a quote on Bloomberg on 1 May 2003: “Swap spreads always go up and down with the budget deficit.” [...] said Tim Bond, chief global strategist at Barclays Capital.”

risk in the banking sector might also have an impact on the swap rate in certain periods (see Apedjinou 2003) in terms of a widening swap spread in the case of a risk increase in the private financial sector and vice versa.¹¹

Figure 2: Government bond yields, swap rates and swap spreads



We use survey data as the fiscal explanatory variable. These data are compiled by Consensus Economics and contain private sector economists' forecasts on a number of macroeconomic variables, including the budget deficit both for the current and the following year.¹² These data should be particularly well suited for analysing the impact in financial markets as they represent the actual views of financial market participants. We believe that this is a major advantage these data enjoy over, for instance, forecasts from international organisations or government institutions. Furthermore, they are available at a higher frequency and therefore reflect changes in the financial market's view of future public finances in a more timely manner. However, to our knowledge, these data have not been used so far to study the interest rate effects of budget deficits. To keep the forecasting horizon constant we constructed 12-months-ahead projections of the deficit ratio (see Appendix B for details about the construction).¹³

¹¹ Examples are the banking crisis in Sweden in the early 1990s and the LTCM crisis in 1998.

¹² For a detailed comparison of Consensus Forecast data with IMF and OECD macroeconomic forecasts see Batchelor (2000).

¹³ In doing so, we take into account the fact that the information set available to forecasters decreases with the length of the forecasting horizon. The estimation with unweighted forecasts (varying horizons) delivers similar results. However, we believe the constructed deficit ratio is superior to the

In accordance with the relevant literature,¹⁴ we include the following explanatory variables in our estimation: the lagged swap spread, the US swap spread, the yield differential between AA and AAA-rated bonds of global financial institutions (AA spread hereafter) and the steepness of the yield curve. The US swap spread is chosen to take account of the US financial market development that might influence the domestic swap spread. The AA spread is included in the estimation in order to control for a potential time-varying banking sector risk inherent in swap spreads. The steepness of the yield curve in terms of the spread between the 10-year government bond yield and the 3-month yield mainly reflects a demand factor for interest rate swaps. The steeper the yield curve is the lower the swap rate should be as the demand for the fixed rate in exchange for a variable interest rate increases (as corporates issue fixed coupon bonds and then enter a fixed-for-floating swap to take advantage of lower short term interest rates) (see Cooper/Scholtes 2001).

We also include a dummy variable in the country equation for Italy for the period 1994:1 – 1996:12 to take account of the Italian withholding tax in that period (see eg Favero et al (1997)). This tax on Italian government bonds had been levied on non-resident investors (from countries lacking a reciprocal tax treaty with Italy) and had resulted in an unusually negative swap spread in Italy until its abolition in 1997.¹⁵

A first descriptive analysis of the data shows that the correlation coefficients between deficit ratio and swap spread have the expected negative signs for all three countries (France: -0.53, Germany: -0.65 and Italy: -0.72). Thus, a higher expected deficit ratio is associated with a decreasing swap spread, reflecting a worsening of the relative solvency of the government versus private debtors.

pure survey projections as the forecast horizon remains constant at 12 months and takes changes in the available information set over time into account.

¹⁴ See eg Apedjinou (2003), Goodhart/Lemmen (1999), Afonso/Strauch (2004) and Cooper/Scholtes (2001).

¹⁵ Non-residents were able to reclaim the 12.5 percent tax on interest payments, which was withheld at the source, from the Italian Finance Ministry. However, as the reimbursement procedure was long (taking up to 60 days) and cumbersome, the market traded Italian government bonds as if the tax could not be reclaimed (thus adding up to 100 basis points on the required yield) (see Institutional Investor Magazine, 'John Meriwether by the numbers', November 1996). Therefore, Italian government bond yields exceeded the lira swap rate (there was no tax on swap contracts), resulting in a negative swap spread. The spread narrowed subsequently and finally became positive with the abolition of the tax on non-residents in 1997.

In line with recent studies (see Codogno et al 2003 and Afonso/Strauch 2004) we estimate an SUR model which allows for country specific parameters. Tests for the equality of parameters across country equations gave mixed results (see Appendix C for the outcomes of the Wald tests) – whereas equality could not be rejected for some variables, it could be rejected for others. Hence, country-specific coefficients should not be suppressed. We take this as evidence in support for estimating an SUR model rather than a (fixed effect) panel and present country specific parameter estimates for all variables in the system. The SUR system has the following form:

$$SW_i^t = \beta_{2i} SW_i^{t-1} + (1 - \beta_{2i}) [C_i + \beta_{1i} DEF_i^t + \beta_{3i} SW_US^t + \beta_{4i} AA_Spread^t + \beta_{5i} YCurve_i^t] + u_i^t$$

where i denotes the country index, t is the time index and u_i^t the error term.

SW_i^t := Swap spread of country i .

C_i := Country-specific constant.

β_{ji} := Country-specific coefficient with $j = 1, 2, 3, 4, 5$.

DEF_i^t := Country-specific projected deficit ratio.

SW_US^t := US swap spread.

AA_Spread^t := Spread between AA- and AAA-rated private banks.

$YCurve_i^t$:= Steepness of the yield curve.

The disturbances and explanatory variables within each country equation are assumed to be uncorrelated. However, errors are assumed to be correlated contemporaneously across equations. Thus, heteroscedastic error terms and cross-sectional correlation are allowed for (see Appendix C for the results of likelihood ratio tests). The empirical set-up is inspired by Codogno et al (2003) in that it allows for a slow dynamic adjustment of the swap spread to its long-run equilibrium. This takes account of the high persistence of the swap spread time series reflected in a high significance of the lagged endogenous variable.

3.2 Estimation results

3.2.1 Baseline regression

Table 1 presents the results of our baseline estimation. The deficit variable has the expected negative sign for Germany and France, but is not statistically significant in any of the country equations. The lagged endogenous variable is highly significant for all countries which signals a high persistency of the swap spread. The US swap spread has significant explanatory power for the French and the German swap spread. As expected, the yield curve has a significantly negative impact on the swap spread. The AA spread significantly influences the swap spread in Germany and France but is uniformly negative in sign. This suggests that perceived banking credit risk is not an explanatory component of the difference between the swap rate and the government bond yield. These initial results are in line with the recent anecdotal evidence of a lack of market discipline.

To see whether our results are distorted by endogeneity of the deficit ratio, we conducted the following two-step procedure as a robustness check. Firstly, for each country the deficit ratio was regressed on its own lagged value as well as on the lagged remaining explanatory variables of the system. Secondly, the fitted values of the regressions were inserted in the SUR model instead of the actual deficit ratios. The estimation results for the deficit are essentially the same as with actual data, indicating that reverse causality is not a problem in our set-up.

We also checked for a possible impact of the business cycle on the swap spread by including a constructed output gap on the basis of the corresponding Consensus Forecast data for CPI and real GDP growth. However, results remained unchanged.

Table 1: Regression results

	Germany	France	Italy
Constant	0.44***	0.11	0.28
Deficit ratio	-0.03	-0.004	0.02
SW(-1)	0.64***	0.31***	0.79***
SW_US	0.21**	0.30***	0.04
AA_Spread	-0.25***	-0.12***	0.04
Yield curve	-0.08***	-0.02**	-0.19***
Dummy Italy	./.	./.	-0.12**
S.E. of regression	0.06	0.06	0.13
Adj. R2	0.84	0.71	0.83
No. of obs	127	127	127

Notes: Sample period: 1994:1-2004:7. *(**)[***] = 10 % (5 %) [1 %] significance level. Reported coefficients show the long-run effects calculated as $\beta_{ji} / (1 - \beta_{2i})$; $j = 1, 3, 4, 5$.

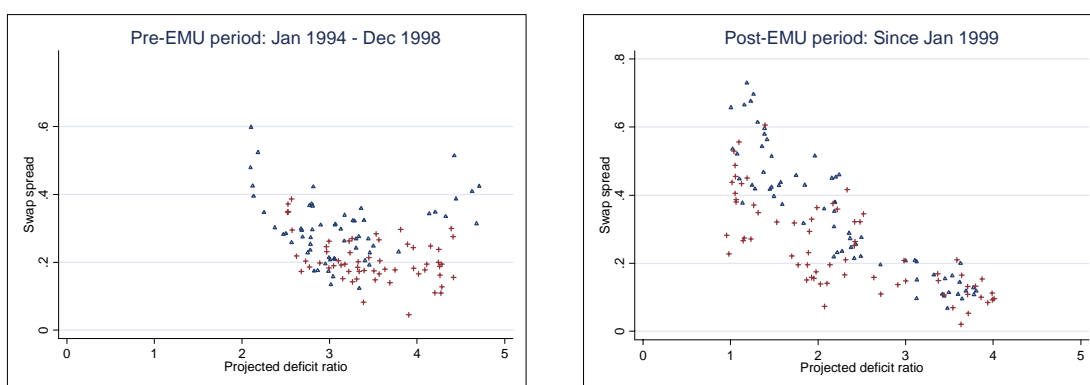
3.2.2 Stability tests

The above estimation over the whole sample period assumes constancy of the estimated parameters. However, the period under review is marked by significant changes in the economic and institutional environment which might have induced changes in the sensitivity of the swap spread with regard to budget deficits. One important change is the introduction of European Monetary Union, which led to a single monetary policy. This event might have an impact on the default risk as perceived in financial markets as EMU member countries gave up their independent monetary policy and thus their ability to monetise their public debt. Furthermore, on the institutional side, the SGP was signed in 1997 aiming to prevent countries from excessive borrowing. Against this background, the interaction between interest rates and budget deficits may have changed over time. Casual inspection of the underlying time series of swap spreads and projected deficits in the different countries also suggests that one can

identify different regimes in the relationship between both variables (see Figure 3 for France and Germany).

While the scatter plot for France and Germany in the period prior to EMU (left scatter plot; January 1994–December 1998 period) shows no clear relationship, a negative correlation between projected deficit ratios and swap spreads is more evident for the EMU period (right scatter plot). Similar pictures emerge if the break date is set in July 1997 (after the SGP was signed). Contrary to this finding, a look at the scatter plots for Italy does not show evidence of a structural break.

Figure 3: Swap spreads and projected deficit ratios in sub-samples



Note: Data for France are indicated by a plus; data for Germany are indicated by triangles.

Apedjinou (2003) presents empirical evidence of structural changes in the relationship between swap spreads and their determinants (he focuses on the short interest rate, liquidity and counterparty risk) for the US market. However, he did not include fiscal policy variables in his estimation. We support his finding of a structural break for our regression as a Chow test carried out for each country separately significantly rejects the null hypothesis of no break for both January 1999 (EMU start) and June 1997 (signing of the SGP). Hence there is evidence of an instability in the estimated relationship between the swap spread and its determining factors. In the following we analyse whether this time-variation holds specifically for the deficit variable and whether it is induced by EMU and/or the adoption of the SGP.

Our first hypothesis is that the introduction of the single monetary policy has led to a larger impact of budget deficits on interest rates as countries lose their ability to

monetise their debt. To control for a potential effect of the start of EMU on our regression results we included dummy variables for the pre- and post-January 1999 period in our SUR system for all countries to identify possible changes in the parameters of the deficit variable. More precisely, a pre- and a post-EMU dummy were constructed. The pre-EMU dummy takes the value “1” prior to January 1999 and “0” thereafter, while the post-EMU dummy reads one and zero in reverse order. Both dummies were multiplied by each country-specific deficit variable. These interaction terms were included into the SUR system at the same time. By doing so, we could identify separate deficit parameters for the respective sub-periods. Table 2 shows the estimated deficit coefficients before and after January 1999.

Table 2: Estimation results for sub-periods – Start of EMU

Scenario EMU	Before January 1999			Since January 1999		
	Coef.	Std. Error	T-Stats	Coef.	Std. Error	T-Stats
Deficit – Germany	-0.005	0.02	-0.29	-0.05***	0.02	-2.68
Deficit – France	-0.001	0.01	0.00	-0.02	0.01	-1.43
Deficit – Italy	0.08	0.06	1.42	0.19	0.12	1.59

The results suggest that, at least in the German case, the start of EMU has led to an increase in the importance of the deficit variable, as the deficit coefficient becomes highly significant upon entry into EMU. The point estimate for the coefficient implies that a one-percentage-point increase in the German deficit ratio is followed by a decline in the German swap spread by 5 basis points. This reflects a relative increase of the German government bond yield compared to the swap rate. While the post-1999 coefficient for France also has the expected negative sign, it is not statistically significant. Furthermore, the estimation result signals that the impact of deficits on the swap spread is of a smaller magnitude than in Germany. Our results do not show a change in the estimated relationship for Italy, as both pre- and post-1999 deficit coefficients are not statistically significant. However, as the split sample periods are quite small, results should be interpreted with care.

Taken together, we find some weak support for the hypothesis that EMU entry has increased the impact of public deficits on interest rates. The loss of the countries' ability to monetise public deficits might have prompted financial markets to incorporate an additional risk premium in government bonds – at least in Germany and France. Results for Italy do not suggest a time-varying influence on swap spreads. This outcome is puzzling. On the one hand, Italian budget deficits were below the 3% ceiling in the period directly following their entry into EMU (in contrast to Germany and France). This might have contributed to a more subdued reaction of financial markets. On the other hand, the Italian debt level is much higher than that of Germany and France, suggesting that financial markets should focus on Italian budget balances. The results also cast doubt on the validity of the argument that risk premia are likely to decrease in a monetary union due to a potential bail-out by sovereigns, the ECB or national central banks. However, this does not necessarily mean that the no bail-out clause is credible. On the contrary, it might reflect the fact that country-specific swap spreads do react to an EMU-wide budget deficit rather than to the national deficit. In order to draw definite conclusions on the credibility of the no bail-out clause one would have to test for cross-country effects or an impact of EMU-wide public finances.

Besides the introduction of EMU, one could imagine that the SGP, which has brought about a more strict application of the fiscal Maastricht criteria in practice, may have increased public awareness of public finances since its signing in June 1997. To test for a potential impact, we included dummies to identify a pre- and a post-June 1997 period. The results are similar to those in the EMU case. They suggest (see Table 3) that the impact of the deficit ratio on interest rates has gained in importance for both Germany (as in the EMU scenario) and France. In both countries, the post-break deficit coefficients become significant, and Wald tests indicate that the difference between the pre- and post-SGP deficit coefficients are statistically significant. Interestingly, the German pre-SGP deficit coefficient becomes weakly significant, which might be related to our choice of sub-samples. For Italy, again, no impact of institutional changes on the deficit-interest rate relationship can be found.

Table 3: Estimation results for sub-periods – Signing of SGP

Scenario SGP	Before July 1997			Since July 1997		
	Coef.	Std. Error	T-Stats	Coef.	Std. Error	T-Stats
Deficit – Germany	-0.03*	0.01	-1.80	-0.08***	0.02	-4.79
Deficit – France	-0.01	0.01	-0.69	-0.03*	0.01	-1.73
Deficit – Italy	0.03	0.05	0.68	-0.08	0.09	-0.88

We offer two potential explanations for these empirical results. Firstly, the SGP is likely to facilitate monitoring by market participants due to the Pact's surveillance component, which creates transparency in the national fiscal developments.¹⁶ Hence, it has become easier to assess government bonds' solvency in financial markets, and sensitivity to public deficits may thus have grown over time. Secondly, our finding of only weak evidence of market discipline prior to the creation of the SGP speaks in favour of fiscal rules as they seem to strengthen the market disciplinary effect, especially in a monetary union. Hence, our pre-SGP results cast doubt on those commentators who cited the disciplinary function of financial markets as an argument against the creation of the SGP.

4 Conclusions and outlook

We investigated for France, Germany and Italy whether the projected budget deficit ratio for 12 months ahead has a negative impact on the swap spread, which could be interpreted as a disciplinary effect on fiscal policy. Our results of SUR model estimations varied with respect to countries and time. We did not find a significant impact of the expected deficit ratio on the swap spread over the whole period under consideration (January 1994 – July 2004). However, at least for Germany and France, the deficit ratio seems to exert an increasing influence over time. The different point estimates before and after EMU entry imply for Germany, as an EMU member, that a one-percentage-point increase in the projected budget deficit ratio decreases the swap spread by 5 basis points. This outcome suggests that market discipline has become more

¹⁶ See Dabán et al 2003.

important along with EMU membership. It supports the hypothesis of increasing perceived default risk due to the loss of the ability to monetise public debt following the changeover to a single monetary policy.

Moreover, estimation results suggest that a rise in Germany's and France's deficit ratio of one percentage point after the SGP was signed is followed by a fall in the swap spread by 8 and 3 basis points respectively. We see possible reasons for this result in the transparency-enhancing function of the SGP and argue that the lack of market discipline prior EMU is evidence in support of the establishment of the SGP. Judging from recent developments in public finances, it seems reasonable to assume that financial markets are paying growing attention to the risks caused by increasing public debt: the countries under review are breaching the 3% deficit limit. France and Germany are involved in an ongoing excessive deficit procedure, although held in abeyance, and there is a discussion about national fiscal rules in addition to the SGP. Furthermore, long-term demographic developments are expected to increase future debt levels in some of the EMU countries.

When comparing our results with other studies, one should recall that we measure just one of two channels through which budget deficits can influence interest rates. Our focus is solely on a potential market disciplining effect through a rise in the risk premium and on supply/demand effects. Studying the entire effect would include the estimation of changes in the real interest rate. Thus, our study should not be taken to draw conclusions on the overall magnitude of an interest rate increase following a rise in budget deficits. Rather, the overall effect is likely to be higher as a potential rise in real interest rates must be added to the changes in the swap spread. It remains an open question, however, whether the default risk premium priced into government bonds suffices to efficiently prevent excessive debt accumulation. This "second" half of the market discipline hypothesis is left for future research.

Appendix A

As mentioned above, one way for deficits to influence interest rates is through their effect on the outstanding amount of debt. The stock of general government debt at the end of period t (B_t) consists of the debt of the preceding period (B_{t-1}) and the current deficit (D_t). The latter comprises interest expenditure on public debt of the preceding period (iB_{t-1})¹⁷ less the positive primary budget balance (S_t) (see the following equations).

$$B_t = B_{t-1} + D_t \quad (1a)$$

$$B_t = B_{t-1} + iB_{t-1} - S_t \quad (1b)$$

In other words, the public deficit is the difference between the stocks of public debt of the current and the preceding period. The deficit rises with a decreasing primary surplus and increasing debt service payments. The indicators of sound public finances that are highly relevant for EU countries are deficit and debt expressed as ratios to GDP (indicated in small letters; see Chart A for the development of deficit and debt ratios in France, Germany and Italy). Then, the budget balance reads as in (1c), where g denotes the growth rate of GDP:

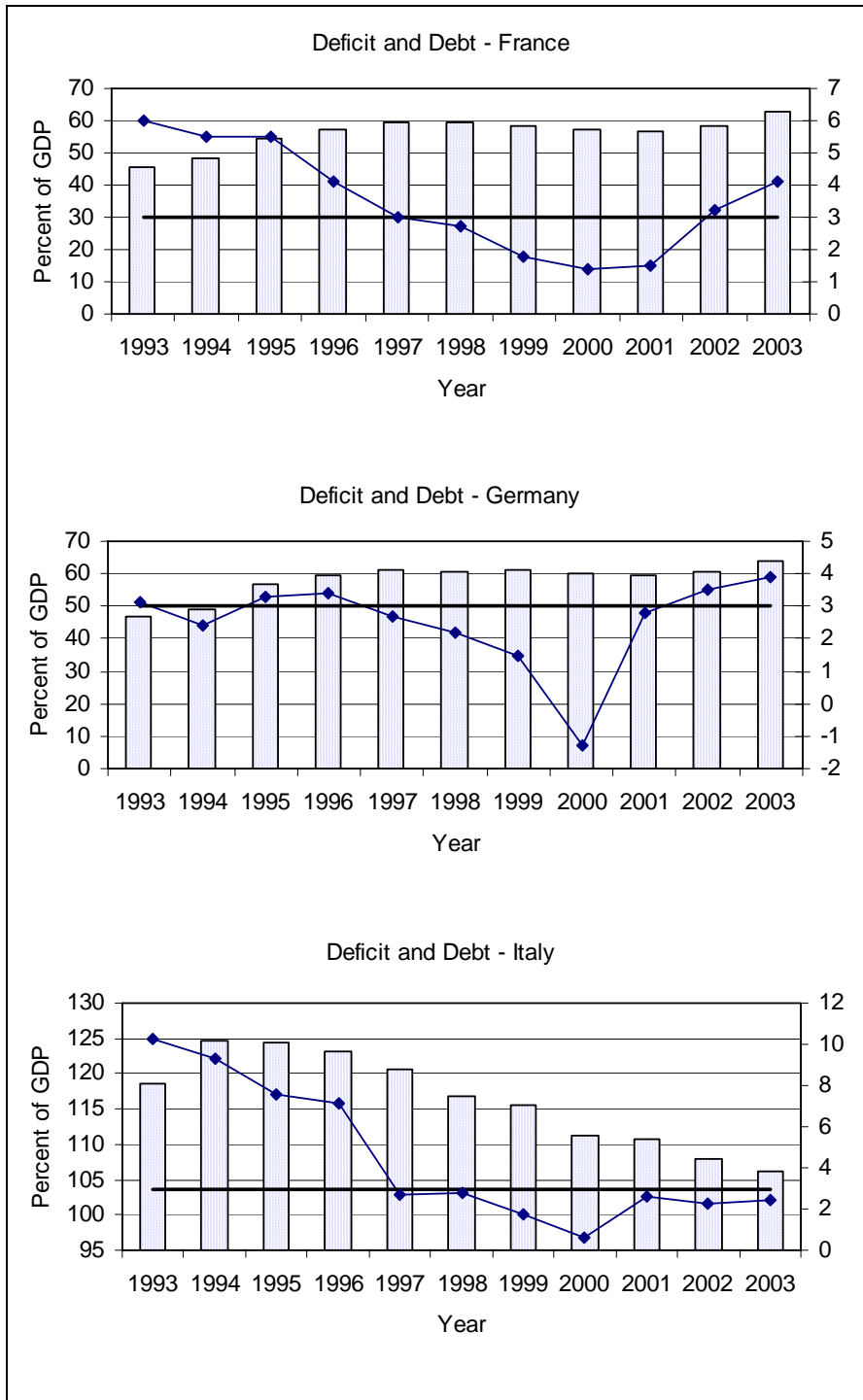
$$b_t = b_{t-1} \frac{1+i}{1+g_t} - s_t \quad (1c)$$

From (1c) we deduce that (a) provided a primary surplus exists, the debt ratio is prevented from exploding due to interest payments, (b) a rise in the debt ratio due to interest expenditure is counteracted by the diminishing effect of GDP growth on it. An overcompensation occurs if the GDP growth rate exceeds the interest rate on public debt. Hence, to avoid a rapid increase in the debt ratio, it should be ensured that interest rates on public debt are not subject to a sharp rise.¹⁸

¹⁷ i denotes the interest rate relevant for the stock of debt of period $t-1$. There is no time subscript as the interest rate is calculated implicitly since government bonds have different maturities. In particular, the interest rate is derived from interest rate expenditure divided by the preceding period's stock of debt. In other words, the interest rate does not reflect an average interest rate for a specific year.

¹⁸ In fact, long-term sustainability of public finances can be better captured by an intertemporal budget constraint on the state. This approach takes intergenerational redistribution of burdens through government activity into consideration, particularly under the aspect of demographic changes ("ageing society"). See Deutsche Bundesbank 2001.

Chart A



Note: Deficit ratio = line (right scale), 3 % deficit threshold = solid line (right scale), debt ratio = bar (left scale). The sharp increase in the German deficit ratio between 2000 and 2001 associated with a contemporary fall in the debt ratio is due to debt redemption out of receipts from the auction of UMTS licenses. Similarly, deficit/debt adjustments generally trigger such contrary developments of deficit and debt ratio. Source: New Cronos.

Appendix B

Consensus Economics provides forecasts for the public sector budget balance in absolute numbers (in € bn since Sept 2001, in national currency before). As the European criterion for budgetary discipline is formulated in terms of the deficit-to-GDP ratio (deficit ratio for short) and as the expectations held by the market participants as well as the public are likely to rely on this ratio rather than on the deficit volume, we construct expected deficit ratios. In order to generate projected nominal GDP figures, we used the real GDP growth and CPI inflation forecasts, which are available for each month for the current and the following year, also provided by Consensus Economics. In order to keep the forecast horizon constant (at 12 months) we calculate a weighted average of the deficit ratios for year t and t+1.

For each month i ($i = 1, \dots, 12$) of year t ($t = 1994, \dots, 2004$) we performed the following calculation, where

D_i^t : Forecast for public sector budget balance in month i (in € bn) for year t

y_i^t : Forecast for real GDP growth in month i for year t

π_i^t : Forecast for inflation rate in month i for year t

Y^{t-1} : Actual nominal GDP of year $t-1$ (in € bn) (*Source: IFS*)

\hat{Y}^t : Projected nominal GDP on the basis of Y^{t-1} , y_i^t and π_i^t .

$$\text{Budget deficit ratio: } d_i^t = \frac{D_i^t}{\hat{Y}^t} = \frac{D_i^t}{Y^{t-1}(1 + y_i^t + \pi_i^t)}$$

and equivalently for t+1

$$d_i^{t+1} = \frac{D_i^{t+1}}{\hat{Y}^{t+1}} = \frac{D_i^{t+1}}{\hat{Y}^t(1 + y_i^{t+1} + \pi_i^{t+1})} = \frac{D_i^{t+1}}{Y^{t-1}(1 + y_i^t + \pi_i^t)(1 + y_i^{t+1} + \pi_i^{t+1})}$$

In order to generate a “synthetic” one-year-ahead forecast for the budget deficit ratio we computed a weighted average of d_i^t and d_i^{t+1} for each month i in the form

$$d_i = \frac{(12 - i)d^t + id^{t+1}}{12} .$$

Appendix C

Likelihood ratio test – results

Test No.	H ₀	H ₁	Log likelihood value under H ₀	Log likelihood value under H ₁	At 5 % critical value of Chi-squared distribution
1	HOM	HET	394.91	448.92	H ₀ to be rejected
2	HET	HET + CSC	448.92	471.26	H ₀ to be rejected
3	HET + CSC	HET + CSC + AR	471.26	474.68	H ₀ not to be rejected

Note: H₀ (H₁) := Null hypothesis (Alternative hypothesis)
 AR := Autocorrelation in the error terms
 CSC := Cross-sectional correlation
 HET := Heteroscedasticity
 HOM := Homoscedasticity

Wald test – results

H ₀	Whole period: Jan 1994 – Jul 2004		EMU scenario: Break in Jan 1999		SGP scenario: Break in Jul 1997	
	chi ²	Prob > chi ²	chi ²	Prob > chi ²	chi ²	Prob > chi ²
CONSTANT	3.03	0.22	8.05	0.02	12.64	0.00
DEF	1.18	0.56	./.	./.	./.	./.
DEF before break	./.	./.	2.21	0.33	3.15	0.21
DEF after break	./.	./.	7.74	0.02	5.91	0.05
SW ^{t-1}	32.44	0.00	42.91	0.00	45.27	0.00
SW_US	11.83	0.00	8.01	0.02	9.62	0.01
AA_Spread	2.22	0.33	0.90	0.64	3.00	0.22
YCurve	4.35	0.11	12.08	0.00	16.17	0.00

Note: H₀: Coefficients of regressors are identical across countries.
 Break is implemented as two interaction terms in the estimated system.
 := H₀ rejected. Interpretation: Coefficients differ across countries.

Appendix D

Data sources

	Description	Source
Budget deficit	Projected one-year ahead budget deficit in % of projected GDP (see Appendix B for details)	Consensus Economics
Swap spread	Spread between yield of the fixed leg of a 10-yr interest rate swap and the yield of the 10-yr benchmark bond	Thomson Financial Datastream
Yield curve	Spread between the yield of the 10-yr benchmark bond and 3-month money market interest rates	Thomson Financial Datastream
AA spread	Spread between yield of the MSCI Financial Corporations AA Index (DS Code: MBCF2AE) and the AAA Index (DS Code: MBCF3AE)	Thomson Financial Datastream

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