MARKET-INDUCED FISCAL DISCIPLINE:
IS THERE A FALL-BACK SOLUTION FOR RULE FAILURE?

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Introduction

Sound fiscal policies are considered a precondition for monetary and financial stability. Fiscal misbehaviour may undermine the credibility of the Central Bank's commitment to monetary stability. A high public debt may induce pressure for both *ex ante* bail-out (refraining from raising interest rates under inflationary tensions) and *ex post* bail-out (debt relief through unanticipated inflation). Unsustainable fiscal policies have often been at the root of episodes of high inflation or even hyperinflation.

In situations where a number of governments share the same currency and retain autonomy in matters of public expenditure, taxation and recourse to debt, the stability of monetary and financial conditions represents a public good. Governments individually face a less steep interest rate schedule in a monetary union than under flexible exchange rates. There is an incentive for each government to exploit the benefits accruing from the discipline of others without complying with the rules.

Hence the need for discipline-inducing mechanisms.

The pros and cons of fiscal rules at the national level have long been debated. Both theoretical and empirical work reached ambiguous results.[1] However, when European monetary union (EMU) was devised, the need for rules counteracting undisciplined fiscal behaviour was widely recognised.[2] Several of the founding members of the EMU had bad fiscal records. Past experience suggested not relying on market mechanisms. In 1992, the Treaty of Maastricht set the fiscal criteria to be met in order to join EMU. Limits on deficit and debt levels were introduced (at 3 per cent and 60 per cent of GDP, respectively). In 1997, the Stability and Growth Pact (SGP) complemented these criteria by setting a medium term target of a budgetary position close to balance or in surplus, with a view to permanently restraining deficit and debt while allowing room for fiscal stabilisation.

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[1] See Kopits and Symansky (1998), Balassone and Franco (2001a), Giordano (2003) and the papers in Banca d'Italia (2001).

[2] See Committee for the Study of Economic and Monetary Union (1989) and European Commission (1990). Canzoneri and Diba (2001, p. 71) note that "… the central bankers who wrote the Delors Report knew that it was impossible to make the ECB totally immune from external pressures".

Over the Nineties EMU fiscal rules were quite successful in inducing all EU countries to improve their budgets. The euro area deficit declined from about 5 per cent of GDP to 1 per cent in 2000. However, in recent years new priorities came to the fore. In particular, the issue of tax reforms gained prominence and tax cuts were introduced in several countries. Together with the slowdown of the economy in 2002, these cuts reversed the deficit reduction process.

In 2002 and 2003 France, Germany, Greece, the Netherlands, Portugal and Italy recorded budget deficits which were clearly inconsistent with the close-to-balance clause of the SGP. In most of these countries the deficit reached or exceeded 3 per cent of GDP. Moreover, one-off measures have been extensively used to meet budgetary targets. New accounting and financial operations – which, even if formally consistent with EMU rules, do not improve the underlying public finance conditions – have also been relied upon.

The SGP is now widely criticised. It is argued that it reduces budget flexibility, discourages public investment, disregards the aggregate fiscal stance and works asymmetrically over the cycle.[3] The current framework may come under further pressure because of the EU enlargement.

The debate about the future of the SGP is quite open. Not all the criticisms are warranted and no alternative rule clearly dominates the present one. In the end, the European governments may retain the SGP in view of its capacity to combine fiscal discipline and flexibility, of the budgetary risks coming from population ageing and of the difficulty to reach an agreement about an alternative set of rules. However, there is also the possibility that the SGP survives but becomes an empty shell.

In this context it is important to consider whether there is a fall-back solution, that is whether financial market mechanisms linking higher deficits to higher interest rates can put pressure on governments to correct fiscal misbehaviour.[4] This implies reconsidering, in the light of recent developments, the debate that took place in the late Eighties when the EMU was designed.

In this paper, we tackle this issue in three steps. First, we examine the institutional requisites for a market mechanism to be effective at disciplining fiscal policy and check whether such requisites are met in the current European setting (section 1). Second, we explore the theoretical and empirical link between a country's fiscal record, the rating of its debt and the risk premium embodied in the interest rates it is demanded to pay (section 2). Third, we discuss, also by looking at

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[3]   For a review and an assessment of the debate see Buti *et al.* (2003) and Franco *et al.* (2003).

[4]   A similar issue arises in decentralised countries where sub-national governments' fiscal discipline can be ensured via either market incentives or fiscal rules. See Balassone and Franco (2001b) and Balassone *et al.* (2004a).

few case-studies, the factors determining governments' sensitivity to market signals and their willingness to change their fiscal stance accordingly (section 3).

1.   Prerequisites for market effectiveness

1.1   Theory

Default premia and credit constraints could in principle discipline irresponsible sovereign borrowers. Market-based fiscal discipline would initially take the form of a rising interest premium on the debt of a country running excessive deficits. If these deficits persisted, the interest premium would increase at an increasing rate until, eventually, the offending country could be denied access to additional credit. The increase in the cost of borrowing along with the threat of reduced availability of credit would then provide the incentive to correct irresponsible fiscal behaviour. The key question is whether and under what conditions will credit markets provide sufficient incentives to restrain irresponsible borrowing.

Bishop *et al.* (1989) indicate four conditions to be met for the market to be effective:

a) there is freedom of movement of capital;

b) full information on sovereign borrowers is available;

c) the market assumes that there is no external guarantee and no possibility of monetisation;

d) the financial system can absorb the bankruptcy of a sovereign borrower.

Lane (1993) identifies the following four necessary conditions:

a) no government unit should have privileged access to the market;

b) the market must have access to all the information necessary to evaluate the financial reliability of each unit;

c) the bailing-out of troubled government units must not be allowed;

d) borrowers must respond to market signals.

The two sets of conditions are similar. Both cases require that the central bank is independent.

Privileged access may take different forms: direct financing by Central Banks, preferred financing by banks, differential treatment of public bonds with respect to the tax system or to accounting rules.

The evaluation of a government's financial situation can be hindered by insufficient information and/or by "creative accounting". Difficulties may be amplified by differences between public and business accounting rules.

The credibility of the ban on bail-outs depends on both the capability of the financial system to withstand the failure of a "large" borrower and on the role played by governments in providing main public services and goods. A sovereign borrower may get too big for any market and may be directly responsible for the provision of essential services so that the costs of a bailout may be outweighed by those of its failure. The no-bail-out clause would consequently become an empty shell.

According to Lane (1993), if any of the three conditions above is not met, market signals risk coming too late and the change in market perception of the state of government finances may change too suddenly with possibly disruptive consequences.

1.2   The European case

The possibility to rely on market-induced fiscal discipline was considered when defining the conditions to be met by a country before joining EMU.

Advocates of the market approach argued that the effectiveness of market discipline would have been enhanced in EMU both by the likely higher capital mobility induced by the single currency and by the credibility of the no-bail-out commitment stated in the Treaty. The EMU wide capital market would have also been more robust to shocks caused by borrowers' failure (Bishop *et al.*, 1989).

CEPR (1991) argued that market reactions would not have been sufficient to tackle the problem of fiscal discipline in a monetary union. It noted that "the true sanction – the denial of further lending – comes too late and too abruptly. There is a quantum jump between rising rates of interest and the inability to borrow" (p. 34). It also noted that "the mere threat of a liquidity crisis may prompt financial intermediaries to act in anticipation and deny further lending at a relatively early stage" (p. 34). However, CEPR also suggested that these shortcomings could have been corrected by introducing proper prudential rules for the financial systems and rejected fiscal rules as unnecessary and unwise.

The Delors Committee acknowledged that market forces can exert a disciplinary influence but noted that the "constraints imposed by market forces might either be too slow and weak or too sudden and disruptive" (Committee for the Study of Economic and Monetary Union, 1989, p. 24). The Committee concluded that countries in EMU should have accepted some constraints on their fiscal policy.

Lamfalussy (1989) pointed out that closer economic integration might generate expectations that a country in critical conditions would be bailed out in the end by the other countries. For this reason, the fiscal stance of governments might have not been fully embedded in credit risk premia.

The European Commission (1990) took a similar view: financial markets differentiate among sovereign borrowers, but "it cannot be taken for granted that market discipline would be sufficient, due to expectations of Community assistance

and/or inadequate response of governments to market signals" (p. 112). It concluded that there was a need for rules and procedures at the Community level.

These views are to be considered in the context of the period. Several of the founding members of the EMU had bad fiscal records. Widening general government deficits and corresponding rises in government debt were observed in many countries till the early Nineties. Between 1989 and 1993 public deficits in the EU as a whole increased by 3.8 percentage points, to 6.0 per cent of GDP. Debt-to-GDP ratios were also on an upward path in most countries. For the Union as a whole, the debt ratio rose from 54 per cent in 1989 to 72 per cent in 1996. Some countries had two-digit deficit ratios and debt ratios above 100 per cent. These circumstances did not suggest that market discipline had been especially effective in Europe.[5]

Moreover, accounting practices for general government were not homogeneous across Europe, even in national accounts, thus providing further obstacles to effective risk assessment by market agencies and investors.

In the end, regulation was seen as a necessary supplement to market forces.

The crisis in which the SGP has plunged in 2003 induces to reconsider the issue.

As to the conditions laid down by Bishop *et al.* (1989) and Lane (1993), the situation is differentiated. Some conditions are fulfilled, others remain problematic.

In the EMU framework, the freedom of movement of capital is ensured and governments' privileged access to the market is not allowed. The Maastricht Treaty established the independence of the European Central Bank, prohibited the ECB and the National Central Banks from directly financing governments and prohibited governments from having privileged access to the financial market.

The information available to market agents on government finance have greatly improved. Thanks also to the statistical requirements provided for by the Treaty and the SGP, homogeneity in accounts has markedly increased. Controls on the accounts are routinely conducted by Eurostat and the European Commission. However, some problems remain open. In order to meet the short term targets, countries have frequently adopted one-off cash-raising measures instead of making the necessary structural adjustment. Monitoring has been hampered by delays in data provision, with the implication that the whistle has often been blown far too late (Balassone *et al.*, 2004b). Data on off-budget liabilities and budgetary prospects have generally been rather limited.

The credibility of the no-bail-out commitment remains an open issue, at least for large highly indebted countries playing a major role even in the large European

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[5]   However, it must be acknowledged that in some countries market reactions were restrained by restrictions to capital movements and by preferential access to financial markets.

financial market. Still in 1997 the IMF noticed that "although the no-bail-out clause in the Maastricht Treaty rules out the possibility of direct EU assistance to individual EU member countries, it is unlikely that market participants will price sovereign debt as if it were corporate debt" (IMF, 1997, p. 192). After 1997, interest rate spreads among European sovereign borrowers have declined markedly. This may reflect either the trust of markets in the disciplining effect of EMU fiscal framework or their expectation of a (at least partial) bail-out for high debt countries in case of difficulties.

2.   Fiscal conditions, credit ratings and risk premia

Governments can reduce the real value of their current liabilities in two ways. They can increase inflation above what was expected by the market at the time government bonds were issued, so that the nominal interest rate does not entirely reflect effective inflation. Alternatively, they can repudiate their debt, either in the form of a simple cancellation by law of their debt obligations or of some tax with retroactive effects on debt repayments.

Both inflation and default risks are priced by the market. When investors perceive such risks, they ask compensation for them, which raises the cost of government debt service.

The inflation risk can be eliminated or reduced by issuing government debt denominated in domestic currency and indexed to domestic inflation, by issuing debt denominated in foreign currency (Giavazzi and Pagano, 1990), and by shortening the maturity of government debt (Missale and Blanchard, 1990).

The default risk increases when devaluation by means of inflation is not allowed. It can be reduced by lengthening the maturity of public debt (Drudi and Giordano, 2000).

Before EMU, yield differentials within Euro area countries were determined, in addition to inflation and default risk, by expected exchange rate movements (which should also incorporate inflation expectations), differences in tax treatments and liquidity.

The loss of monetary sovereignty has made it impossible for EMU countries to pursue independent inflation policies and has enhanced the exposure of EMU national governments to default risk. Since inflation risk is likely to be the same for every country in the EMU zone, intra-EMU exchange risk is zero and tax treatments are somewhat harmonised across countries belonging to the Union, yield differentials in the area should mainly reflect differences in creditworthiness and liquidity.

Identifying and measuring the impact of each determinant of yield differentials is not easy. In empirical studies this task has been typically

accomplished by using different definitions of spreads. This solution is however somehow problematic. Creditworthiness has often been related to: a) the level, composition and rate of change of public debt; b) institutions and rules; c) macroeconomic conditions.

Information on country risk is also available to market participants via credit ratings produced by specialised agencies. Such ratings are based, for the most, on the analysis of few macroeconomic variables.

In the sections which follow we examine the determinants and characteristics of sovereign ratings and review the results obtained by a number of selected empirical studies aiming at testing whether and to what extent fiscal fundamentals are priced by the market.[6] We supplement this analysis with an heuristic examination of available data.

2.1   Sovereign ratings

Ratings are summary measures of assessments over the probability that a borrower will default. Given the large economies of scale in processing the information to assign ratings and the time necessary to build up the needed reputation, the rating industry is highly concentrated. There are only three agencies performing a significant worldwide activity (Moody's, Standard & Poor's and Fitch-IBCA). In general, ratings assigned to the same borrower do not differ much.

Ratings are inversely correlated to yields. The relationship is non-linear, *i.e.* increases in yield corresponding to a single notch decrease in rating get larger as the rating worsens.

Furthermore, ratings may affect the number of potential investors either discouraging the more risk-averse or because statutes and regulations of some investors demand higher provisions for lower rating assets and do not allow to buy assets carrying ratings below a certain level (Dale and Thomas, 1991; Cantor and Packer, 1997).[7]

The extent to which ratings reinforce market signals also depends on whether the rating agencies lead the market (thereby conveying additional information to market participants) rather than follow it (thereby simply summarising information already available to market participants).

In their statements on rating criteria, major agencies list numerous economic, social and political factors. However the relative weight given to each factor is

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[6]   A summary of the results obtained for EU countries is also presented in Table 1A at the end of the paper.

[7]   In this respect, it should be noted that the Basel accord introduces the use the credit assessment of the leading rating agencies for determining risk weights for sovereign bonds. Only sovereign bonds rated AA or more would get a zero risk weight. Below that rating level the risk weight rises gradually.

difficult to assess as some factors are difficult to quantify[8] and agencies, for obvious reasons, provide relatively little guidance on the issue (Standard & Poor's, 1994; Huhne, 1996; Truglia, 1998).

Cantor and Packer (1996) focus on "eight variables that are repeatedly cited as determinants of sovereign ratings" (p. 77): per capita income, GDP growth, inflation, central government debt, external balance, foreign currency debt, economic development and default history. They run OLS regressions relating Moody's and Standard & Poor's ratings to these 8 variables for a sample of 49 countries and find that they explain more than 90 per cent of the sample variation. Somewhat surprisingly, however, central government debt turns out not to be significant.

Sy (2001) reports the findings of a follow up study whereby the factors identified by Cantor and Packer continue to adequately explain ratings in 1996 and in 1997. The relationship breaks down in 1998 though, in the wake of the Asian crisis.

Indeed, the reliability of ratings as indicators of the probability of a crisis and, possibly, of a default has been questioned after the Asian crisis. Ferri *et al.* (1999) argue that "credit rating agencies aggravated the East Asian crisis. In fact, having failed to predict the emergence of the crisis, rating agencies became excessively conservative. They downgraded East Asian crisis countries more than the worsening in these countries' economic fundamentals would justify" (p. 335).[9]

The inability of rating agencies to forecast the East Asian crisis has been stressed by international financial institutions (BIS, 1998; IMF, 1998, World Bank, 1998) and acknowledged by the agencies. After the crisis, the latter revised their rating models to give more weight to short-term foreign currency debt (Fitch-IBCA, 1998; Truglia, 1998).

Reisen (2000) argues that there are reasons to have less confidence in sovereign ratings than in US corporate ratings and that pricing in markets reflects these lower degree of confidence, as the correlation between ratings and yields is lower for sovereign than for corporate bonds. He takes a rather pessimistic view by arguing that "sovereign ratings lag rather than lead the markets" and that "it seems that there is little scope to improve on that performance" (p. 77).

However, there is some evidence that ratings lead the market.

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[8]   Beers (1997), after explaining that the S&P ratings are a summary measure of scores assigned to a number of factors determining economic and political risks, points out that "there is, however, no exact formula combining the scores to determine ratings" (p. 462).

[9]   See also Ruggerone (2003).

Cantor and Packer (1996) show not only that ratings are highly correlated with yield spreads[10] but also that rating announcements may cause a change in the market's assessment of sovereign risk. They find that changes in ratings are anticipated by the market in the sense that relative spreads increase (decrease) in the month preceding a downgrading (upgrading). However, they also find that spreads increase (decrease) further after the announcement of the downgrading (upgrading.). These results are essentially confirmed by Reiser and von Maltzan (1999).

Standard and Poor's (1994) reports that yields are relatively insensitive to downgrading as long as the ratings stays above-investment-grade, while yields become very responsive to even small downgrading when the rating plunges below-investment-grade. This is confirmed by Ferri *et al*. (1999). They analyse the impact of downgrading during the East Asian crisis (which was in many cases large, down to the lower B-notches and even into C-notches) and find that "after the downgrading the yield spread of East Asian crisis countries' bonds denominated in USD with respect to US Treasury bonds of equivalent maturity significantly rose" (p. 343).

Larrain *et al.* (1997) find that rating changes Granger-caused yield spreads during the Asian crisis. However, Reisen and von Maltzan (1999) run a Granger causality test correcting for joint determinants of ratings and spreads and find that sovereign ratings are mutually interdependent with changes in bond yields.

Reinhart (2002) argues that "… sovereign credit ratings systematically fail to anticipate currency crises but do considerably better predicting defaults" (p. 21). She points out, however, that downgrading usually follows currency crises, possibly highlighting how currency instability increases default risk.

Overall the available evidence seems to suggest that the credit rating system is effective in signalling fiscal crisis which are well under way, but cannot be relied upon to anticipate crisis at an early stage.

2.2   Yield spreads

Several papers have investigated interest rate spreads in recent years. This section examines three strands of empirical work, referring to the US experience, to OECD and EU countries.

States and municipalities in the USA

Capeci (1991) considers general obligation issues by 136 US municipalities in 1982 and 1987 to investigate how the market reacts to changes in credit quality,

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[10]   They find that ratings alone explain a higher percentage of variation of yield spreads in their sample than the eight macroeconomic variables on which they base their rating analysis.

both directly and indirectly through changes in credit ratings. He finds that both the credit rating and the cost of borrowing are sensitive to changes in the fiscal condition of the issuer (in particular, the size of its tax base and its debt burden). The effects of changes in the rating on the cost of borrowing are less clear.

Drawing on a set of survey data on general obligation bond yields for US states,[11] Bayoumi *et al.* (1995) test the "market discipline hypothesis". They focus on an important aspect of such hypothesis, that is the existence of a non-linear relationship between yields and debt variables. Bayoumi *et al.* specify an equation for the yield spread (relative to the yield on the New Jersey bond) that includes, in addition to state tax rates and the ratio of state debt to trend gross state product, the unemployment rate, to account for cyclical factors, and a measure of the strength of constitutional constraints on state borrowing. There are two coefficients associated with debt, respectively measuring the level effect of debt on yields and the non-linearity caused by the interaction between yields and interest payments.[12]

The results by Bayoumi *et al.* are broadly consistent with the market discipline hypothesis. All coefficients, with the exception of that on the tax rate, turn out to be significant at conventional levels. More interestingly, the statistical significance and the point estimates of the second coefficient on debt imply a highly non-linear supply curve.[13] The authors thus conclude that credit markets do appear to provide incentives for sovereign borrowers to restrain borrowing.

OECD countries

Alesina *et al*. (1992) investigate whether high debt countries pay a default risk premium on their debt by comparing the interest rates on public and private financial instruments denominated in the same currencies in 12 OECD countries over the period 1974-89. In particular, they measure the default risk either by the difference between the public interest rate and the private interest rate or by the ratio of the two of them. The problem with these measures is that they depend on changes

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[11] The sample consists of 38 states over the period 1981-90 (380 observations).

[12] The right-hand side of their supply function contains, in addition to a constant and annual dummy variables, a ratio where in the numerator appears the sum of all explicative variables, including the quantity of outstanding debt (B); in the denominator there is the term $1-\alpha B$. The equation is estimated using non-linear, two-stage least squares. If the estimated coefficient on B in the denominator, α, turns out to be zero, then the supply function is linear, implying that the market will accept any level of debt at a constantly increasing default premium. If, instead, the coefficient is greater than zero, the supply function is non-linear with a maximum quantity supplied given by 1over the estimated coefficient.

[13] The mean debt ratio in the sample is 2.3 percent, with a maximum and minimum of 7.1 and 0.2 percent. The mean yield spread is 32.4 basis points; the maximum spread is 146.4. At the mean values of the sample, each percentage point increase in the debt ratio raises the yield by 23 basis point, but the slope rises to over 35 points at debt levels which are one standard deviation above the mean. A backward bend in the supply curve occurs at a level of debt equal to 8.7 percent of gross state product, about 25 percent higher the maximum debt observed in the sample.

in private risk. Moreover they cannot distinguish between credit risk and liquidity risk.

Alesina *et al.* (1992) find that in countries with high public debt the spread between public and private rates of return is positively related to the size of outstanding debt and its rate of growth. This is not the case in countries with a stable and sustainable debt-to-GDP ratio. The evidence thus suggests that the markets perceive a default risk on the public debt of some OECD countries. The strength of the correlation and the size of the default risk is however very small.[14]

Caselli *et al.* (1998) examine a panel of OECD countries over the period 1970-91. They find that the cost of servicing public debt depends on primary balance, debt level, inflation and growth. The debt level has a relatively large effect in high-debt countries.

EU countries

Lemmen and Goodhart (1999) analyse the determinants of market's perception of government creditworthiness using an unbalanced panel of 13 EU member countries over the period 1987-96. Following Alesina *et al.* (1992), they aim at explaining public/private sector yield differentials by means of variables that measure the size of government. In contrast to Alesina *et al.* (1992), they measure the default risk by the spread of 10-year benchmark government bond yields over the corresponding swap yield of the same maturity denominated in the same currency.[15] Since the private risks entailed in interest rate swap yields are significantly lower than in corporate bond rates (there is no principal at risk in an interest rate swap) this measure is less sensitive to changes in private risk. However, like in Alesina *et al.* (1992), the measure cannot distinguish between credit risk and liquidity risk.

Lemmen and Goodhart consider the following determinants of the default risk: (i) the government's tax raising capability, measured as the difference between the highest level of general government current receipts and current receipts (as a percentage of GDP); (ii) the debt-to-GDP ratio; (iii) political conditions that affect the country's creditworthiness, measured by the variability of inflation; (iv) the government's capacity to increase seigniorage revenue, measured by lagged inflation.

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[14] In the specification that includes countries with high public debt only, a one percentage point increase in the debt ratio is found to imply an increase of 1.6 basis points in the risk premium, as measured by the difference between private and public interest rates, or a 0.1 per cent increase in the public/private interest ratio.

[15] The swap yield usually exceeds the domestic benchmark government bond yield, as government debt is perceived as less risky than private debt. Only for Italy, and for short periods for Belgium, Portugal and Spain, the spread has at times been positive. Italy exhibits a relatively high and variable default risk; therefore, in some regressions it is excluded from the sample.

The results show that the risk of government default depends positively on the first difference of the debt-to-GDP ratio and the variability of inflation. As expected, inflation and the first difference of taxable capacity are found to significantly reduce the risk.[16]

Lønning (2000) compares the yields on Deutsche Mark denominated bonds issued in 11 EU countries with those on equivalent German government bonds over the 1994-96 period.[17] He regresses the yield differentials against variables supposed to be relevant factors affecting the risk of default, such as the government debt, the budget deficit, the structural budget deficit, the current account and the country rating. The coefficients of these variables generally have the expected sign. The coefficient for rating is always significant, whereas coefficients for other variables are either significant or not significant depending on what variables are included. The author interprets this finding as evidence both that rating conveys information about default risk beyond the information contained in the macroeconomic variables included in the regression, and that markets and rating agencies differ in their evaluation of default risk. The results suggest that at least part of the yield differentials on government debt between countries is a default premium. However, like in other studies, default premia turn out to be quite small.[18]

Codogno *et al.* (2003) recognise that interest rates on euro-denominated bonds issued by different governments have not fully converged and try to assess the relative importance of differences in creditworthiness of sovereign issuers and differences in liquidity in determining the observed interest rate spreads.[19] Like in Lemmen and Goodhart (1999), Codogno *et al.* (2003) measure the default risk by the spread of 10-year benchmark government bond yields over the corresponding rate estimated on swap contracts. In addition to the deviation of each country's debt-to-GDP ratio from Germany's one, their specification includes variables approximating banking and corporate sector risk premia in the US, which are meant

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[16] In their baseline specification, a one percentage point increase in the first difference of the debt ratio is found to induce an increase of 1.5 basis points in the risk premium. However, the relationships are not very robust to changes in the sample. In the regressions where Italy is excluded from the sample, taxable capacity turns out to be insignificantly negatively associated with the default risk. Also, the first difference of the debt-to-GDP ratio appears to have a negative effect on the spread in the sub-period 1987-91.

[17] Data for government bonds with large enough issues (at least 1 billion Deutsche mark) are found for 13 national bonds. Observations are annual.

[18] In the paper the author reports the result of a rough numerical example, which suggests a default premium of about 20 basis points, which compares with a maximum difference of 34 points in the interest rate on European government bonds included in the sample.

[19] As the variability of both credit risk and liquidity over the sample period (1991-2002) is limited, they focus on fluctuations rather than levels of the spreads. Moreover, as liquidity-related variables affect yields at high frequencies while risk-related variables are only observed at low frequencies, they address the effect of fiscal fundamentals on credit risk using monthly data and evaluate the effect of liquidity factors in daily data.

to account for international exogenous risk.[20] These variables appear in the regression both linearly and interacted with the deviation of debt ratios in order to test whether the impact of international factors on yield differentials depends on local fiscal fundamentals.

Codogno *et al.* (2003) find that the market perception of the default risk is an important component of yield differentials only in some countries. In particular, they find that for most countries differences in debt-to-GDP ratios have no significant effects on relative asset swap spread when considered separately. However, for Austria, Italy and Spain, deviations in debt ratios are significant in the specification that includes their interaction with international risk variables. Furthermore, in the case of Italy and Spain a substantial part of total yield differential can be attributed to the default risk. In contrast, the international risk factors enter significantly in the linear specification for all countries except Italy and Spain. Liquidity factors play in general a smaller role.

The latter finding contrasts with those of Bernoth *et al.* (2004), who consider a new data set of US dollars and Deutsche Mark (Euro after 1998) denominated government bond issue spreads (with respect to US and Germany government issues, respectively) between 1991 and 2002 in 13 EU countries. They show that the bond yield spreads depends both on the fiscal conditions (debt ratio, deficit ratio, debt service to revenue level) of the issuer country and the liquidity of the bond market, so that countries whose national debt has a larger share in the total EU debt may pay lower interest rates than EU countries with smaller shares in spite of a higher debt ratio. Both default and liquidity risk premia reduce with EMU membership.

Also FitchRatings (2004) observes that spreads on euro-area government bonds seem to be driven as much by liquidity as credit risk and notes that Finland and Ireland, both solid AAA sovereigns, are paying 20-25 basis points over German Bunds on 10-year debt and only a few basis points less than AA Belgium. Italy continues to pay 15-20 basis points more than the cheapest governments.

Finally, Afonso and Strauch (2004) focus on a slightly different issue. They select relevant fiscal policy events that took place in 2002 to assess how markets react when the SGP is put under stress. In particular, using daily data, they estimate the impact of these fiscal events on the 10-year interest rate swap spreads. They find a significant reaction of spreads only to some policy events. In no case the impact exceeds five basis points. Furthermore, they cannot detect any persistence of the market reaction.

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[20] The variables in the baseline specification are: the spread between ten-year fixed interest rates on US swaps and the yield on ten-year US government bonds; the spread between the yield on Moody's Seasoned AAA US corporate bonds and the yield on ten-year US government bonds.

A summing up

Determinants of creditworthiness have a relatively strong impact on spreads for US state and municipal bonds where the yield curve bends backward at relatively low levels of debt. This can be taken as evidence of low risk of disruptive effects from delayed market signals. However, the impact of determinants of creditworthiness is much smaller in the EU where small yield spreads are observed even in correspondence of high debt-to-GDP ratios. This difference may reflect the different rank of the borrowers: municipalities rather than sovereign countries. The effectiveness of credit markets in imposing fiscal discipline on governments seems to depend on the level and structure of government.

According to FitchRating (2004), 15-20 basis points is perhaps the most that could be attributed to credit differentials between AAA and AA euro-area governments. The spread between AAA and AA US States is only about half this size. FitchRatings concludes that it is unlikely that financial markets can give a strong incentive for fiscal discipline to euro-area sovereign borrowers, since "a euro-area government whose budgetary position weakens is likely to have to pay more for its debt, but that the extra cost will be small."

2.3   A look at the data

In this section we present some evidence on the developments over the period 1980-2003 in spreads between EU government bond yields, in sovereign credit ratings, as well as in some fiscal variables, which may have had a role in determining the market perception of sovereign creditworthiness.

In the sample period German long-term bond yields have usually been the lowest.[21] The spreads in long-term government bond yields between Germany and Euro area countries reduced markedly over the last two decades.[22] A similar pattern can be observed for the three EU countries that have not joined the monetary union (Denmark, Sweden and UK – Figure 1).[23]

The reduction in government bond yields during the Eighties was mainly driven by the sharp decrease in inflation in high yield countries: the average spread between EU countries and Germany dropped by 2.4 percentage points, to 1.9 per cent (Table 1). The convergence was faster in the period 1992-98, as the introduction of the common currency approached; the average spread reached

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[21]   There are only a few episodes in which Luxembourg and the Netherlands have lower yields.

[22]   Long-term government bonds are typically ten-year bonds or bonds with the closest available maturity.

[23]   In the specification that includes countries with high public debt only, a one percentage point increase in the debt ratio is found to imply an increase of 1.6 basis points in the risk premium, as measured by the difference between private and public interest rates, or a 0.1 per cent increase in the public/private interest ratio.

Figure 1

Long-term Government Bond Yield Spread Against Germany
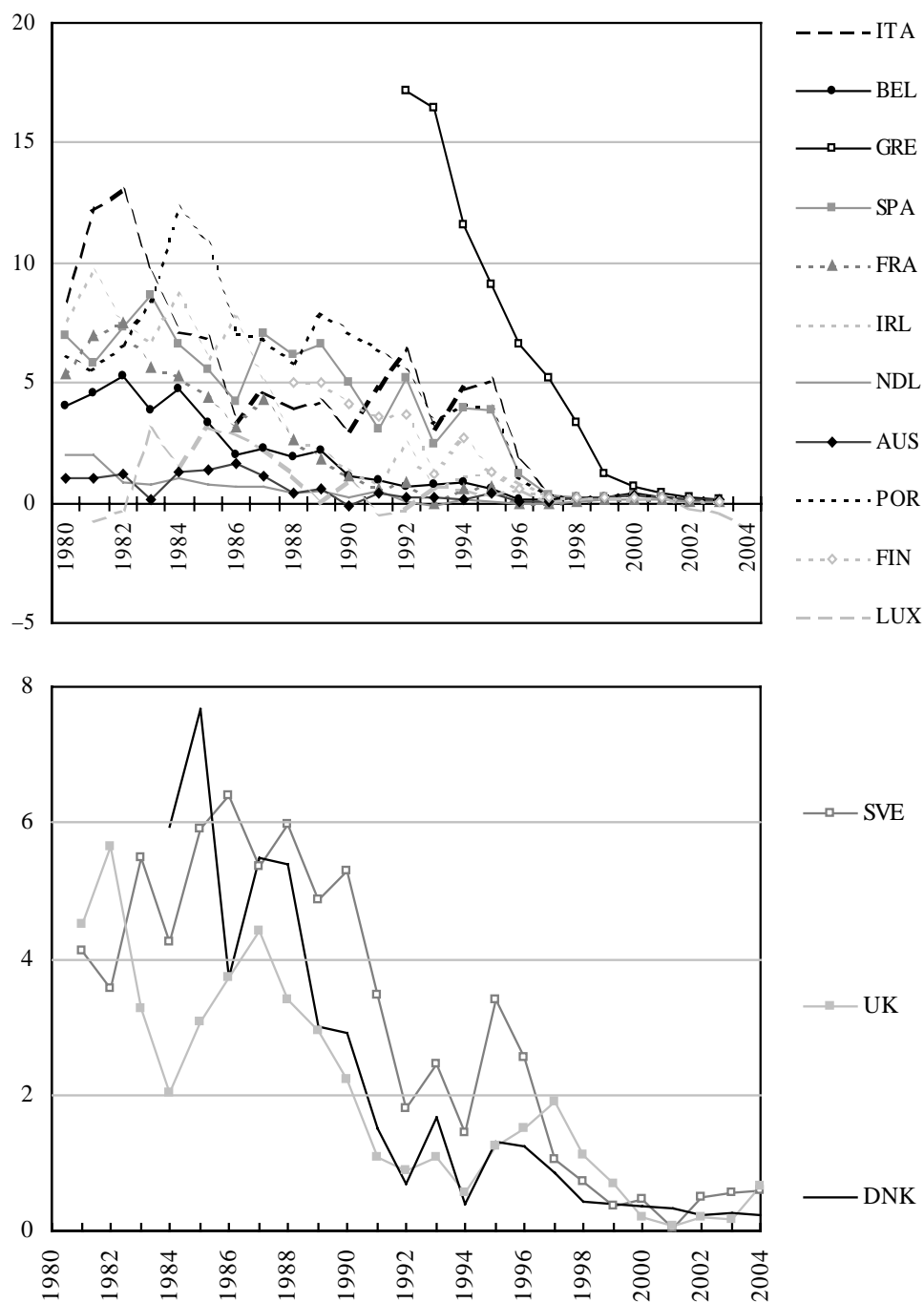*(percentage points; end of year data)*

<div align="right">**Table 1**</div>

Long-term Government Bond Yield Spread Against Germany
(percentage points)

	Jan. 1980	Dec. 1991	Dec. 1998	Dec. 2003
Austria	0.51	0.40	0.19	0.11
Belgium	3.34	0.92	0.22	0.08
Denmark	n.a.	0.69	0.40	0.23
Finland	n.a.	3.64	0.20	0.04
France	4.12	0.59	0.04	0.05
Greece	n.a.	n.a.	3.31	0.16
Ireland	8.67	0.89	0.15	0.07
Italy	7.07	4.74	0.13	0.17
Luxembourg	–1.01	–0.28	0.24	–1.00
Netherlands	1.69	0.50	0.09	0.04
Portugal	6.11	6.40	0.26	0.11
Spain	7.06	3.11	0.21	0.05
Sweden	3.19	1.79	0.36	0.57
UK	5.76	0.89	0.68	0.65
Average	4.75	2.05	0.46	0.18

46 basis points at the end of 1998 (24 points, excluding Greece that joined EMU two years later, on January 1, 2001). From 1999 onwards the spreads continued to narrow, although not in a continuous manner. At the beginning of 2004 there still remain small differences in yields, suggesting that differences in liquidity and credit risk between euro-area countries are still present.

Sovereign risk, as assessed by rating agencies, exhibits a similar evolution. In the analysis that follows we refer to the index of global creditworthiness measured semi-annually in *Institutional Investor*'s Country Credit survey of sovereign risk experts at financial institutions around the world.[24] Compared with Moody's and Standard and Poor's ratings, this index exhibits a much higher variability and is available for a longer period.

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[24] The country credit ratings developed by *Institutional Investor* are based on information provided by senior economists and sovereign-risk analyst at leading global banks and money management and securities firms. They grade each country on a scale of zero to 100, with 100 representing the countries that have the least chance of default. The ratings are released every year in March and September.

In Figure 2 and Table 2 we report sovereign risk (computed as 100 minus the credit rating) differentials against Germany. Germany has always been the country with the lowest chance of default in the sample, with the exception of 2003, when its credit risk ranked above the average.

Also country ratings have converged over the last two decades. The average differential against Germany decreased by 6.3 points in the period 1980-91, and by almost 3 additional points over the years preceding the monetary union (1992-98). However, in contrast to government bond yields, the largest drop (from a positive differential of 11.4 points to a negative one of 0.5) occurred in the last five years. Interestingly, in line with some of the empirical findings discussed above, convergence in credit ratings seems to have followed that in interest rates.

Finally, a comparison of Table 1 and Table 2 shows that at the end of 2003, whereas the three EU countries which did not join the monetary union exhibit the highest yield spread against Germany, their sovereign rating is among the highest in the sample. This seems to suggest that what the market is pricing in these case is liquidity or/and exchange rate risks.

Table 2

Sovereign Risk Differentials Against Germany

	Sept. 1979	Sept. 1991	Sept. 1998	Sept. 2003
Austria	12.6	5.6	4.1	–3.5
Belgium	12.1	10.3	9.4	–0.4
Denmark	23.0	17.6	8.2	–4.2
Finland	23.4	14.3	11.8	–3.8
France	7.2	2.8	2.5	–4.9
Greece	35.7	42.7	38.3	13.7
Irland	25.0	22.3	12.5	–0.7
Italy	24.5	10.8	13.9	3.7
Netherlands	8.6	2.3	1.0	–5.4
Portugal	46.3	26.6	17.4	6.4
Spain	28.0	14.4	12.9	1.1
Sweden	14.1	11.6	13.8	–2.5
UK	7.7	5.1	2.0	–5.5
Average	20.6	14.3	11.4	–0.5

Figure 2

Sovereign Risk Differentials Against Germany
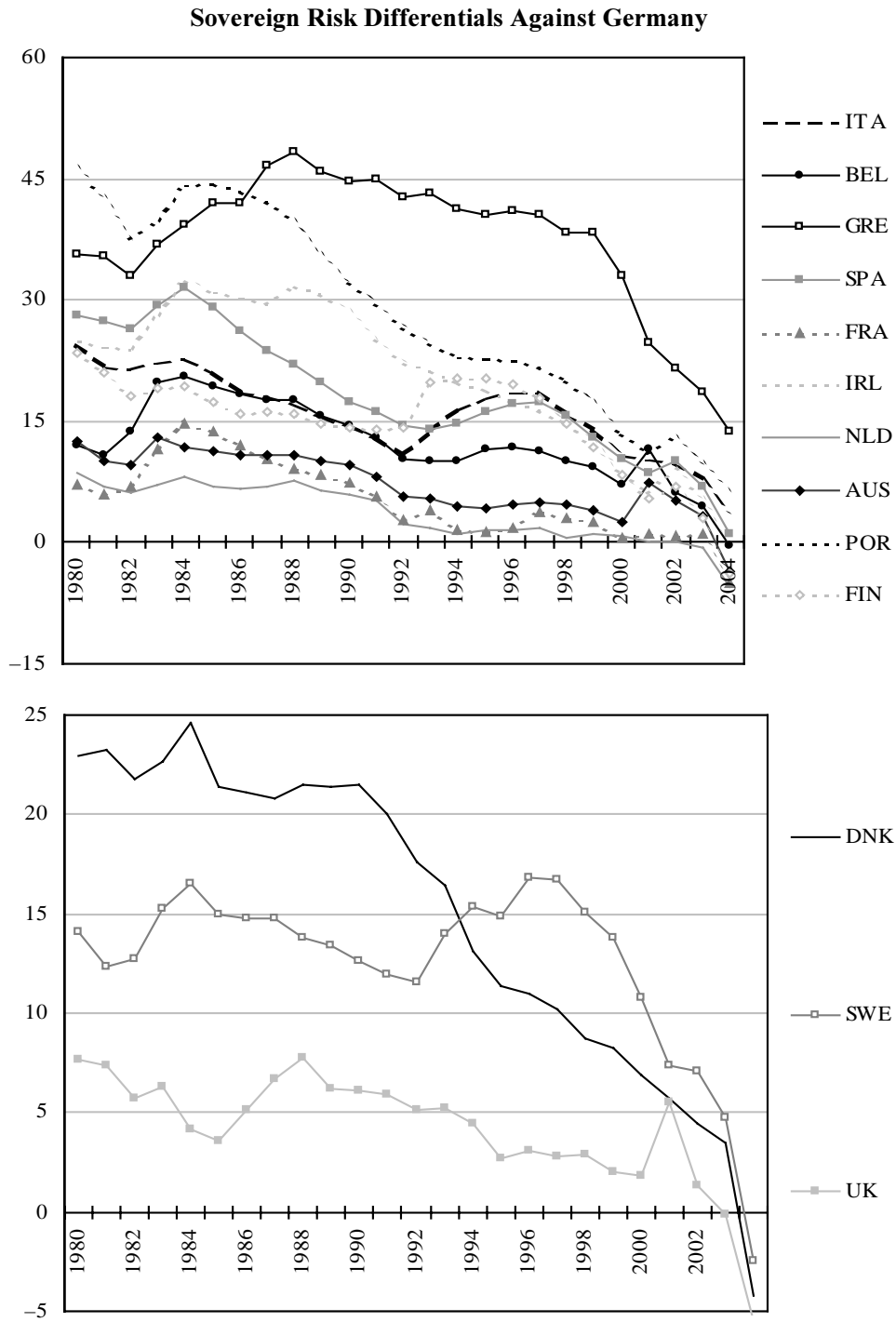
A scatter-plot of the sovereign credit risk differentials against government bond yield spreads shows the positive relationship between the two series (Figure 3). The results of simple regressions of yield spreads against rating differentials using different samples are reported in Table 2A in the Appendix. The correlation index between credit risk and yield differentials is 0.73 in the overall sample period.[25] It is highest in the years 1992-98 (0.77). It is lower in the period 1999-2003 (0.67), reflecting the fact that in the years preceding the monetary union agency ratings got very much along market perception, whereas in the following years ratings continued to converge while full convergence in interest rates had virtually already been achieved. This is particularly evident if we exclude Greece from the sample, in which case the correlation in the last 5 years of the sample drops to 0.32. The correlation in the overall period remains the same (0.73) if we restrict the sample to the high-debt countries (Belgium, Greece, Italy, Ireland and the Netherlands). However, in this case the correlation is highest in the period 1999-2003 (0.85), and remains so even if we exclude Greece from the sample. Since in monetary union differences in inflation and/or exchange rate risks, as well as in tax treatment, are no longer relevant, default risk is expected to account for a much

Figure 3

Sovereign risk and yield differentials

Credit risk differential

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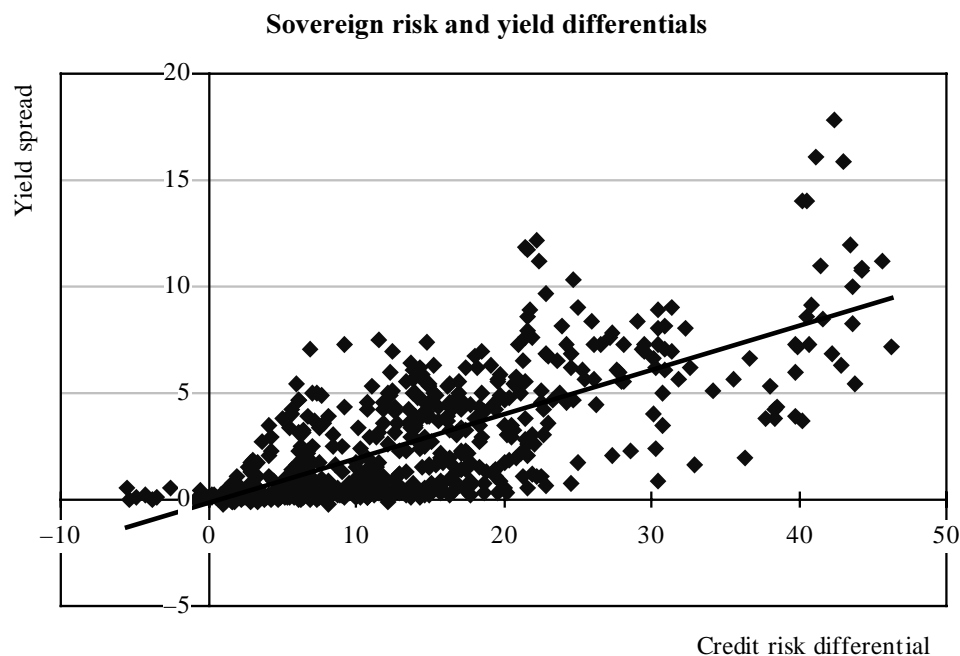
[25] The correlation remains above 0.7 even if we exclude Greece, which is to some extent an outlier.

larger share of the yield spread now than in the past. Finding a higher correlation between credit rating and yield spreads in the post-EMU period in high-debt countries somehow confirms this expectation.

In the analysis that follows we focus on the relationships between the measures of government bonds yield spread and credit risk that we have employed so far and some fiscal variables. In order to explain the movements in either the yield spread or in the rating, we alternatively consider the change in the debt-to-GDP ratio or the net borrowing, as these are the variables which the data suggest having the biggest impact on yield spreads and credit rating.[26] In the regressions with the yield spread as the dependent variable the change in the debt-to-GDP ratio and the net borrowing are considered in deviation from the German ones. Furthermore, the inflation differential with respect to Germany is included as an additional explicative variable. Also following the evidence, we consider the contemporaneous relationship between yield spreads and fiscal variables, whereas we look at the impact of fiscal outturns on the rating released one period ahead.[27]

Figure 4 plots sovereign credit risk against net borrowing. Figure 5 plots yield spread against net borrowing differential. Both graphs show a positive relationship between the variables.

The results of all regressions, using different measures of the fiscal condition and different samples, are shown in Tables 3A and 4A in the Appendix.[28] All measures of fiscal condition appear significantly and positively correlated with both the government bond yield spread and the credit risk. The relationship is generally stronger in the subsample of high debt countries and in the period 1992-98. The causal link between the relevant variables, especially for high-debt countries in the years preceding the monetary union, is however dubious. Rating, spread and fiscal variables in years 1992-98 appear to move all in the same direction, perhaps suggesting that in that period both rating agencies and markets were looking at the same signals (*i.e.*, fiscal developments) to assess the probability with which the country would have succeeded in joining the union. Net borrowing in year t explains 31 per cent of the variation in the credit rating in year $t+1$ in the entire sample and 34 per cent of the variation in the sub-sample of high-debt countries. As expected, yield spread is strongly and significantly related to inflation differential. Altogether,

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[26] We also considered the impact of changes in the debt-to-GDP ratio (or of the net borrowing) on changes (rather than levels) in yield spreads or in ratings. None of these relationships turned out to be significant.

[27] We analyse the impact of a change in debt-to-GDP ratio (or of net borrowing) at the end of year t on the rating released in September of the year $t+1$.

[28] The results presented here are obtained using simple OLS regressions. They do not change qualitatively if we perform a panel analysis using randomd effect GLS estimation instead. Indeed, the within-country R-squared is generally significantly higher than the one obtained using OLS regression, above all in the sub-sample of high-debt countries.
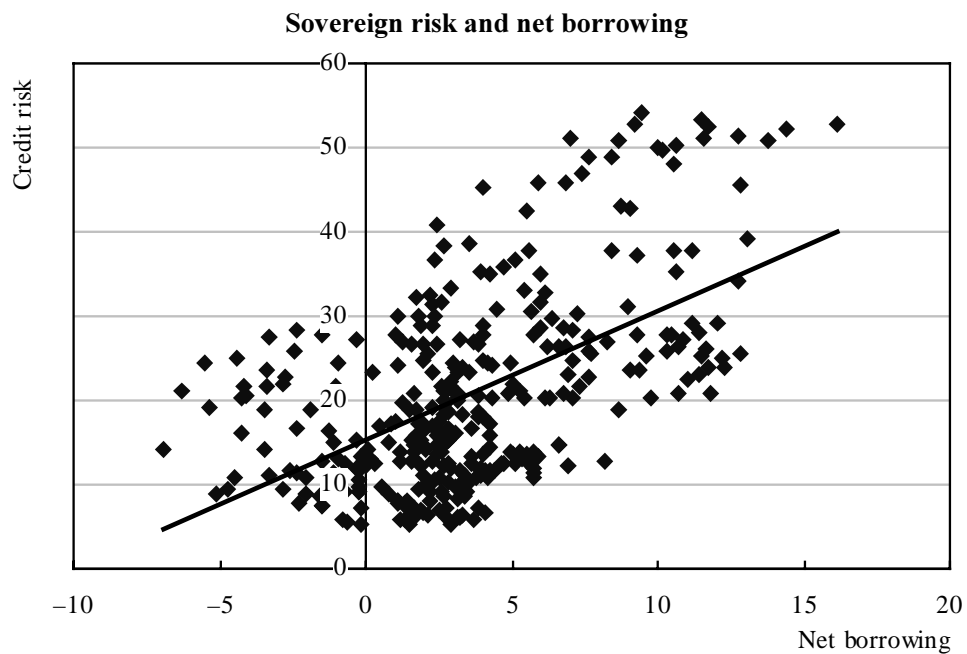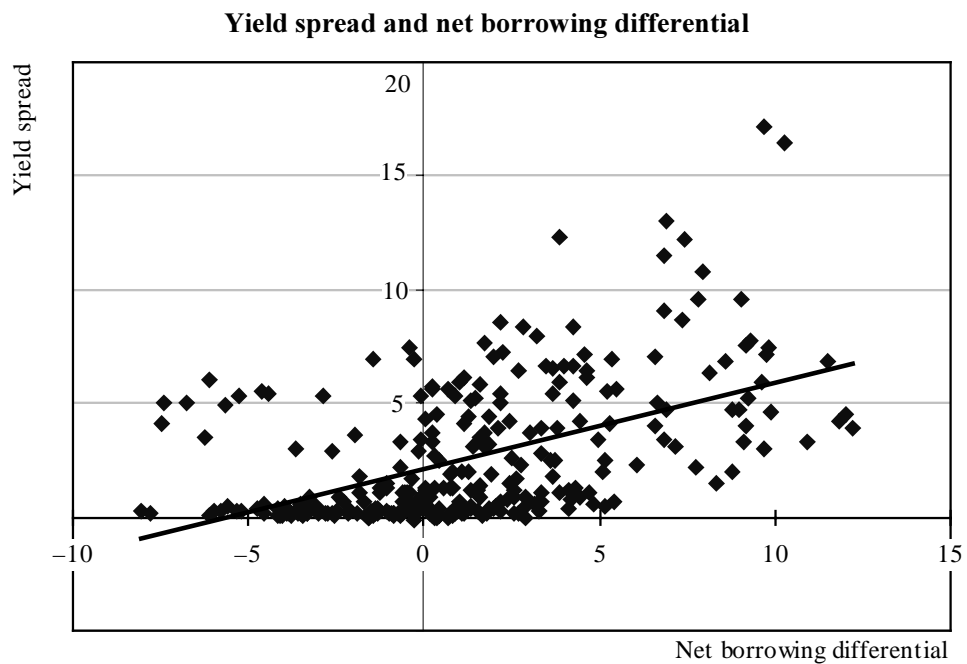
Figure 4

Sovereign risk and net borrowing

Figure 5

Yield spread and net borrowing differential

variation in the yield spread in the entire sample, 77 per cent for high debt countries.

Even controlling for inflation, the impact of fiscal conditions appears quantitatively large, especially in the Nineties. In the entire sample, a 1 percentage point increase in the net borrowing differential makes the spread increase by 23 basis points; in the sub-sample of high-debt countries the impact is larger (31 basis points). However, in the period 1999-2003, where the spread should mainly account for differences in creditworthiness (and liquidity), the relationship is much weaker and almost never significant. The same qualitative results apply if we use the change in debt-to-GDP ratio as the explanatory variable.

3.   Government's sensitivity to market signals

In the previous section, we have analysed the literature and the data to investigate the link between fiscal performances and the cost of borrowing. We have found that the market provides the right signals to sovereign borrowers.

However, this condition alone is not sufficient to ensure the effectiveness of market discipline. Lane (1993) stresses the importance of governments' sensitivity to market signals, that is whether, by how much and how quickly do sovereign borrowers respond to market incentives.

Policy-makers' reaction time may be excessively long if they have short time horizons. The debt structure may also contribute to delay reactions. While the increase in yields on new bonds may immediately signal market's reaction to excessive borrowing, the burden on the budget may increase slowly if most of the debt is made of long-term bonds.[29]

FitchRatings (2004) considers, as an example, an AAA country with debt increasing up to 100 per cent of GDP. The country may be downgraded to AA and its spread may widen by 20 basis points. It notes that the annual interest costs will eventually rise by 0.2 per cent of GDP and it concludes that this extra-burden might add little to the pressures the country's government would be feeling; it is certainly not enough to ensure that market forces can discipline governments where the SGP has failed.

3.1   A descriptive analysis

Some indications on the reactions of policy makers to market signals may be obtained by studying the cases of the four EU countries whose debt passed 100 per

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[29]   In the case of Italy, which is the country where - due to the relatively short duration of debt and to its high level - the impact of a change in interest rates is strongest, a 1 percentage point increase in the interest rate on all maturities would induce an increase in interest expenditure of 0.2 percentage points of GDP in the first year and 0.45 in the second year, while it will take many years for the rise to exert its full impact.

cent of GDP in the Eighties or in the Nineties: Belgium, Greece, Ireland and Italy (Table 3).

Belgium

In Belgium the debt-to-GDP ratio was 67.9 per cent in 1969 and it was on a declining path until 1974, when it reached a low of 57.8 per cent. In the same years the ten-year yield spread between Belgian and German government bonds was negative, except for 1969.

After 1974 the debt ratio grew fast. In 1980 it amounted to 77.6 per cent. The yield spread with respect to Germany turned positive: in 1980 it was 4 percentage points. In six years the debt ratio grew by 20 points and the yield spread by 5.

Notwithstanding the rise in spreads, Belgium ran deficits averaging at 12 per cent of GDP in the following three years. The debt-to-GDP ratio grew by almost 25 additional points, to 112 per cent in 1983. The yield spread reached a peak of 5.3 points in 1982. The rating declined sharply, from 86.9 in 1980 to 74.2 in 1982.[30]

It was only at that stage that a sizeable fiscal correction kicked in. The 1981 primary deficit of 5 per cent of GDP turned into a surplus in 1984, which became sizeable in 1987 (3.0 per cent of GDP) and grew to a high of 6.9 per cent of GDP in 2000.

However, the overall deficit remained sizeable until 1993 (7.3 per cent of GDP) due to the high interest bill. The yield spread declined slowly, coming close to zero only in 1996. The debt ratio started declining only from 1994, after having peaked at 134.0 per cent in the previous year. The rating improved slowly between the second half of the Eighties and the first of the Nineties, to reach the 1980 level in the early 2000s.

Greece

Fiscal conditions in Greece deteriorated sharply at the beginning of the Eighties. The deficit-to-GDP ratio, still below 3 per cent in 1980 rose to about 9 per cent in 1981 and averaged around that level until 1988. Correspondingly, the debt ratio rose from 25 per cent in 1980 to 69 per cent in 1988. The country's sovereign rating deteriorated sharply: from 62.1 in 1980 to 47.2 in 1988. Nevertheless, Greece continued to run high primary deficits until the early Nineties. The debt ratio reached above 110 per cent in 1993. At that stage the long-term bond yield spread with respect to Germany was about 17 percentage points.

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[30]   We refer here to the ratings developed by *Institutional Investor* described in section 2 of the paper. Germany's rating averages to 95 over the Eighties and to 90 thereafter.

Table 3

Fiscal and credit risk indicators for selected EU countries

	1969	1974	1980	1982	1984	1987	1993	1996	2000	2002
debt/GDP	67.9	57.8	77.61	101.01	115.81	130.63	134.14	130.18	109.6	105.26
spread	0.6	–1.3	4.0464	5.2581	4.7255	2.2694	0.7632	0.11	0.3855	0.122
overall balance/GDP	2.5	2.9	8.68	10.89	9.6	7.63	7.34	3.82	–0.12	–0.06
primary balance/GDP	..	..	2.69	1.78	–0.15	–2.85	–3.56	–5.04	–6.87	–6.06
rating	..	..	86.9	74.4	73.8	76.5	79.8	79.6	83.1	89.5
debt/GDP	19.8	23.3	25.23	33.83	46.35	63.23	110.17	111.32	106.21	104.88
spread	..	..	..	..	..	..	16.4232	6.6295	0.6446	0.2445
overall balance/GDP	–1.9	1.3	2.65	6.84	8.44	9.18	13.77	7.44	1.91	1.24
primary balance/GDP	..	..	0.65	4.05	4.06	2.56	0.98	–3.1	–5.09	–4.29
rating	..	..	62.1	57.2	51.2	45.7	48.6	50.3	70	75.3
debt/GDP	53.6	56.4	68.06	82.56	96.36	111.33	93.74	74.15	39.32	33.35
spread	2.5	6.1	7.5804	7.4141	8.6425	5.0213	0.5532	0.8221	0.2532	0.1281
overall balance/GDP	3.9	7.5	12.08	13.11	9.31	8.39	2.29	0.22	–4.29	0.29
primary balance/GDP	..	..	5.84	4.56	0.38	–0.75	–3.96	–4.36	–6.37	–1.09
rating	..	..	73.4	65.9	62.1	62.3	70	74.5	88.5	88.5
debt/GDP	37.9	51.4	57.82	64.64	75.95	90.44	118.14	122.65	110.6	106.7
spread	0.4	–0.4	8.3944	12.9691	7.1855	4.6393	3.1059	1.775	0.408	0.2147
overall balance/GDP	2.9	6.3	8.3	11.2	11.5	11	10.3	7.1	1.8	2.3
primary balance/GDP	..	..	3.2	4.2	3.5	3.2	–2.8	–4.4	–4.6	–3.4
rating	..	..	75.8	71.9	72.1	77	73.5	72.4	84.2	86.2

Greece's primary balance turned into a surplus only in 1994. The debt ratio was still about 105 per cent in 2002. While the rating is now well above its 1980 level, the yield spread is just 0.2 percentage points.

Ireland

In Ireland the debt-to-GDP ratio was about 50 per cent during the first half of the Seventies. The deficit ratio was about 3 per cent until 1974 when it rose sharply to 7.5 per cent. The deficit reached 12 per cent of GDP in 1980. The long-term bond yield spread with respect to German bonds rose from 2.5 points in 1969 to 6.1 in 1974. Between 1974 and 1980 the debt ratio grew by 12 points, to 68.1 per cent. At that stage the spread was about 8 percentage points, the rating was 73.4.

Ireland kept recording high deficits until the second half of the Eighties. In 1987 the deficit ratio was still 8.4 per cent; the debt ratio peaked at 111.3 per cent. The yield spread remained around the 1980 level until 1986 and the rating dived close to 60.

Only in 1987 did the primary balance turn into a surplus, which became sizeable in the following year and remained so thereafter. In the first half of the Nineties the debt ratio was about 90 per cent. The yield spread declined to about 1 percentage point. The rating went back to the 1980 level. Since then extremely high growth rates markedly accelerated the process of debt reduction: in 2002 the debt ratio was 33.4 per cent, the yield spread was down to 0.1 points and the rating improved to 88.5.

Italy

In Italy fiscal conditions started deteriorating in the first half of the Seventies, with the deficit ratio reaching almost 7 per cent and the debt ratio growing by more than 13 points (to 51.4 per cent) between 1970 and 1974. The yield spread with respect to Germany remained low in this period but rose sharply thereafter, reaching 8.6 points in 1977.

Between 1975 and 1980, the deficit ratio was on average 8 per cent of GDP. The debt ratio was close to 60 per cent. The yield spread remained at about 8 points. In 1980 Italy's rating was 75.8.

Italy kept recording two digit deficit ratios well into the Nineties. The debt-to-GDP ratio peaked at 124.3 in 1994. Mainly due to a relatively sharp decline in the inflation rate, the yield spread, after an increase to 13 points in 1983, declined to 3.3 points in 1986. At the same time, Italy's rating showed no significant deterioration.

The primary balance showed a surplus first in 1992, peaking at 6.7 per cent of GDP in 1997. The debt ratio declined slowly, to reach 106.7 per cent in 2003. The

yield spread with respect to Germany declined further. It reached 0.2 points in 2002. In the same year, Italy's rating was 86.2.

A summing up

From the overview we may conclude that, with the exception of Italy, the deterioration in public finance conditions was readily and sizeably priced by the market.[31] While the time elapsed until a significant fiscal correction was enacted was longest in Italy (almost 20 years), it took quite a while also in the other three countries: almost a decade in Belgium and 13-14 years in Greece and Ireland.

Moreover, for Belgium, Greece and Italy it took another decade for the primary surplus to compensate the interest bill enough to allow the debt-to-GDP ratio to start declining. Belgium, Greece and Italy have been running low deficits since 1999 but their debt-to-GDP ratios are still about 105 per cent.

Thus, it seems that even if markets provide prompt indications about emerging fiscal imbalances, there is still be a role for fiscal rules in forcing policy makers to timely react to imbalances. In this way, both the direct costs of a prolonged period of fiscal instability and the costs of the needed correction can be sizeably reduced.

3.2   A panel analysis

In this section we present the results of a panel regression, which investigates the relationship between the structural primary budget balance (defined as general government net borrowing corrected for the effect of the business cycle, aiming at capturing the fiscal policy stance) and the country creditworthiness (measured by either the agency rating or the yield spread against German bonds).[32] As the aim is to test whether fiscal policy reacts to either market or agency perception of government creditworthiness, we consider one-year lagged values for the measures of credit risk. We also include among the regressors, in addition to the lagged structural primary balance, the lagged stock of debt, expecting that the presence of a high stock of debt would induce fiscal authorities to pursue more responsible policies.

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[31]   As already pointed out, the reaction of financial markets to fiscal imbalances in the different countries was obviously affected by restrictions to capital movements and preferential access to financial markets.

[32]   As already pointed out, the yield spread is not a pure measure of the country creditworthiness. This particularly applies to the period before 1999. However, irrespective of the determinants of the spread (whether it reflects inflation, exchange-rate or default risk, or other), it may be worth investigating whether authorities generally react to changes in their financing ability.

The sample consists of 14 EU countries (excluding Luxembourg) over the period 1981-2003.[33] In the regression using the yield spread as an explicative variable we drop, of course, Germany from the sample.

Our estimating equations is the following:

$$STRUCT = \alpha_0 + \alpha_1\, STRUCT(-1) + \alpha_2\, RISK(-1) + \alpha_3\, DEBT(-1) + \varepsilon,$$

where STRUCT is the structural primary balance as a percentage of GDP, DEBT is the debt-to-GDP ratio and RISK is the credit risk, measured alternatively by the *Institutional Investor* country risk assessment or the government bond yield spread against Germany.

Given the presence of the lagged dependent variable among the regressors, we apply the Arellano-Bond fixed-effects dynamic panel estimation.[34]

The results obtained by using the yield spread as a measure of the credit risk are presented in Table 5A at the end of the paper. Table 6A reports the results when the credit risk is measured by the country rating.

All coefficients come out with the expected sign in almost all regressions. For the whole sample the estimated coefficient of lagged primary deficit is 0.68, significantly different from zero and lower than one as expected, both when we use the yield spread and the country risk among the explicative variables. The estimated coefficient on lagged debt is –0.04 in both regressions, significantly different from zero and negative as expected. Also the coefficient on the lagged measure of perceived risk is almost always negative as expected (with the exception of the sub-period 1992-98), not always significant though, suggesting that fiscal authorities may have only occasionally reacted to market's or agencies' perception of country creditworthiness.

The relationship appears more robust between primary deficit and yield spread than between primary deficit and credit rating, quantitatively stronger and more significant over the sub-period 1999-2003 in the highly indebted countries. In the entire sample, a one-percentage-point increase in the yield spread in one year seems to induce governments to improve the structural primary balance in the following year by 0.17 percentage points of GDP. Fiscal authorities' reaction rises to 0.68 points of GDP if we look at the sub-sample of high-debt countries in the years 1999-2003. However, being recent years characterised by decreasing yield spread in the high-debt country, some kind of asymmetric reaction by governments to favourable and unfavourable developments of the macroeconomic conditions may have determined these results. A high negative coefficient may indeed reveal a

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[33] The panel is unbalanced as we use, within the period 1981-2003, all available information for each country.

[34] In all regressions that we will present here, the test for second order autocorrelation does not reject the validity of the procedure. The Sargan test for over-identifying restrictions does not signal over-fitting biases.

loosening in fiscal policies induced by lower interest rates, rather than a general attitude of governments to promptly and strongly react to signals of decreased creditworthiness.

4.   Conclusions

The possibility of relying on market mechanisms to provide effective incentives to fiscal discipline was assessed in depth in the late Eighties when the EMU was designed.

At that time it was widely considered that the constraints imposed by market forces are either too slow and weak or too sudden and disruptive. In the end, fiscal rules were seen as a necessary supplement to market forces.

This paper aimed at reassessing the case for financial market discipline in a context in which European financial markets are much more integrated than they were 15 years ago. Our answer is again negative: financial market discipline does not provide an adequate fall-back solution in case of rule failure.

Concerning the conditions to be met for market discipline to be effective, we have argued that the evidence concerning the EU is mixed. Governments' privileged access to the market is no longer an issue. However, in spite of marked progress (mainly due to the enforcement of fiscal rules), the available information on governments' finance is still somewhat unsatisfactory. Moreover, the credibility of the no-bail-out commitment remains an open issue.

The evidence we have examined unambiguously suggests that market rewards fiscal discipline and punishes with higher risk premia fiscal imbalances. However, the same evidence also unambiguously suggests that market reactions to growing deficit and debt levels tend to be slow and small in size.

The credit rating system seems effective in signalling fiscal crisis which are well under way, but cannot be relied upon to anticipate crisis at an early stage. Determinants of creditworthiness have a relatively small impact on yield spreads across EU countries. Narrow yield spreads are observed even in correspondence of high debt-to-GDP ratios.

As to policy makers' reactions to market signals both the case studies and the panel analysis suggest that fiscal corrections tend to be significantly delayed even when the deterioration in public finance conditions is readily priced by the market.

FitchRatings (2004) observes that "15-20 basis points […] is perhaps the most that could be attributed to credit differentials between AAA and AA euro-area governments [and that] such amounts hardly seem likely to keep a German finance minister awake at night" (p. 6). This contemporary evidence seems to confirm the results obtained by Flandreau *et al.* (1998) analysing European data for the 1880-1913 period: "... the gold standard experience ... supports the view that

markets react to increases in debt by inflicting higher risk premia. On the other hand, countries had to plunge quite deep into debt before they started feeling the pain." (p. 145).

Identifying the way ahead in the current debate on EMU fiscal rules was not the aim of this paper. However, our analysis suggests some preliminary considerations.

In order to improve the effectiveness of market discipline, two different courses of action may be taken: a) remove the factors currently hampering the market's assessment of fiscal conditions; b) amplify the signals sent from the market to the policy makers.

The first option would entail, on the one hand, further reducing whatever room is currently left in regulation for governments' privileged access to the market and, on the other hand, increasing fiscal transparency, in order to provide citizens and markets with clear and comprehensive information.

By introducing the use of credit assessment by the leading rating agencies for determining risk weights to be attached to sovereign bonds in the context of the assessment of capital adequacy, the recent Basel accord moves a step in the right direction.[35] Another possibility would be the extension of the large exposure directive, which sets limits to the amount which can be lent to a single private borrower (no more than 25 per cent of capital), to governments too (Arnold and Lemmen, 2001).

Greater fiscal transparency could be achieved by providing the public with more detailed and timely statistics than those currently available (Balassone *et al.*, 2004b). The independence of statistical institutions should be guaranteed as much as that of Central Banks. Data on public assets and liabilities should cover both financial and non-financial items and should not be restricted to general government units alone, rather their coverage should extend to the broader public sector. Estimates concerning off-budget liabilities and public guarantees should be made available. As to budget data, information on cyclically adjusted balances and the extent of one-off revenues and expenditures should also be released. Moreover, reconcilable cash and accrual data should be available and the link between deficit and debt measures should be fully explained. Short and long term projections on revenue and expenditure by level of government should be carried out and released routinely. The assumptions underlying fiscal projections should be clearly spelled out. *Ex post* assessment of projections including the effects of new legislation should also become a routine exercise.

Concerning the alternative course of action (*i.e.* amplifying the signals sent from the market to the policy makers) several proposals have been put forward.

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[35] Proposals to this effect were advanced already in CEPR (1991).

Most of the proposals entail the use of the excessive deficit procedure as a sort of public rating system to supplement the market one. Arnold and Lemmen (2001) suggest that the bonds of governments in excessive deficit could be shifted to a higher risk category for the purposes of assessing banks' capital adequacy. Similarly, restrictions may be introduced to the use of public bonds of governments in excessive deficit as collateral in monetary policy operations. Another option could be the introduction of joint (*i.e.*, multi-country) issuance of public bonds from which countries in excessive deficits could be excluded.

All these proposals are problematic. They all result in making access to credit more costly for less disciplined governments, either because of technical reasons or of reputational effects. In this respect, the only way the effects of these rules may differ from rating agencies' downgrading seems to be that they are more direct and, perhaps, more visible. However, this benefit is achieved with some relevant costs in other domains.

A different suggestion is made by Bayoumi *et al.* (1995) who argue that a rules-based approach could use observed yield spreads rather than deficits as reference indicators. Linking fiscal rules to market signals makes the rules both less arbitrary and more flexible. Instead of using fixed limits on deficit and debt levels, in such an hypothetical context it is the market which decides whether a certain deficit or debt level (or a combination of the two) is unsustainable and, therefore, needs to be corrected. Of course, identifying the relevant spread and measuring it accurately becomes crucial. This solution would raise a number of problems. For instance, the direct effects of changes in spreads might be amplified by their effects on the implementation of EU procedures thereby getting a country in a vicious circle. Governments pursuing unsound policies might not be punished if also the reference issuer pursues an unsound policy. Governments pursuing sound fiscal policies might be punished if other factors determine a higher spread.

In the end, our conclusion is that for the time being it would be extremely risky to replace fiscal rules with market mechanisms. However, greater transparency in fiscal accounts would allow markets to usefully complement rules.

APPENDIX

Table 1A

Some Evidence on Determinants of Risk Premia on Government Bonds

	Measure of risk premium (dependent variable)	Sample	Coefficients on selected independent variables *(t-statistics in parentheses)*								
			Public debt (1)	Change in public debt (1)	Public debt interacted w/int. risk	GDP growth	Maturity (2)	Tax raising capability (3)	Budget surplus	Current account	Rating (4)
Alesina *et al.* (1992) (5)	Difference between public and private interest rate	12 OECD countries	1.51 (3.52)	3.33 (1.79)	–	0.03 (2.34)	–0.19 (–2.26)	–	–	–	–
		6 OECD high debt countries	1.60 (3.56)	4.34 (2.10)	–	0.03 (2.46)	–0.18 (–0.21)	–	–	–	–
		6 OECD low debt countries	0.63 (0.42)	–0.93 (–0.21)	–	0.03 (2.46)	–0.21 (–0.13)	–	–	–	–
Lemmen and Goodhart (1999)	Difference between govt. bond and swap interest rate	13 EU countries	–	0.02 (5.81)	–	–	–	–0.03 (–3.83)	–	–	–
		12 EU countries (exclud. Italy)	–	0.01 (4.96)	–	–	–	–0.00 (–0.89)	–	–	–
Lønning (2000)	Difference between DM denominated bonds and German bonds interest rate	13 national bonds issued by 11 EU countries	0.08 (1.43)	–	–	–0.47 (–0.99)	–	–	–1.51 (–3.49)	1.65 (3.08)	–18.86 (–3.75)
Codogno *et al.* (2003) (6)	Difference between government bond and swap interest rate	Austria	–0.90 (–2.21)	–	0.83 (1.95)	–	–	–	–	–	–
		Italy	Not significant	–	0.41 (2.10)	–	–	–	–	–	–
		Spain	–0.33 (–2.75)	–	0.81 (6.75)	–	–	–	–	–	–

(1) In all works, with the exception of Lønning (2000), debt is expressed as a percentage of GDP. In Codogno *et al.* (2003) each country's debt-to-GDP ratio is expressed in deviation from Germany's ratio. Therefore, the expected sign is minus. (2) Maturity is measured as the fraction of short-term debt over total privately held debt. (3) Tax raising capability is measured as the difference between the highest level of general government current receipts over the period 1960-96 less present current receipts as a percentage of GDP. (4) In order to include the rating variable in his regressions, Lønning (2000) assigns the following numerical values to "Moody's Bond Record": Aaa=3.76, AA1=3.71, AA2=3.66, AA3=3.60, Aa=3.54, A1=2.88, A=2.83, Baa=0. (5) Alesina *et al.* (1992) perform the analysis both by imposing the restriction that all countries have the same coefficients on all variables (except the intercept) and by allowing the coefficients on debt variables (size, variation and maturity) to differ across high and low debt groups. (6) Codogno *et al.* (2003) perform the analysis on a set of 10 EU countries separately. Here we report the results only for countries where fiscal fundamentals (measured either by the deviation in debt-to-GDP ratio or by the interaction term with a measure of international risk) turn out to be significant. The coefficients we report must be multiplied by a term, 1–λ, where λ is estimated equal to 0.60, 0.78 and 0.61, for Austria, Italy and Spain, respectively.

<div align="right">**Table 2A**</div>

Dependent Variable: Yield Spread
(t-statistic in parentheses)

	All countries				High-debt countries			
	1979-2003	1979-91	1992-98	1999-2003	1979-2003	1979-91	1992-98	1999-2003
Intercept	−0.19 (−1.38)	1.14 (4.69)	−1.06 (−4.33)	0.12 (5.24)	−0.83 (−2.89)	−0.15 (−0.28)	−1.68 (−3.26)	0.02 (0.52)
Credit risk differential	0.21 (25.60)	0.18 (14.65)	0.23 (15.94)	0.02 (10.22)	0.24 (15.58)	0.24 (8.73)	0.27 (11.28)	0.03 (10.96)
R^2	0.53	0.44	0.59	0.45	0.53	0.44	0.65	0.71
Number of observations	586	275	181	130	219	100	69	50

<div align="right">**Table 3A**</div>

Dependent Variable: Sovereign Risk
(t-statistic in parentheses)

	All countries				High-debt countries			
	1980-2003	1980-91	1992-98	1999-2003	1980-2003	1980-91	1992-98	1999-2003
	(1)	(1)			(1)	(1)		
Intercept	19.94 (32.27)	22.48 (21.46)	20.5 (19.53)	11.98 (15.99)	23.85 (20.66)	26.5 (10.74)	25.69 (12.18)	16.12 (8.25)
Change in Debt/GDP ratio	0.83 (6.36)	0.99 (4.36)	0.33 (1.85)	-0.13 (-0.53)	0.98 (4.71)	0.72 (1.60)	0.69 (2.18)	0.51 (1.00)
R^2	0.11	0.11	0.03	0.004	0.16	0.05	0.13	0.04
Number of observations	322	154	98	70	115	55	35	25
Intercept	15.64 (22.59)	19.17 (16.38)	13.08 (8.71)	12.10 (18.63)	15.25 (9.74)	16.61 (3.96)	15.22 (5.50)	14.08 (9.98)
Net borrowing	1.45 (11.59)	1.14 (6.40)	1.81 (6.37)	0.40 (1.53)	1.64 (7.86)	1.39 (3.15)	2.12 (4.67)	1.31 (1.73)
R^2	0.31	0.20	0.3	0.03	0.34	0.15	0.40	0.12
Number of observations	336	168	98	70	120	60	35	25

(1) Data start from 1981 when the dependent variable is the change in debt/GDP ratio.

Table 4A

Dependent Variable: Yield Spread

(t-statistic in parentheses)

	All countries				High-debt countries			
	1980-2003 (1)	**1980-91** (1)	**1992-98**	**1999-2003**	**1980-2003** (1)	**1980-91** (1)	**1992-98**	**1999-2003**
Constant	1.38 (10.19)	2.39 (10.74)	1.52 (8.68)	0.25 (6.07)	1.08 (4.78)	1.65 (5.44)	1.72 (4.70)	0.33 (3.38)
Change in Debt/GDP ratio differential	0.14 (5.78)	0.04 (1.03)	0.17 (6.18)	0.01 (1.50)	0.16 (4.73)	0.08 (1.33)	0.17 (3.86)	0.03 (1.86)
Inflation differential	0.56 (18.48)	0.44 (12.73)	1.09 (15.87)	0.02 (0.94)	0.85 (14.37)	0.72 (12.96)	1.22 (12.69)	0.03 (0.52)
R^2	0.60	0.58	0.76	0.04	0.74	0.81	0.88	0.14
Number of observations	279	123	91	65	104	44	35	25
Constant	1.12 (8.98)	2.26 (10.37)	0.70 (4.30)	0.25 (6.08)	0.42 (1.95)	1.16 (2.45)	0.58 (2.17)	0.30 (3.74)
Net borrowing differential	0.23 (8.52)	0.08 (2.13)	0.40 (7.78)	0.02 (1.67)	0.31 (7.30)	0.16 (2.19)	0.44 (5.65)	0.07 (3.12)
Inflation differential	0.50 (17.96)	0.42 (13.03)	0.86 (12.50)	0.02 (0.67)	0.62 (11.42)	0.56 (9.94)	1.00 (10.34)	0.05 (1.03)
R^2	0.65	0.60	0.80	0.05	0.77	0.78	0.91	0.31
Number of observations	289	133	91	65	108	48	35	25

(1) Data start from 1981 when the dependent variable is the change in debt/GDP ratio.

Table 5A

Dependent Variable: Structural Primary Budget Balance
(t-statistic in parentheses)

	All countries				High-debt countries			
	1981-2003	1981-91	1992-98	1999-2003	1981-2003	1981-91	1992-98	1999-2003
Constant	–0.05	0.03	–0.14	–0.11	–0.09	0.02	–0.55	–0.1
	(–2.29)	(0.49)	(–2.17)	(–1.04)	(–2.69)	(0.13)	(–5.17)	(–0.36)
STRUCT(–1)	0.68	0.35	0.58	0.45	0.62	0.52	–0.25	0.28
	(16.04)	(3.30)	(6.87)	(4.60)	(7.60)	(3.94)	(–1.62)	(1.40)
SPREAD(–1)	–0.17	–0.05	–0.16	–0.67	–0.14	–0.18	0.12	–0.68
	(–3.47)	(–0.57)	(–1.69)	(–3.04)	(–2.28)	(–1.12)	(1.35)	(–2.44)
DEBT(–1)	–0.04	–0.09	–0.03	–0.11	–0.05	–0.07	–0.12	–0.11
	(–5.98)	(–4.82)	(–2.15)	(–3.29)	(–4.75)	(–1.86)	(–5.60)	(–1.82)
Number of obs.	230	84	81	65	93	35	33	25

Table 6A

Dependent Variable: Structural Primary Budget Balance
(t-statistic in parentheses)

	All countries				High-debt countries			
	1981-2003	1981-91	1992-98	1999-2003	1981-2003	1981-91	1992-98	1999-2003
Constant	–0.003	0.05	–0.12	0.01	–0.09	–0.06	–0.05	–0.28
	(–0.16)	(0.93)	(–1.62)	(-0.49)	(–2.44)	(–0.30)	(–5.10)	(–0.92)
STRUCT(–1)	0.68	0.38	0.54	0.46	0.62	0.39	–0.15	0.24
	(17.74)	(3.73)	(7.88)	(4.95)	(8.63)	(3.08)	(–1.21)	(1.20)
CREDIT RISK(–1)	–0.03	–0.09	–0.02	–0.06	–0.06	–0.18	0.27	–0.17
	(–1.22)	(–1.64)	(–0.24)	(–1.51)	(–1.63)	(–1.73)	(3.31)	(–2.74)
DEBT(–1)	–0.04	–0.1	–0.03	–0.07	–0.04	–0.05	–0.17	–0.09
	(–4.67)	(–4.67)	(–1.82)	(–2.38)	(–3.36)	(–1.18)	(–6.95)	(–1.69)
Number of obs.	267	107	90	70	97	37	35	25

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