Monetary Integration, Soft Budget Constraints, and the EMU Sovereign Debt Crises

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Abstract

One possible explanation for the European sovereign debt crises is that the European Economic and Monetary Union (EMU) gave rise to consolidation fatigue or even deliberate over-borrowing. This paper explores the validity of this explanation by studying how three decisive stages in the history of the EMU affected public borrowing in EU member states: the signing of the Maastricht treaty in 1992, the introduction of the Euro in 1999, and the suspension of the SGP in late 2003. The methodology relies on difference-in-difference regressions covering 26 OECD countries over the 1975-2009 period. The findings indicate that the first two "treatments" reduced deficits especially in traditional high-deficit countries. In contrast, the watering down of the original SGP encouraged borrowing in countries which traditionally have had high deficits.

Keywords: EMU, monetary union, fiscal policy, public deficits
JEL codes: F15, F42, H62, H63

1 Introduction

The ongoing sovereign debt crises represent the greatest challenge the European Union (EU) has encountered so far.[1] To address this challenge, European policy makers have adopted unprecedented measures. EU member states and the IMF provided low-interest loans – essentially a bailout – to Greece, Ireland, and Portugal. The European Central Bank intervened by buying government securities on secondary markets (Buiter and Rahbari, 2010). In addition, the European Financial Stability Facility and the European Financial Stabilization Mechanism[2] were created to channel resources to any EU country that should come to face fiscal difficulties in the future (Sibert, 2010).

These measures are intended to cope with the current and any future emergencies, but to avoid future sovereign debt crises in the first place, it is widely argued that policy makers must fundamentally reform the fiscal structures that underlie the European Economic and Monetary Union (EMU). There is, however, disagreement as to how the EMU should be reformed since it remains unclear what caused the sovereign debt crises. One possibility is that the crises were caused by the EMU itself. The argument is that some countries, once they had been admitted into the Euro area, anticipated that they would receive a bailout in case of a fiscal crisis because the "other" member states would be unable to afford the default of a fellow member state, either for political reasons or because of financial contagion. Therefore, the individually perceived costs of public debt fell below the social costs. This reduction in the perceived costs of borrowing resulted in incentives to either relax consolidation efforts or even to deliberately over-borrow.

The theoretical literature on fiscal federalism gives credence to this explanation for the sovereign debt crises. Contributions such as Wildasin (1997), Goodspeed (2002), and Cooper et al. (2008) show theoretically that in a federation, the budget constraints of sub-national governments will become soft if the federal government or "other" member states

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[1]Former ECB President Jean-Claude Trichet, for example, claimed that Europe is facing "the worst crisis since the Second World War" (http://www.guardian.co.uk/business/2011/aug/09/european-debt-crisis-trichet-spain-italy-bonds).

[2]These facilities are temporary and will be replaced in 2013 by the permanent European Stability Mechanism.

of the federation cannot commit to a no-bailout policy.[3] One possible consequence of such soft budget constraints is sub-national over-borrowing. The EU has many trappings of a federation, and while there is not yet a real federal government that can bail out an indebted member state, "other" members can easily assume this role (and have done so recently). Indeed, Cooper et al. (2008) apply their theoretical results to discuss the possibility of bailouts and soft budget constraints within the EU.

During the current crises, different reform proposals have been made, ranging from tightening the stipulations in the Stability and Growth Pact (SGP) and increasing the fiscal powers of the EU to expelling certain member states from the Euro area or disbanding the Euro altogether.[4] To determine the relative merits of such proposals, it is necessary to establish the underlying causes for the European sovereign debt crises. In particular, it remains unclear whether the sovereign debt crises emerged because of lax fiscal policies that were implemented in view of bailout expectations or whether the debt crises ensued because of unfortunate economic developments unrelated to the EMU and outside of the control of member states. Against this backdrop, the aim of this paper is to empirically test whether the EMU led to soft budget constraints and consequently created incentives to relax consolidation efforts or even to deliberately over-borrow.

Different methodologies have been used in the literature to test for soft budget constraints in fiscal federations. Pettersson-Lidbom (2010) studies soft budget constraints in Swedish municipalities by using past bailouts of "neighboring" municipalities as instru-

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[3] *Soft budget constraint* is a term coined by Kornai (1986) to explain the behavior of socialist firms in pre-1990 Hungary. The term originally described the phenomenon that ailing firms in socialist economies could expect to receive a bailout from the state. For ideological reasons, the state could not tolerate bankruptcies or layoffs. But since the managers of the firms could then reasonably harbor bailout expectations, they did not have sufficient incentives to adhere to their budget constraints: their budgets became soft. It was recognized that the soft budget constraints concept, which essentially refers to a type of moral hazard, could also be used to describe various economic phenomena in market economies, such as the borrowing policies of sub-national jurisdictions in fiscal federations.

[4] Endowing the EU with more fiscal resources and political authority seems to be the favored response of national policy makers and European officials. See for example a speech by European Commission President José Manuel Barroso where he states that "we need more, not less Europe" (http://www.cbe.es/eventos/actualitat/archivos/52/suportBarroso.pdf). On the other hand, the electoral success of parties that are skeptical towards the EU indicates that significant parts of the European electorate favor less integration and more national autonomy, even to the extent of excluding some countries from the Euro-are or and returning to national currencies. Consider, for example the recent electoral gains by the Euro-skeptical True Finns party in Finland.

ments for bailout expectations. He finds that municipalities that harbor "larger" bailout expectations tend to borrow more. Rodden (2005) investigates whether German States face soft budget constraints by studying whether fiscally strong states respond differently to negative fiscal shocks than fiscally weak states. Baskaran (2012) studies the same question as Rodden (2005) but applies a different methodology. His methodology relies on the idea that if German States face soft budget constraints, then their borrowing should be characterized by horizontal or vertical strategic interactions.[5]

As these papers indicate, there is no single empirical methodology to test for soft budget constraints. Rather, the methodology has to be tailored to the specific federation that is analyzed. Our approach to study this question for the Euro area depends on determining the causal effect of three important stages of the EMU on public borrowing: the signing of the Maastricht treaty in 1992, the introduction of the Euro in 1999, and the failure of the European Council in late 2003 to censure France and Germany after their breach of the 3% deficit criterion (i. e. the suspension of the original SGP).

To identify the causal effects of these three stages, we rely on a sample covering 26 OECD countries (including all EU 15 countries) over the 1975-2009 period.[6] We perceive the three stages described above as policy treatments and split the sample in appropriately defined treatment and control groups and estimate difference-in-difference regressions. Once we have identified the causal effect in the difference-in-difference framework, we interpret these with respect to the original research question: whether or not soft budget constraints are responsible for the European sovereign debt crises.

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[5]Note that there is a related literature that investigates the influence of IMF bailouts on creditor moral hazard (see for example Dell'Ariccia et al. (2006) and Lee and Shin (2008)). This literature is distinct from our investigation in two ways. First, it focuses on the influence of bailout expectations on the extent of investors' risky lending behavior rather than the borrowing decisions of politicians. Second, the IMF is an international financial institution that is organized differently and has other objectives than a fiscal federation or a monetary union.

[6]See Table 1 for a list of all countries in our dataset.

2 A short history of the EMU

The EMU is a political project that was initiated in a rudimentary form already in the 1960s. After early setbacks, it reappeared on the agenda in the early 1990s (Verdun, 2007). While much of its recent history was a sequence of small steps consisting of a multitude of obscure negotiations and agreements, there were a few decisive breakthroughs. The first was the signing of the Maastricht treaty in 1992. This treaty contained many provisions, but the most important one revolved around an expressed commitment of the twelve member states of the then European Economic Community to a common currency. To facilitate the introduction of the common currency, the *Euro*, the treaty spelled out a number of monetary and fiscal convergence criteria. The fiscal criteria defined a limit on the deficit to GDP and the debt to GDP ratio: countries that wished to enter the Euro area were effectively required to have a deficit to GDP ratio of less than 3% and a debt to GDP ratio of less than 60% prior to entry.

The rationale for the fiscal criteria were the apprehensions of some member states that the EU would devolve into a "transfer union" after the introduction of a common currency, redistributing resources from rich to poor countries. In particular, it was argued that some countries could over-borrow and then demand a bailout from the remaining member countries. A related argument was that indebted member states could pressurize the ECB to pursue an inflationary policy in order to reduce their real burden of debt and thus provide them with a "monetary" bailout. By requiring fiscal convergence, it was expected that all Euro member states would find themselves along a stable fiscal path when the currency was to be introduced. However, the treaty also contained a stipulation that was commonly interpreted as a no-bailout clause.

The Maastricht criteria were further developed and adapted in the SGP to ensure that member states would continue to run sound fiscal policies after they had been admitted into the Euro area. In particular, the Pact consisted of a preventive and dissuasive arm. The preventive arm was aimed at avoiding excessive deficits in the first place, while

the dissuasive arm was supposed to deal with excessive deficits once they have occurred (Beetsma and Giulidori, 2010). In particular, the dissuasive arm codified the procedures through which member states that breached the 3% ceiling were to be sanctioned in the post-Euro period.

When the Euro was launched in 1999, eleven countries were deemed to comply with the convergence criteria and thus admitted into the Euro area. Greece followed suit two years later. These determinations were not uncontroversial. In particular, it was argued that several countries only managed to comply with the convergence criteria because of creative accounting or one-off budgetary tricks (Savage, 2001). Nevertheless, three countries that were in principle eligible to enter the Euro area effectively declined: Denmark, Great Britain, and Sweden.

Soon after the introduction of the Euro, the European economies were hit by a recession. Several countries breached the 3% ceiling already in the first five years after the start of the common currency: Portugal in 2001, France and Germany in 2002, the Netherlands and Greece in 2003, and Italy in 2004 (Morris et al., 2006). As a consequence, the European Commission, in compliance with the provisions of the SGP, initiated excessive deficit procedures against these countries. However, it soon became apparent that the stipulations of the SGP would not be seriously enforced. Most notably, the decision of the Council not to censure France and Germany after these two countries failed to comply with the Council's recommendations to reduce deficits from early/mid 2003 signified that the SGP was unenforceable against the bigger member states. The SGP was thus put in abeyance in late 2003.

The SGP could not remain in abeyance indefinitely. It had been argued that the original SGP was not sufficiently flexible to respond to business cycle fluctuations. While it was politically opportune to keep some type of limits on fiscal policy, European policy makers decided to account for the macroeconomic cycle in evaluating member states' deficits. The reformed SGP was put into place in 2005. This SGP was more flexible in accounting for the business cycle, but it was also far less transparent than the original

Pact. It retained in principle the 3% deficit ceiling, but applied it effectively to cyclically adjusted figures. Moreover, a number of exceptions were formulated under which member states were exempted from fulfilling the criteria.

3 Empirical model

It follows from the historical overview that either the introduction of the Euro or the suspension of the SGP could have resulted in soft budget constraints in some member states, causing them to relax consolidation efforts and return to pre-Maastricht borrowing levels or even to borrow more than in the pre-Maastricht period. We test this conjecture by perceiving the signing of the Maastricht treaty, the introduction of the Euro, and the suspension of the SGP as policy treatments and relating these treatments to public borrowing in EU 15.[7]

In general terms, we want to estimate the average effect of a treatment e on an outcome y. If the treatment were random, an unbiased estimate of the treatment effect could be obtained by comparing the outcome variable in countries that were affected by treatment with that in countries that did not experience the treatment in the post-treatment period:

$$\hat{\beta} = \overline{y}_{t=1,e=1} - \overline{y}_{t=1,e=0}, \tag{1}$$

where y is the outcome variable, and $t = 1$ indicates the post-treatment period, and $e = 0, 1$ indicates whether a country was affected by the treatment.

One problem with Equation 1 is that each of the three interventions that we study in this paper were clearly not random. Countries that signed the Maastricht treaty and subsequently introduced the Euro and were affected by the suspension of the SGP were a select group. Most obviously, they had to be located in Europe. It is possible that countries that experienced either of the treatments have systematically different levels of

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[7]Previous empirical evidence regarding the fiscal effects of some of the EMU interventions, albeit usually with a different focus, is provided by Baskaran (2009), von Hagen (2006), Galí and Perotti (2003), Marinheiro (2005), Wyplosz (2006), and Candelon et al. (2009).

public borrowing than countries in the control group. Consequently, any estimate of the average treatment effect based on Equation 1 could be biased.

The idea behind the difference-in-difference approach is to difference out from Equation 1 any observed and unobserved country-specific and time-invariant factors that might affect the deficit. This idea can be implemented by subtracting the averages of the outcome variable in both the treatment and control groups prior to the treatment from the respective post-treatment averages. Any remaining difference in the outcome variable between the control and treatment groups in the post-treatment period is ascribed to the treatment:

$$\hat{\beta} = (\overline{y}_{t=1,e=1} - \overline{y}_{t=0,e=1}) - (\overline{y}_{t=1,e=0} - \overline{y}_{t=0,e=0}) \tag{2}$$

In other words, in the difference-in-difference framework the difference in the difference of the outcome variables is attributed to the treatment.

We define as the treatment group for the Maastricht intervention all EU 12 countries that signed the Maastricht treaty in 1992 and the three former EFTA countries – Austria, Finland, and Sweden – that joined the EU in 1995. The treatment group for the Euro intervention are the twelve EU 15 countries that have introduced the Euro. The treatment group for the "suspension of SGP" treatment overlaps with the treatment group for the Euro treatment. The control groups in each case are all "other" countries in the sample, both European countries that are not members of the Eurozone and other OECD countries.

In addition to the control and treatment groups, we split the sample into appropriately defined treatment periods. The Maastricht intervention period is assumed to start in 1992 for all countries in the treatment group except the three former EFTA members. Since these countries entered the EU only in 1995, the Maastricht treatment sets in for these countries in this year. The Euro intervention is defined to begin in 1999 for all countries except Greece. Since Greece introduced the Euro only in 2001, the treatment sets in for this country only in this year. The Euro treatment ends for all treated countries in 2003.

In 2004, the suspension of SGP treatment to set in for all countries in the sample, since the corresponding decision was made by the Council in late 2003. This treatment runs until 2008, i. e. the end of the sample period.

Follwing much of the literature, we implement the difference-in-difference methodology in a linear regression framework. The basic empirical model is

$$\text{Deficit}_{it} = \alpha_i + \gamma_t + \beta_1 \text{EMU } 1992_{it} + \beta_2 \text{EMU } 1999_{it} + \beta_3 \text{EMU } 2004_{it} + \epsilon_{it}, \qquad (3)$$

where Deficit_{it} is an indicator for the borrowing of country i in year t, α_i country and γ_t time fixed effects, and ϵ_{it} is a random shock.

The covariates of interest are EMU 1992, EMU 1999, and EMU 2004, which are dummy variables indicating whether a country was signed the Maastricht treaty, introduced the Euro, or was affected by the suspension of the SGP in late 2003. To measure public borrowing, we use the primary deficit to GDP ratio. The primary deficit is defined as government net borrowing minus interest payments. This deficit measure captures the government's discretionary fiscal policy reasonably well since it partials out interest payments and relies exclusively on current expenditures and revenues.[8] Figure 1 shows for all countries in the sample the average primary deficit to GDP ratio in the different periods considered in this paper. The definitions of all variables can be retrieved from Table A.3. Summary statistics are provided in Table A.4.

The formulation in Equation 3 reveals under what conditions the difference-in-difference estimator will result in biased estimates. The first is that despite the inclusion of country-fixed effects, there might remain omitted variables that affect both the likelihood of treatment and the value of the deficits. The reason we restrict the sample in this paper to 26 OECD countries is to address this point. These OECD countries are reasonably homo-

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[8]We use data on the primary deficit to GDP ratio from the OECD's Economic Outlook no. 90 database. However, this version of the database does not provide data for some countries in the earlier parts of the sample period. In these cases, we use data from the no. 87 version of the Economic Outlook, the latest version that provides the relevant data. The correlation in primary deficit to GDP ratio between both datasets is high, i. e. 0.99. Moreover, deficit values for country-year pairs for which both versions of the database provide data are generally very similar.

geneous in economic and political terms. They had, in particular, comparable levels of economic development and political freedom before the treatments.Table 2 presents the corresponding evidence. The primary deficit to GDP ratio in the pre-Maastricht period did not differ between EU 15 and non-EU 15 countries. Differences in other macroeconomic variables such as the unemployment rate or inflation rate are not significant either. It hence seems plausible to perceive the treatments as essentially random, especially when conditioned on country and year fixed effects.

Additionally, it is possible to account for omitted variable bias by including time-varying control variables. Yet, including control variables in this framework is not unproblematic because they might be affected by the treatments themselves, which complicates the interpretation of the estimates (Angrist and Pischke, 2009).[9] Nevertheless, it would be reassuring if the results with and without control variables are roughly equivalent. Consequently, we report regressions results where we include as control variables (i) trade openness, (ii) the dependency ratio, (iii) the inflation rate, (iv) GDP growth, (v) the unemployment rate, (vi) the interest rate, (vii) government ideology, and (viii) government fragmentation. This set of control variables should cover the main economic and political determinants of deficits.

The second reason why difference-in-difference estimates might be biased is that group or country-specific trends in public borrowing are correlated with the onset of the treatments. One approach to check for heterogeneous trends is to plot an indicator for public borrowing separately for EU 15 and non-EU 15 countries over time. With such a plot, it is possible to visually determine whether the series for the two sets of countries diverge over time. Figure 2 plots the primary deficit to GDP ratio for EU 15 and non-EU 15 countries. Visual inspection suggests that especially in the post-Maastricht period, the

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[9]For example, assume that we control for the unemployment rate. The Maastricht intervention might have affected the unemployment rate and the same time the deficit. In particular, unemployment might have increased in the aftermath of Maastricht because countries consolidated. Consequently, the Maastricht intervention and the unemployment rate will be correlated, and it will become difficult to identify the effect of the Maastricht treaty from that of the unemployment rate. In econometric terms, multicollinearity between the unemployment rate and the EMU 1992 dummy might result in insignificant estimates for the EMU 1992 intervention, even if it in reality affects the deficit.

series evolve similarly. Yet even though the assumption of common trends in the treatment and control groups does not appear to be too far off, it is unrealistic to expect that it holds perfectly, especially in finite samples. Moreover, some noticeable divergences are obvious in the pre-Maastricht period. Therefore, we will account in the estimations for possibly non-homogeneous trends by controlling for group-specific and country-specific trends.

4 Average treatment effects

Figure 2 allows for a preliminary assessment of the average treatment effects. It appears that a few years after the signing of the Maastricht, primary deficits declined faster in EU 15 and in non-EU 15 countries. Deficits in EU 15 countries remained below deficits in non-EU 15 countries during most of the 1999-2003 period. However, around 2004 deficits declined more strongly in the non-EU 15 than in EU 15 countries. In the post-2004 period, average deficits in EU 15 and non-EU 15 countries were basically identical. These findings suggest the conclusion that the Maastricht treaty had a negative effect on deficits in EU 15 countries. The suspension of the original SGP, on the other hand, appears to have had a positive effect.

Does a more systematic analysis confirm this conclusion? Baseline estimates for the average treatment effects based on Equation 3 are reported in Table 3. We report four models. All models include country and year fixed effects. The first model does not include any group- or country-specific trends. The second model includes a group-specific trend and the third model includes a country-specific trend. Finally, the last model includes a country-specific trend and additional control variables.

Hypothesis tests are based on heteroscedasticity-robust and clustered standard errors (Bertrand et al., 2004). However, the number of clusters is limited, i. e. there are only 26 countries. Cameron et al. (2008) show that inference can be biased if the number of clusters is less than 30. They find that the wild bootstrap standard errors perform

well in such circumstances. We therefore provide the wild bootstrap p-values below the coefficient estimates in brackets.

Consistent with the graphical analysis from Figure 2, there appears to be some evidence that the Maastricht treaty (EMU 1992) had a negative effect on borrowing (the estimated coefficient is consistently negative) while the reform of the SGP (EMU 2004) had a positive effect (the estimated coefficient is consistently positive). However, the coefficient is only significant in model (I), both based on conventional and wild bootstrap hypothesis tests. The Euro intervention dummy (EMU 1999) is consistently negative but never significant. Overall, these results suggest that the signing of the Maastricht treaty had on average a negative effect on borrowing. The introduction of the Euro did not result in a noticeable relaxation of consolidation efforts, even though the estimated coefficient is consistently smaller in absolute terms than that for the Maastricht intervention. The suspension of the SGP, on the other hand, appears to have increased borrowing in EMU countries relative to the prior periods. Nevertheless, while such an interpretation is appealing, the statistical insignificance of the estimates is worrisome. One reason why the results might be relatively weak could be that there are heterogeneous treatment effects. We address this possibility in the next section.

5   Effect heterogeneity

The previous results impose the ex-ante assumption that the effect of the treatments was the same in all countries. This is a strong assumption given the heterogeneity of the EU 15 group. One dimension along which EU 15 countries differ is their historical attitude toward stable fiscal policies. Some countries have traditionally incurred small deficits while others had persistently high deficits and high levels of borrowing before the signing of the Maastricht treaty. Consequently, it might be worthwhile to explore whether the effect of the treatment has varied in different set of countries.

In Figure 3, we report the coefficient estimates and 90% confidence intervals (standard errors are based on heteroscedasticity robust and clustered standard errors) from models where the effect of the treatments is allowed to vary between three sets of countries. EU 15 countries are classified according to their average deficit in the pre-Maastricht period: those below the 33th percentile with respect to their average primary deficit to GDP ratio are classified as low-deficit countries, those between the 33th and 66th percentile are classified as middle-deficit countries, and those above the 66th percentile are classified as high-deficit countries. By this definition, we find that low deficit countries are Denmark, Finland, Ireland, Luxembourg, and Sweden. Countries with average deficits are France, Germany, Netherlands, Portugal, and the UK. Countries with high deficits are Austria, Belgium, Greece, Italy, and Spain. The regression results that correspond to Figure 3 are reported in Table A.1.[10]

The point estimates and confidence intervals indicate that the responses to the treatments were indeed heterogeneous. The Maastricht treatment had a significantly negative effect in the high-deficit countries. These countries reduced their deficits in the immediate aftermath of the treaty. For low- and middle-deficit countries, the Maastricht treaty had no statistically significant effect. The introduction of the Euro also had heterogeneous effects. It seemingly caused the low-deficit countries to run even more frugal fiscal policies (this conclusion has to be qualified to some extent, however, because the wild bootstrap p-values reported in Table A.1 are insignificant). In the high-deficit countries, the EMU 1999 intervention was statistically insignificant. However, the coefficient remains negative. Ignoring the statistical insignificance for the moment, it appears that high-deficit

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[10] The model underlying Figure 3 is an extension of Equation 3. More specifically:

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\begin{aligned}
\text{Deficit}_{it} =\ & \alpha_i + \gamma_t \\
& + \beta_{1,L}\,\text{EMU } 1992 \times LOW + \beta_{2,L}\,\text{EMU } 1999 \times LOW + \beta_{3,L}\,\text{EMU } 2004 \times LOW \\
& + \beta_{1,M}\,\text{EMU } 1992 \times MIDDLE + \beta_{2,M}\,\text{EMU } 1999 \times MIDDLE + \beta_{3,M}\,\text{EMU } 2004 \times MIDDLE \\
& + \beta_{1,H}\,\text{EMU } 1992 \times HIGH + \beta_{2,H}\,\text{EMU } 1999 \times HIGH + \beta_{3,H}\,\text{EMU } 2004 \times HIGH \\
& + \text{Country-specific trends} \\
& + \epsilon_{it}.
\end{aligned}
$$

$$(4)$$

countries continued to run relatively frugal policies compared to the pre-Maastricht period even after the Euro had been introduced. For middle-deficit countries, we find no statistically significant effect the EMU 1999 intervention.

The conclusions change substantially for high-deficit countries in the post-2004 period. Once the Council failed to censure France and Germany, high deficit countries noticeably relaxed consolidation efforts. Deficits in this group of countries increase to pre-Maastricht levels: the estimated coefficient is very close to zero. The low-deficit countries, on the other hand, continued to run more frugal fiscal policies than in the pre-Maastricht period. For middle-income countries, we observe no statistical differences between the pre-Maastricht and post-2004 period.

The insignificance of the average effect of the three treatments reported in Table 3 is therefore to some extent due to effect heterogeneity. The low- and high-deficit countries were affected differently by the various treatments, in particular by the signing of the Maastricht treaty and the suspension of the SGP. Once the heterogeneity is taken into account, we observe that the treatments have significant effects.

While the previous results take possible heterogeneity in the response to the treatments into account, one shortcoming is that we imposed ex-ante that any heterogeneity evolves along the primary deficit to GDP ratio in the pre-Maastricht period. A more general approach to allow for possibly heterogeneous effects is by means of quantile regressions. Quantile regressions show how the treatment has affected different quantiles of the conditional distribution of the primary deficit to GDP ratio. That is, with this approach we can explore whether e.g. the high-deficit observations in the e.g. pre-Maastricht period had even higher deficits in the immediate post-Maastricht period.

The results of the quantile regressions are collected in Figure 4. Each subfigure shows for the respective intervention the quantile coefficient estimates. For the EMU 1992 intervention, subfigure (a) suggests that all but the highest quantile were statistically unaffected. The primary balance to GDP ratio in the 90th quantile, on the other hand, declined significantly in the aftermath of the signing of the Maastricht treaty. The EMU

1999 intervention, too, displays no effect on primary deficits for all but the highest quantiles. In the 90th quantile, we observe a negative and almost statistically significant effect. According to the estimates, the highest quantiles continued to exhibit relatively frugal fiscal policies even after the signing of the introduction of the Maastricht. The EMU 2004 intervention displays a positive coefficient for all quantiles. The coefficient is significant or almost significant for all but the 10th quantile. This indicates that fiscal policies became laxer in Euro area countries after the reform of the SGP (however, note that the standard errors do not account for intra-country clustering).

The quantile estimates confirm in large parts the results reported in Figure 3 for the Maastricht and Euro interventions. They suggest that these two interventions affected primarily high-deficit countries: they borrowed less than in the pre-Maastricht period. The findings are slightly different with respect to the effect of the reform of the SGP. They suggest that this intervention led to higher deficits than in the pre-Maastricht period in all but the countries with the lowest deficits. Consequently, the quantile estimates suggest that the failure to censure France and Germany did not only result in less consolidation efforts but may even have caused deliberate over-borrowing in almost all Euro area countries.

6   Conclusions

It is possible that the ongoing sovereign debt crises in Europe are a consequence of critical mistakes made during the history of the EMU. The introduction of the Euro and the failure to censure France and Germany combined with the subsequent reform of the SGP may have caused soft budget constraints, which in turn led to consolidation fatigue or even deliberate over-borrowing. The estimates presented in this paper support this explanation. While the interventions had no statistically significant effect on average, we find that high-deficit countries reduced their primary deficit to GDP ratio significantly once the Maastricht treaty was signed. They continued to run relatively frugal fiscal poli-

cies even after the Euro had been introduced. However, once the Council failed to follow through with the excessive deficit procedure against France and Germany, the high-deficit countries returned to their pre-Maastricht levels of borrowing. The quantile regression results are consistent with the findings from the standard difference-in-difference models. It is interesting to note that the high-deficit countries are almost identical to the so called PIIGS countries. The only exception is Ireland, which had a very low primary deficit to GDP ratio in the pre-Maastricht period.

Consequently, it appears that the inability of the Council to impose sanctions on France and Germany provided a signal to high-deficit countries that it is acceptable to succumb to any consolidation fatigue they may have harbored after the introduction of the Euro. It is thus a plausible conclusion that the sovereign debt crises are at least partially caused by the relaxation of consolidation efforts after 2004. The question is why the traditional high-deficit countries believed that a relaxation of consolidation efforts would be a sustainable strategy. Returning to pre-Maastricht deficit levels must have appeared as an unsustainable policy given that these countries could not monetize their public debt after monetary authority had been transferred to the ECB. A plausible explanation is that the high-deficit countries expected that they would get a bailout once levels of debt became unsustainable. Once France and Germany could break the deficit ceiling with impunity and the SGP had been reformed, some countries apparently believed that they would not be held responsible if they should come to face a fiscal crisis.

This conclusion suggests that to avoid sovereign debt crises in the future, fundamental reforms to the fiscal structures that underlie the EU are necessary. The question is what type of reforms should be pursed. Our findings indicate that providing additional fiscal resources to EU institutions or introducing an European intergovernmental transfer mechanism that channels resources from wealthier to poorer states is not a reasonable strategy. Once EU institutions receive independent fiscal powers or a formal transfer scheme is introduced, the feasibility and thus the likelihood of a bailout increases from the perspective of all countries that might consider expanding their borrowing. These

soft budget constraints that were found to exist in some member countries of the EMU would only be reinforced.

On the other hand, our results do not suggest that a common currency must necessarily result in unsustainable fiscal policies. Given that the relaxation of the consolidation efforts took place only after the apparent inability of the Council to censure two important EU member countries and the subsequent weakening of the deficit stipulations in the SGP, one apparent way forward is a tightening of the stipulations. There have been indeed attempts to reform the SGP recently, and these may result in a re-hardening of budget constraints.

However, strict rules were believed to exist in the past and yet soft budget constraints ensued. In other words, it is questionable whether any new rules will be effective at this point. In view of such considerations, the true challenge appears to be enforceability of the rules. An effective strategy to prevent debt crises in the future could be to provide EU-institutions with the authority to police and, if necessary, intervene in the fiscal policy of member states. An independent supranational authority could be created with the power to rewrite national budgets in cases where this independent authority determines that a budget is unsustainable (Schuknecht et al., 2011). Administrative instead of fiscal centralization may consequently be the best way to avoid future sovereign debt crises. Even though the current crises provide a compelling opportunity to pursue such reforms, it will be difficult to convince member states to submit to central control of their national budgets. In addition, such reforms are bound to raise questions of democratic legitimacy. Nevertheless, European policy makers may prefer to face such questions than to face an EU stuck in perpetual crisis.

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Table 1: Included countries and their treatments

Country name	Maastricht treaty (*EMU 1992*)	Euro introduction (*EMU 1999*)	Suspension of SGP (*EMU 2004*)
Australia			
Austria	×	×	×
Belgium	×	×	×
Czech Republic			
Denmark	×		
Finland	×	×	×
France	×	×	×
Germany	×	×	×
Greece	×	×	×
Spain	×	×	×
Sweden	×		
United Kingdom	×		
Canada			
Japan			
Korea, Republic of			
Luxembourg	×	×	×
Netherlands	×	×	×
New Zealand			
Norway			
Poland			
Portugal	×	×	×
Hungary			
Iceland			
Ireland	×	×	×
Italy	×	×	×
United States			

[1] This table lists all countries that are included in at least one of the estimated models

[2] Countries that have signed the Maastricht treaty in 1992 and the former EFTA countries that entered the EU in 1995 (Austria, Sweden, Finland) are indicated with *EMU 1992*, countries that have introduced the Euro in 1999 or, in the case of Greece in 2001, are indicated with *EMU 1999*, countries that were affected by the failure of the European Council to censure France and Germany and the suspension of the SGP are indicated with *EMU 2004*.

Table 2: Differences in pre-treatment characteristics (i.e. pre-1992) of EU 15 and non-EU 15 countries

		Non-EU 15 members	EU 15 members	Difference		
Primary deficit to GDP ratio	Mean	0.640	0.867	-0.227	t-statistic	-0.278
	Std. Error	(0.659)	(0.482)	(0.816)	p-value	0.783
	N	121	235			
Inflation	Mean	15.683	8.952	6.731	t-statistic	0.677
	Std. Error	(7.848)	(6.113)	(9.948)	p-value	0.505
	N	148	254			
GDP growth	Mean	2.457	2.133	0.324	t-statistic	0.459
	Std. Error	(0.568)	(0.420)	(0.706)	p-value	0.650
	N	138	255			
Unemployment rate	Mean	4.659	6.044	-1.385	t-statistic	-1.100
	Std. Error	(0.993)	(0.773)	(1.258)	p-value	0.284
	N	136	221			
Interest rate	Mean	6.350	9.549	-3.199	t-statistic	-1.465
	Std. Error	(1.658)	(1.420)	(2.183)	p-value	0.156
	N	187	255			

[1] This table compares key macroeconomic variables in the pre-1992 period between EU 15 and non-EU 15 OECD countries. Averages, differences, t-statistics, and corresponding p-values are collected in this table. Standard errors are adjusted for intra-country clustering.

Table 3: EFFECT OF EMU ON PRIMARY DEFICIT TO GDP RATIO, DIFFERENCE IN DIFFERENCE ESTIMATIONS, 1975-2009

|	(I)	(II)	(III)	(IV)
EMU 1992	-1.557*	-1.276	-1.346	-1.163
	(0.894)	(1.075)	(1.090)	(0.970)
	[0.092]	[0.276]	[0.256]	[0.292]
EMU 1999	-1.157	-0.615	-0.609	-0.079
	(1.033)	(1.690)	(1.672)	(1.326)
	[0.294]	[0.760]	[0.758]	[0.986]
EMU 2004	0.688	1.430	1.369	0.890
	(1.083)	(2.182)	(2.230)	(1.904)
	[0.588]	[0.606]	[0.606]	[0.664]
Country dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Control variables	No	No	No	Yes
Group-specific trend	No	Yes	No	No
Country-specific trend	No	No	Yes	Yes
Countries	26	26	26	26
N	818	818	818	741
F	1.780	12.586	1.463	4.770

[a] This table presents difference in difference style regressions that relate three distinct stages of the EMU to the primary deficit to GDP ratio.

[b] Stars indicate significance levels at 10%(*), 5%(**) and 1%(***).

[c] Standard errors (clustered at the country level and heteroscedasticity robust) are given in parentheses below each coefficient estimate.

[d] Wild bootstrap p-values are given in brackets below each coefficient estimate.

[e] Control variables in Model (IV) (results omitted): Openness, Dependency ratio, Inflation, GDP growth, Unemployment, Ideology, Government fractionalization.
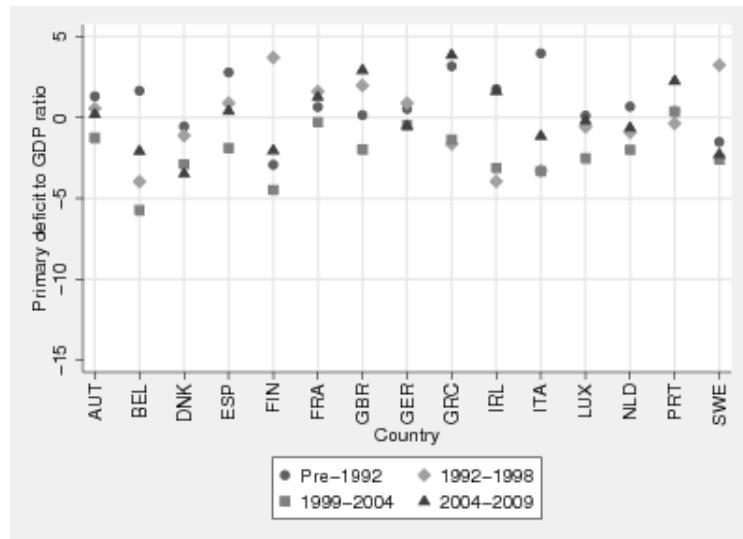
(a) EU 15 COUNTRIES
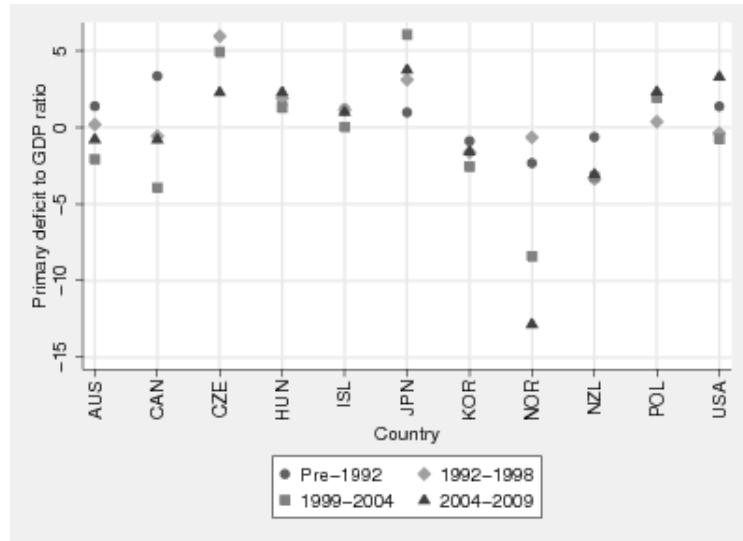
(b) NON-EU 15 COUNTRIES

Figure 1: PRIMARY DEFICIT TO GDP RATIO IN VARIOUS PERIODS IN EU AND NON-EU COUNTRIES: THIS FIGURE PRESENTS THE AVERAGE DEFICIT TO GDP RATIO IN EU AND NON-EU COUNTRIES IN DIFFERENT (EMU RELATED) PERIODS.
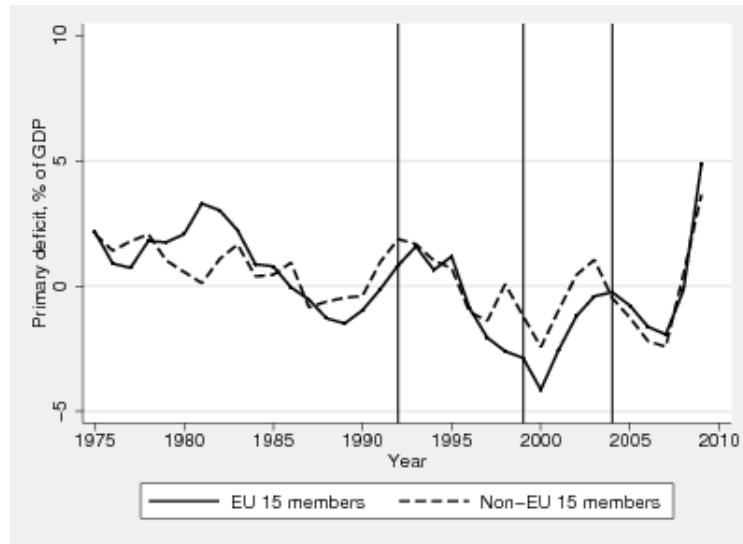
**Figure 2:** Development of primary deficit to GDP ratio in EU 15 and non-EU 15 countries
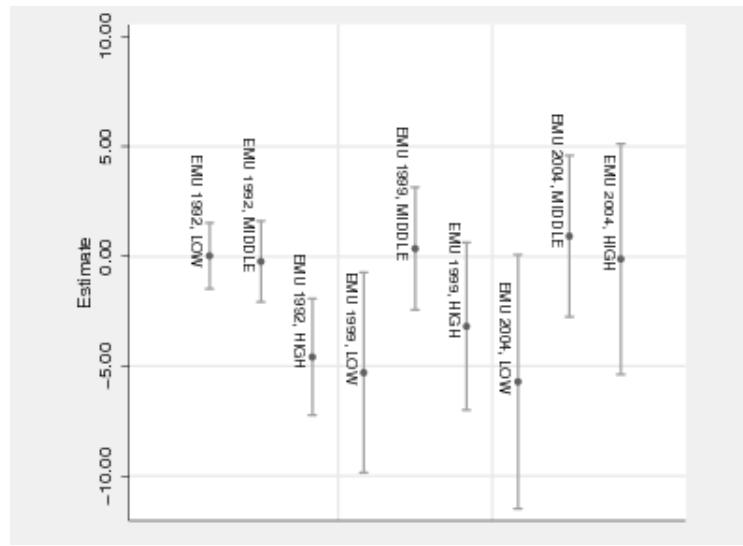
Figure 3: Effect of EMU on primary deficit to GDP ratio for pre-1992 low-, medium, and high-deficit countries: This figure presents the coefficient estimates and 90% confidence levels for the various EMU interventions when the estimated coefficents are allowed to vary between different groups of EMU countries.
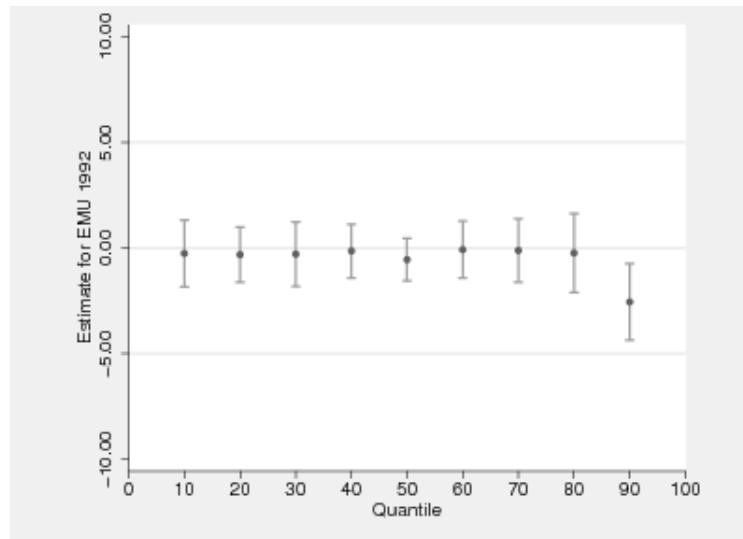
(a) QUANTILE ESTIMATES FOR EMU 1992
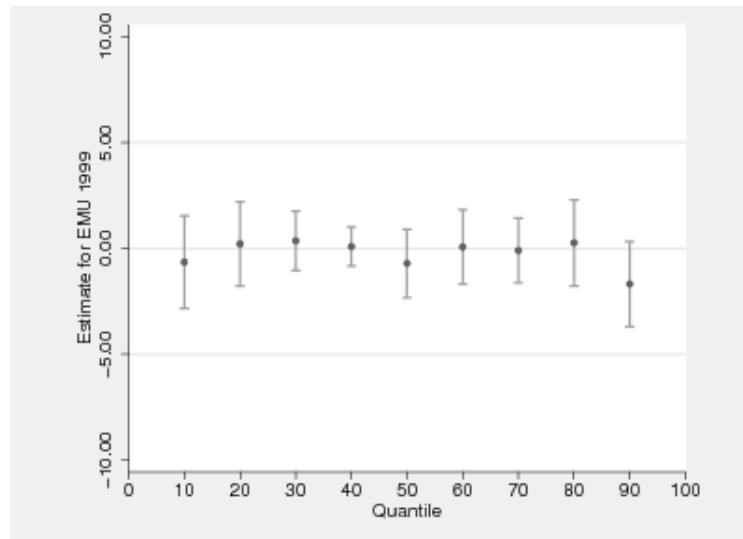
(b) QUANTILE ESTIMATES FOR EMU 1999
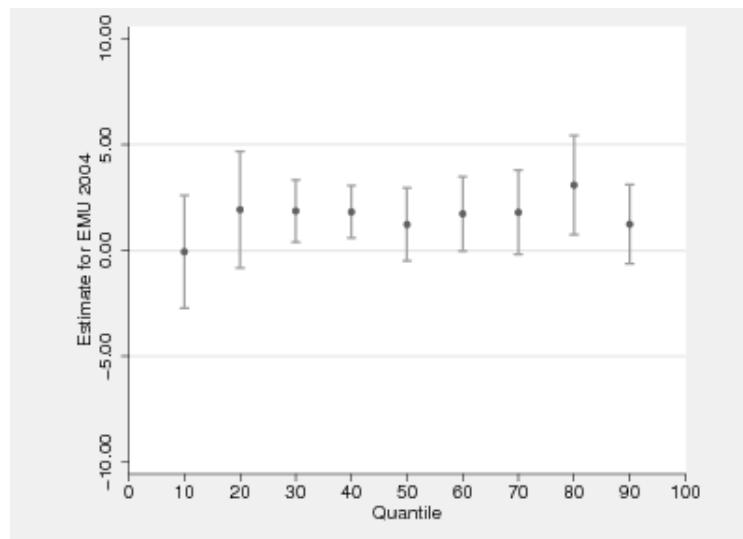
(c) QUANTILE ESTIMATES FOR EMU 2004

Figure 4: EFFECT OF EMU ON PRIMARY DEFICIT TO GDP RATIO FOR DIFFERENT QUANTILES: THIS FIGURE PRESENTS THE COEFFICIENT ESTIMATES AND 90% CONFIDENCE LEVELS FOR THE VARIOUS EMU INTERVENTIONS FROM QUANTILE REGRESSIONS FOR THE VARIOUS EMU INTERVENTIONS.

Appendix

Table A.1: REGRESSION RESULTS FOR ESTIMATES REPORTED IN FIGURE 3: EFFECT OF EMU ON PRIMARY DEFICIT TO GDP RATIO, DIFFERENCE IN DIFFERENCE ESTIMATIONS, COUNTRY GROUPS, 1975-2009

	Coef.	Std. Error	Wild Bootstrap p-value
EMU 1992 × LOW	-0.291	(1.004)	[0.820]
EMU 1992 × MIDDLE	0.142	(0.876)	[0.862]
EMU 1992 × HIGH	-4.527***	(1.594)	[0.020]
EMU 1999 × LOW	-5.531**	(2.766)	[0.494]
EMU 1999 × MIDDLE	0.756	(1.290)	[0.580]
EMU 1999 × HIGH	-3.094	(2.264)	[0.208]
EMU 2004 × LOW	-5.992*	(3.539)	[0.464]
EMU 2004 × MIDDLE	1.440	(1.647)	[0.424]
EMU 2004 × HIGH	-0.005	(3.113)	[0.998]
Country dummies	Yes		
Year dummies	Yes		
Country-specific trend	Yes		
Countries	26		
N	818		
F	6.729		

[a] This table presents the regressions results from which the coefficients and confidence intervals in Figure 3 were retrieved. The dependent variable is the primary deficit to GDP ratio. The treatment group is EMU countries. The control group is non-EMU OECD countries.

[b] Stars indicate significance levels at 10%(*), 5%(**) and 1%(***).

[c] Standard errors (clustered at the country level) are given in parentheses and wild bootstrap p-values are reported in squared brackets.

Table A.2: Regression results for estimates reported in Figure 4: Effect of EMU on primary deficit to GDP ratio, difference in difference estimations, Quantile regressions, 1975-2009

	(10th)	(20th)	(30th)	(40th)	(50th)	(60th)	(70th)	(80th)	(90th)
EMU 1992	-0.261	-0.319	-0.295	-0.145	-0.557	-0.080	-0.122	-0.243	-2.560**
	(0.958)	(0.789)	(0.931)	(0.771)	(0.607)	(0.823)	(0.908)	(1.135)	(1.100)
EMU 1999	-0.650	0.212	0.354	0.085	-0.710	0.067	-0.099	0.262	-1.684
	(1.330)	(1.202)	(0.853)	(0.558)	(0.980)	(1.071)	(0.931)	(1.237)	(1.224)
EMU 2004	-0.066	1.924	1.860**	1.816**	1.224	1.728	1.796	3.084**	1.235
	(1.612)	(1.674)	(0.892)	(0.751)	(1.047)	(1.065)	(1.210)	(1.419)	(1.133)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	No	No	No	No	No	No	No	No
Country-specific trend	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Countries	26	26	26	26	26	26	26	26	26
N	818	818	818	818	818	818	818	818	818

[a] This table presents difference in difference style quantile regressions that relate three distinct stages of the EMU to the primary deficit to GDP ratio.
[b] Stars indicate significance levels at 10%(*), 5%(**) and 1%(***).
[c] Bootstrapped standard errors (not clustered) are given in parentheses below the coefficient estimates.

Table A.3: DEFINITION AND SOURCE OF VARIABLES

Label	Description	Source
Dependent variables		
Primary deficit	Primary deficit, as a percentage of GDP	OECD Economic Outlook
Treatment variables		
EMU 1992	Dummy variable, 1 for EU 12 member country if Year $\geq$ 1992, 1 for Austria, Finland, and Sweden if Year $\geq$ 1995, 0 else	Own construction
EMU 1999	Dummy for those EU 15 countries that have introduced the Euro; assumes the value 1 from 1999 onwards for the 11 EU countries that introduced the Euro in 1999; for Greece, this dummy is 1 from 2001 onwards; in all other cases, this dummy takes on the value 0	Own construction
EMU 2004	Dummy variable, 1 from 2004 onward for the 11 EU countries that introduced the Euro and were thus affected by the decision of the European Council not to censure France and Germany for their breaking of the 3% deficit limit; 0 else	Own construction
Control variables		
Openness	Exports plus imports divided by GDP, current prices & exchange rates	OECD Macro Trade Indicators
Dependency ratio	Share of population < 15 and > 64	OECD Population and Labour Force Statistics Database
Inflation	Growth rate of CPI	OECD Key Short-Term Economic Indicators Database
GDP growth	Growth rate of GDP per capita in US$ (log differences), constant prices and PPPs	OECD GDP Database
Unemployment	Unemployment rate	OECD Economic Outlook
Interest rate	Long-term interest rate on government bonds	OECD Economic Outlook
Ideology	Index variable for party of chief executive, 1= right-wing, 2= centrist, 3 = left-wing	Beck et al. (2001); Teorell et al. (2010)
Government fragmentation	Probability that two randomly chosen government officials are members of different parties	Beck et al. (2001); Teorell et al. (2010)

The primary balance to GDP data are generally taken from the no. 90 version of the OECD Economic Outlook database. However, this version of the database does not provide data for some countries in the earlier part of the sample period. We replace such missing values whenever possible with figures provided in the no. 87 version of the Economic Outlook database, i.e. the latest version of the database that provides the relevant data for the countries in question. Data for Germany prior to 1991 refers West-Germany.

Table A.4: Summary statistics

Variable		Mean	Std. Dev.	Min.	Max.	Obs.
Primary deficit	overall	0.074	3.527	-16.190	14.005	818
	between		1.754	-4.665	4.131	26
	within		3.126	-11.452	13.126	31.462
EMU 1992	overall	0.120	0.325	0.000	1.000	818
	between		0.109	0.000	0.350	26
	within		0.308	-0.230	1.006	31.462
EMU 1999	overall	0.071	0.257	0.000	1.000	818
	between		0.079	0.000	0.250	26
	within		0.245	-0.179	0.985	31.462
EMU 2004	overall	0.088	0.283	0.000	1.000	818
	between		0.097	0.000	0.300	26
	within		0.268	-0.212	0.917	31.462
Openness	overall	73.371	44.134	16.012	324.342	741
	between		47.051	21.956	246.503	26
	within		14.067	10.197	151.210	28.500
Dependency ratio	overall	33.384	1.958	27.433	42.040	741
	between		1.407	30.156	35.574	26
	within		1.470	28.877	43.483	28.500
Inflation	overall	5.217	6.464	-4.480	83.950	741
	between		3.173	1.543	16.637	26
	within		5.713	-9.867	72.530	28.500
GDP growth	overall	2.107	2.615	-9.039	11.027	741
	between		1.082	1.197	5.819	26
	within		2.404	-10.318	8.074	28.500
Unemployment	overall	6.708	3.415	1.066	19.931	741
	between		2.845	2.835	14.107	26
	within		2.163	-0.786	16.208	28.500
Interest rate	overall	7.640	4.346	0.000	29.742	741
	between		2.255	2.289	12.277	26
	within		3.858	-1.200	25.104	28.500
Ideology	overall	1.950	0.932	1.000	3.000	741
	between		0.450	1.000	2.667	26
	within		0.817	0.283	3.829	28.500
Government fragmentation	overall	0.274	0.261	0.000	0.828	741
	between		0.205	0.000	0.716	26
	within		0.154	-0.125	0.953	28.500