



European  
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ISSN 1725-3187

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# EUROPEAN ECONOMY

Economic Papers 489 | April 2013

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Economic and  
Financial Affairs

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KC-AI-13-489-EN-N  
ISBN 978-92-79-28571-4  
doi: 10.2765/42955

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## Do Sound Public Finances Require Fiscal Rules Or Is Market Pressure Enough?\*

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### **Abstract**

This paper discusses the balance between market pressure and fiscal rules in order to keep public finances on a sustainable path. We provide empirical evidence on market assessments of sovereign default risk to economic news, announcements of national austerity programs, EU programs designed to support government finances, and banking fragility emanating from several countries in the euro area affected by the European sovereign debt crisis. We find that, in general, the quality of market signals is an insufficient indicator alone to accurately guide the conduct of fiscal policy, particularly during the crisis period. Therefore, market signals should be used to complement fiscal rules rather than serving as a substitute.

Keywords: Euro area, sovereign debt, fiscal rules, financial markets, transmission of news  
JEL codes: E62, F36, F44, G14, H63

\* An earlier version of this paper has been presented at the European Commission's annual research conference, "Economic Growth and the Future of the Economic and Monetary Union", November 19-20, 2012, Brussels, Belgium. We are grateful for helpful comments from Francesca D'Auria, Plamen Nikolov, Michael Thiel and other DGEFIN staff members, as well as conference participants. We thank Xin Li for excellent research assistance.

## *1. Introduction*

It is widely believed that members of a monetary union should have their fiscal policies restricted by rules to prevent unsustainable debt developments.<sup>1</sup> Otherwise, the argument goes, a country allowing its debt-to-GDP ratio to grow continuously will create negative spillover effects. There are two dimensions to this position: First, with access to borrowing in the union-wide capital market, a country with excess deficits will drive the union interest rate upwards. This may force other union members to follow more restrictive fiscal policies to keep their public debt on a sustainable path. Second, the common central bank may come under pressure to ease the stance of monetary policy, thereby potentially undermining the independence of the central bank and creating an inflationary pressure.

Both of these spillover arguments motivate the need for a control mechanism to keep budget deficits, or debts, below a certain threshold. However, it is not uncontroversial to argue in favor of explicit fiscal rules. For two reasons: First, financial markets may play an important role in preventing governments from pursuing overly expansionary fiscal policies. The point is that a risk premium will be attached to government debt of a country in fiscal trouble, leaving the interest rate in a country with sound public finances unaffected, and hence there would be no spillovers.<sup>2</sup> However, whether that actually happens or not depends on whether the markets price the financial or default risks to the monetary union itself; or whether they price the risk to individual countries. If it is the former, then spillover effects are present, rules or no rules. Second, fiscal rules are oftentimes ineffective and frequently difficult to enforce.<sup>3</sup> Either way, fiscal rules are likely to be problematic.

In the aftermath of the financial crisis, budget deficits and debt ratios have increased to levels that would have been unthinkable just a few years ago. Market interest rates and sovereign credit default swaps (CDS) spreads have increased sharply in many countries, signaling lack of confidence in fiscal (and other) policies and forcing the political system to respond with programs designed to restore long-term sustainable public finances. However, it has become a widespread concern among policymakers that the current market pressure is too

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<sup>1</sup>There is a large academic literature on the implications for fiscal policy of monetary unification in Europe, see, e.g., Hughes Hallett, Hutchison and Jensen (1999). See Ayuso-i-Casals, J. (2012) for a recent overview of expenditure rules.

<sup>2</sup>Recent studies on European interest rate spreads (e.g., Mink and De Haan, 2012) find evidence of contagion, in particular across southern European countries.

<sup>3</sup>Based on data collected for the American states, von Hagen (1991) found that explicit fiscal rules had only little impact on budget deficits.

severe and that investors over the past three years have overreacted to negative news and not fully incorporated good news into asset prices.

This pattern is very different from what was observed during the initial phase of Economic and Monetary Union (EMU) in Europe when interest rates converged very rapidly in the euro area. Interest differentials almost ceased to exist at the time of the introduction of the euro even though there remained large differences in underlying fundamentals such as government debt levels. And, during the first years of the euro, government deficits increased in many countries with no discernible effect on interest rates or CDS spreads. This is puzzling and motivates the following question: Have market participants overreacted to economic and fiscal developments in the euro area compared to earlier years, or is current pricing simply incorporating the predominance of bad news and continuing skepticism about the sustainability of public finances and economic adjustment?

The architects behind EMU recognized the potentially important role of financial markets with respect to signaling market perceptions of public policies being too expansionary or not sustainable. But they also saw the need to complement market pressure with explicit fiscal rules designed to ensure sound public finances. The balance between these two mechanisms for maintaining fiscal discipline is the topic of this paper.

In both the policy and academic debate many have expressed skepticism about both the ability of markets to accurately price sovereign default risk, and thereby provide reliable market signals to policy makers about debt sustainability, and whether any set of fiscal rules could be effective in curbing fiscal profligacy. First, many observers have concluded that the markets mispriced the risk of sovereign debt default in the countries of the south-west euro area periphery (SWEAP) both before and after the outbreak of the sovereign debt crisis, seemingly reacting to waves of excessive optimism or pessimism. Second, the track record of fiscal rules in the EU to date is mixed. In particular, the Stability and Growth Pact (SGP) has had limited effectiveness. While remaining operative on paper — complete with its excessive deficit procedure, sanctions for violators and other enforcement procedures — the SGP has had clear shortcomings in practice, which the EU is attempting to address.<sup>4</sup>

An open question and focus of our work, therefore, is how much reliance should policymakers place on fiscal rules as opposed to market pressure in maintaining a sustainable fiscal policy trajectory. What is the “optimal” combination of markets and rules in achieving

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<sup>4</sup> See for example Calmfors (2005), Buti (2006) and Larch, van den Noord and Jonung (2010).

this objective? We consider these issues from two perspectives: First, we undertake a survey of the literature in this area to assess the state of knowledge and we address empirically the extent to which rules have historically been effective in limiting fiscal deficits and government spending, or in enhancing revenues. Second, we examine if markets may be relied upon to accurately price the risk of sovereign default in the EU. In this regard, we investigate whether markets were consistent before and after crisis periods in their pricing of economic news, banking problems, policy initiatives and regulatory/fiscal actions into sovereign default spreads. We also examine the nature of financial market contagion across the EU before and during the crisis; whether the existence of fiscal rules can prevent contagious effects between countries experiencing a sovereign debt crisis; and if financial markets can provide an additional disciplinary effect on the development of public finances.

The road map is as follows. In Section 2 we address the rationale for introducing fiscal rules and review some recent empirical papers. Section 3 is focused on the track record of fiscal rules operating at the supranational level in the EU, and in Section 4 we provide a broader empirical assessment on the link between fiscal rules and the actual conduct of fiscal policy. Section 5 reviews the literature on market discipline, focusing on what is known about whether markets accurately measure sovereign default risk and whether policy actions are incorporated into market perceptions of default risk. We also outline the empirical methodology and data for measuring market perceptions of default. This is followed, in Section 6, by a presentation of our empirical results on market perceptions of risk and policy effectiveness. This section addresses how markets price sovereign risk, whether policy measures affected market pricing of sovereign risk, how banking fragility affects risk perceptions, and the nature of contagion across the SWEAP and from the SWEAP to other EU countries. Finally, Section 7 concludes and offers some suggestions for future research.

## ***2. Fiscal Rules: Background and Experiences***

Fiscal rules are legislative agreements intended to promote fiscal discipline by “tying the hands” of policy makers in order to constrain decisions about spending and revenue programs. For example, fiscal rules may impose constraints on total government

expenditures, deficits or debt. Whatever target is chosen, fiscal rules are used to address longer-term budget problems.<sup>5</sup>

A fiscal rule does clearly not guarantee improved budget outcomes. After all, any rule imposed by a legislature can be circumvented by the same legislature. This is how democracy works. According to IMF (2009b), fiscal rules have been introduced in about 80 countries, and while the experiences are mixed, the message from the empirical literature is relatively clear, namely that well-designed rules can help promoting a better fiscal performance. Yet, some remarkable less successful experiences do exist. In the US, for example, the Congress enacted the Gramm-Rudman-Hollings law in 1985, stipulating a target path for the federal deficit and aiming at a balanced budget by 1991. However, the target path was never reached. Similarly, in the EU, fiscal rules were established by treaty in the early 1990s, but the enforcement mechanisms have not prevented targets for debts and deficits from being breached.

Although fiscal rules operating at the supranational level in the EU have largely failed, a number of European countries have found national fiscal rules to be helpful in achieving greater budget discipline. For example, Switzerland, Sweden, Finland, and the Netherlands all realized improvements in their fiscal situations after adopting rules that limit spending.

A recent paper by Iara and Wolff (2011) confirms the importance of fiscal rules at the national level for the assessment of sovereign risk by financial markets in the euro area. It is found that past realizations of fiscal variables are better on average in countries with stronger rules-based fiscal governance. Indeed, stronger fiscal rules turn out to be of great importance to contain sovereign bond spreads in times where market uncertainty is most pronounced. Specifically, using a data set summarizing the quality of rules-based fiscal governance in EU member states, Iara and Wolff (2011) find that better fiscal rules can reduce sovereign bond spreads between euro area member states and Germany by 100 basis points and more, depending on global risk aversion and country-specific fiscal fundamentals.

Hardly surprising, the strength of the legal base of the fiscal rules in force and the enforcement mechanisms turn out to be of particular importance. National fiscal rules have been found to reduce the probability of sovereign default. Moreover, these factors affect expectations of future fiscal outcomes and are especially important in times of higher risk

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<sup>5</sup> Given the focus on the long-term stance on public finances, a concern has been raised that fiscal rules might potentially obstruct the conduct of short-term, counter-cyclical fiscal policy, or holding back beneficial productive public investments (Krogstrup and Wyplosz, 2009).

aversion. Overall, these results lend empirical support to the strengthening of national rules-based fiscal governance as part of the economic governance reform agenda in the euro area (Hughes Hallett and Jensen 2012).

An important issue addressed by Krogstrup and Wälti (2008) is whether the positive relationship between fiscal rules and performance actually represents a causal link from rules to outcomes. Or is the relationship driven by a third variable, such as voters' preferences for fiscal policies? Using a new measure of fiscal preferences of the electorate in Swiss cantons, the authors find that when taking into account fiscal preferences of the electorate, the estimated impact of fiscal rules on real budget balances decreases slightly, yet remaining highly significant. So, this piece of research also supports the conclusion that fiscal rules work for the purposes of keeping budget balances in check over the medium-to-long term.

As discussed by Bernanke (2010), there are four critical factors for achieving a high degree of effectiveness of fiscal rules: First, effective rules must be transparent. By illuminating the fiscal challenges, and by pointing out feasible solutions, transparency serves to (a) clarify the choices faced by policymakers, (b) facilitate a dialogue with the general public and (c) encourage policy makers to recognize the broader fiscal consequences of their decisions. Transparency is clearly enhanced by good "watchdogs", such as fiscal councils (Calmfors and Wren-Lewis, 2011).

Second, an effective rule must be sufficiently ambitious to address the underlying problem. As mentioned before, a fiscal rule should be adopted which is consistent with achieving long-term sustainability. In order to address this seriously, future revenues and expenditures, such as old-age pensions and health-care spending, have to be forecast. Although such forecasting is complicated and subject to forecast uncertainties (Alho, Jensen and Lassila, 2008), a recent study by Anderson and Sheppard (2009) points to a number of benefits of making fiscal projections, such as raising the profile of fiscal sustainability in policy-making, providing a framework for discussing fiscal sustainability of current policies (and impacts of policy reforms), and centralizing responsibility for long-term policy analysis.

Third, rules seem to be more effective when they focus on variables that the policymakers can control directly, as opposed to factors that are largely beyond their control. For example, actual budget deficits depend on spending and taxation decisions but also on the state of the economy. As a result, when a target for the deficit or the debt is missed, ascribing responsibility may be difficult, thus suggesting that constraints should be imposed on budgets



in cyclically adjusted terms rather than actual ones. Measuring the output gap is also a complicated task, which may benefit from including a fiscal council as an integrated part of the framework governing a fiscal rule.

Fourth, and perhaps most fundamentally, fiscal rules cannot substitute for political will, which means that public understanding of and support for the rules are critical. In other words, legitimacy of the rules is key to success. This typically requires that the rules enjoy support across a broad political spectrum. For example, the fiscal rules that Denmark adopted in the 1990s had overwhelming support (Andersen, Jensen and Pedersen, 2008), which undoubtedly contributed to their success in reducing Denmark's ratio of public debt to GDP.

Conversely, in the absence of public support and commitment from elected leaders, fiscal rules may ultimately have little effect on budget outcomes. Educating the public about the consequences of unsustainable fiscal policies may be one way to help building that support. The new fiscal framework that was introduced in Sweden after the banking crisis in the early 1990s also had an overwhelming support in the parliament, as both the Social Democrats and the center-right parties agreed that in order to prevent future crises it was necessary to reform the Swedish fiscal framework (Bergman, 2011). Subsequently, this has proved to make the framework credible and enforceable, and there is now consensus among economists and policy makers that the framework has been successful and there is no political wish to relax the rules.

Both the Danish and the Swedish examples suggest that new fiscal frameworks should be introduced as integrated elements of crisis resolutions, i.e. when the public may be ready for accepting new policies. During the 1970s, Denmark suffered from problems similar to those many European countries have today, namely low growth combined with large fiscal and external imbalances. The first step towards a more sustainable situation was to peg the Danish krone to the Deutsch Mark in 1982. Then followed a period with fiscal and structural reforms designed to address the imbalances (Bergman and Hutchison, 1999, 2010).

Sweden was forced to take a different path towards sustainable public finances. The fixed exchange rate policy was not credible in the long run and after a period of speculative attacks on the krona, Sweden was forced to abandon the fixed exchange rate policy. The public finances had deteriorated very fast as a result of the banking crisis and therefore it was deemed necessary to implement a wide ranging budget consolidation which was complemented by the build-up of a new fiscal framework with tight rules designed to break

the ever rising government expenditures. An inflation target for monetary policy was also adopted.

These two examples illustrate that it is possible to reform the economy even during crises, provided that the reform agenda enjoys a broad political support in order to become credible.

### **3. *Fiscal Rules at the Supranational Level: Experiences from the European Union***

#### *3.1. The fiscal framework in the European Union*

In the European Union (EU), fiscal rules have been in place for several years. The Maastricht Treaty imposed numerical limits on the fiscal debt and deficits of those joining the euro area. Those limits became permanent with the SGP in 1997. The most recent development involves the fiscal compact, which was agreed in 2012. This is a balanced budget rule, extended by an automatically triggered correction mechanism at the national level and a strengthening of the automaticity of the excessive deficit procedure within the SGP if a member of the euro area breaches the deficit criterion.

The SGP was adopted in 1997, prior to the creation of the euro, in order to ensure that fiscal discipline is maintained in the member states.<sup>6</sup> The Amsterdam Treaty, which governs the working of the SGP, defines a country to have an excessive fiscal deficit if *both* that country's deficit exceeds 3% of its GDP, *and* if the Council of Ministers judges it to have done so. This leaves open the possibility that the Council of Ministers will judge the deficit *not* to be beyond the 3% limit on the grounds that the excess is either excusable, or only temporary; or because the excess is measured incorrectly or has appeared for reasons beyond the accused government's control. In effect, the SGP has proved to be unenforceable in practice.

Two facts suggest why the SGP is difficult to enforce. First, deficits are to a large extent endogenous, as revenues and expenditures fall and rise around the cycle. Thus, slow or negative growth will typically make a given deficit *ratio* rise, even if the deficit itself has not changed. This gives plenty of scope for arguing that a deficit is temporary or unexpected and beyond the violating government's control. Second, when France and Germany had exceeded the 3% limit for two years, without accepting the sanctions or deficit reduction plans imposed

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<sup>6</sup> Recent studies evaluating the SGP include Buti, Eijffinger and Franco (2005), European Central Bank (2005), Fischer, Jonung and Larch (2006), Hallerberg, Strauch and von Hagen (2007) and Schuknecht, Moutot, Rother and Stark (2011).

upon them, their cases were referred to the European Court of Justice. However, the Court found in favor of Germany and France precisely because the Council of Ministers had not declared them to be in excess of the 3% limit. In effect, the credibility of the enforcement process was compromised.<sup>7</sup>

Since a necessary condition for enforcing the SGP is that the Council of Ministers declares a country to be in violation of the excessive deficit procedure, there clearly is a “sinners-sitting-in-judgment-of-sinners” problem involved. This is so since the Council includes representatives of the violating government and unanimity is required in matters of taxation and fiscal policy. Even if unanimity is taken away, there is very little incentive for countries to vote to support an excessive deficit decision and sanctions. Indeed, it could be claimed that the SGP will fail almost by construction, as the only incentive to adhere to it is the risk of a new financial and debt crisis.

In fact, an accused government will have a natural incentive to veto such a decision or to try to promote a veto. In the meantime other council members, whether they also have excessive deficits or not, have a strong incentive to provide a veto on the argument that “it will be our turn next, so a veto now will bring a veto in our favor next time”. More worrying still are the possibilities that countries will form coalitions to vote against such decisions in support of one another. They will do so in their own perceived short term self-interest on the argument that some countries are too big to fail, or that it would be too dangerous to the rest of the community and to the voting country in particular, in terms of deflationary spill-overs, if the accused were forced to cut back its deficits sharply.

As France and Germany push for sanctions for euro area members who break borrowing limits, both countries are among the worst offenders. Wyplosz (2012) has shown that, of the 12 original members of the single currency, 10 have run up budget deficits beyond the 3 per cent limit since 1999. From 1999-2011, Greece has broken the rules every year, Portugal in 10 of those years and Italy eight. Next is France (seven), followed by Germany (five). In contrast, Ireland, which had to be bailed out because of the state of its public finances, was outside the 3 per cent limit in four of those years. Spain, which like most euro area countries is adopting tough austerity measures to put its public finances in order, also broke the rules in four of those years. Only Luxembourg and Finland were within the limit every year.

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<sup>7</sup> Buti (2006) and Calmfors (2005) provide detailed accounts on the developments leading to the revision of the SGP in 2005. They both argue that a major weakness of the first generation SGP was poor enforcement mechanisms.

The six-pack has addressed the lack of automaticity of sanctions in the SGP (in the preventive arm as well as in the excessive deficit procedure) as it introduces reverse qualified majority voting. This is likely to strengthen the framework. It is more difficult to form coalitions for sanctions than against sanctions.

In sum, only two countries have managed to consistently fulfill the criteria, and financial sanctions have never been imposed. The reformed SGP leaving greater room for discretion has not succeeded in securing fiscal discipline. The lack of enforcement has persisted. To be fair, one must also remember that the financial crisis has had a strong effect on some European countries and it is not surprising that deficit and debt levels has increased. This may also point to another weakness of the SGP, the lack of a crisis mechanism. Larch, van den Noord and Jonung (2010) identify a number of weaknesses in SGP and provide suggestions for improving the rules. In particular they argue that a mechanism for crisis resolution is lacking and that the EU enforcement is weak. In addition, it can be argued that there is weak incentives for countries to run budget surpluses during good times thus preparing for future bad times by reducing government debt and thus creating room for expansionary fiscal policy during bad times.

### 3.2. *Recent developments of the fiscal framework in the euro area*

The recent changes of the economic governance framework in the EU and in the euro area have taken place in several incremental stages. The starting point is the *European Semester*, agreed in June 2010 by the European Council, which is an instrument to ensure consistency between monetary, fiscal and structural policies. A few months later, in September 2010, the European Commission published their ideas of what would constitute an effective system of fiscal restraints to provide long-term financial stability. These proposals specify a debt target of 60%; that countries with debt ratios exceeding 60% should show adequate progress to reaching that target, defined as eliminating 1/20th of the excess over 60% each year; and that each economy with a persistent excess debt ratio on this criterion should pay a fine of 0.2% of GDP each year. There was also a proposal that the growth in public spending should not exceed the growth in GDP. Moreover, these proposals added a “debt brake”, meaning that current spending must be balanced across the cycle. However, the sanction or penalty to be imposed on those who fail to meet this condition, what definitions of current spending and cycle should be used, and how compliance with such a condition can be measured in real time, are all problems that remain unresolved. But they need to be resolved before they become constitutionally embedded.

The *Euro Plus Pact*, also referred to as the *Competitiveness Pact*, was agreed in March 2011. While mentioning a better coordination of economic policy as the main objective, the real focus was to improve competitiveness in order to obtain a higher degree of convergence. There were provisions that countries unable to improve their competitiveness, or correct persistent macroeconomic imbalances, will be fined 0.1% of GDP each year. However, what constitutes “persistent”, or what criteria define “competitiveness”, and which imbalances should be targeted, are matters that remained to be agreed. Popular suggestions are to increase the retirement age, or restrict wage increases to no more than productivity growth.

Under the term the “*six-pack*”, five regulations and one directive entered into force in December 2011. It was decided *not* to create a pan-European treaty to implement the ideas set out in the Commission’s September 2010 report, but to create instead an inter-governmental agreement with the aim of strengthening SGP. The six-pack applies to both the preventive and the corrective arm SGP. For example, the six-pack operationalize the 60% debt target that was already part of SGP making it possible to initiate excessive deficit procedure when the debt ratio exceeds 60%. The six-pack also strengthens the SGP by introducing reverse qualified majority voting in both the preventive and the corrective arms making sanctions more automatic if a member country is found to breach the rules of the pact. All in all, these are important steps toward an enforceable fiscal framework in Europe.

In March 2012 the Heads of State or Government of all EU countries (with the exception of the UK and the Czech Republic) signed the *Treaty on Stability, Coordination and Governance in the Economic and Monetary Union* (TSCG), see European Council (2012). The most important component of the TSCG is the *fiscal compact*, which states that the budgetary position of the general government shall be balanced or in surplus. This rule is not new, it is part of SGP, but the difference is that the TSCG requires member states to adopt the medium-term objective in national law, preferably in its constitution and that TSCG operationalize the target. The medium-term objective is defined as a maximum structural deficit of 0.5 % of GDP at market prices.

If significant deviations from the medium-term objective or the adjustment path towards it are observed, a correction mechanism shall be triggered automatically. The mechanism shall include the obligation to implement measures to correct the deviations over a defined period of time. These rules shall take effect in the national law of the euro area member state at the latest one year after the entry into force of the fiscal compact through provisions of binding

force and permanent character, preferably constitutional, or otherwise guaranteed to be fully respected and adhered to throughout the national budgetary processes.

The euro area members may temporarily deviate from their medium-term objective or the adjustment path towards it only in exceptional circumstances, namely if the ratio of government debt-to-GDP at market prices is significantly below 60 %, and where the risks to the long-term sustainability of public finances are low. In such situations, the lower limit of the medium-term objective can reach a structural deficit of at most 1.0 % of GDP at market prices. Otherwise, when the ratio of their general government debt-to-GDP ratio exceeds the 60 % reference value, the member shall reduce it at an average rate of one twentieth per year as a benchmark. If the Court of Justice of the EU finds that the country concerned has not complied with its judgment, it may impose on it a penalty payment capped at 0.1 % of its GDP.

Two other conditions have been added. First, all member governments have agreed to allow their budget plans and performance to be inspected and commented on by Commission officials. Second, as in the six-pack, TSCG introduces reverse qualified majority voting at each stage of the excessive deficit procedure. This is stricter than what is stipulated by the six-pack.

While there are many important improvements of the fiscal framework in the TSCG (and in the six-pack), the fiscal compact may be difficult to implement and enforce. This is due to a legal aspect, which is often neglected by economists. The point is that the UK and the Czech Republic decided not to sign the TSCG. Since two EU members were not willing to commit to the TSCG, it takes the form of an intergovernmental treaty outside the EU legal framework, and as such it does not need to respect the EU Treaties. Indeed, the UK made it very clear that they would not accept the TSCG to become part of EU law. Therefore, the treaty is based on ordinary international law rather than EU law.

With this weaker legal status of the fiscal compact compared to the SGP it may well become even less enforceable than the failed SGP. As is well-known, EU law (regulations, directives and decisions) take precedence over national law and are binding on national authorities. For example, it is only within the EU legal framework that (a) the EU Commission is allowed to submit cases for the Court of Justice of the EU and (b) the relevant enforceability mechanisms apply, such as the legal apparatus that makes it possible to levy fines etc. By contrast, if the anchor for the fiscal compact is ordinary international law, it is up to the

individual states to take each other to court, and this is unlikely to happen very often for the reasons identified in Section 2. It should be noted that the intention is to incorporate the substance of the TSGE into the EU Treaties within at most five years following its entry into force, and it is hoped that it will be applied and interpreted in conformity with EU law even before that.

The bottom line is that the fiscal compact is long on good intentions but short on substance (Gros, 2012). However, there is a potentially important addition to the compact, namely that only euro area countries following the compact will be eligible to receive support from the permanent bail-out fund, the European Stability Mechanism (ESM). This may prove an effective enforcement channel but it clearly remains to be seen how powerful it is in practice.

Finally, it is worth stressing that even though fiscal rules in the euro area to some extent have been unsuccessful, they were founded on long-term targets. So, despite the weak past performance, a fiscal framework based on a long-term orientation is still the appropriate design for the future, i.e. after the disruptions of the financial crisis. The six-pack and the TSCG address some weaknesses identified in the SGP but there are still some unsolved issues, a crisis resolution mechanism and incentives for restrictive fiscal policy during good times are lacking. And again, while focusing on long-term targets we recognize that fiscal policy could play a role as a stabilization device, as long as the longer-term objectives would not be jeopardized for the sake of short-term objectives. Specifically, if the common monetary policy is not stabilizing enough at the individual country level, the fiscal stabilization objective is permitted only if debt sustainability is not compromised.

As discussed by Auerbach (2009), the search for an optimal long-term orientation of fiscal policy (e.g., an optimal level of public debt) involves complicated trade-offs. For example, how should concerns about intergenerational equity be balanced against economic performance (inflation, investment, growth etc.) and long-term fiscal sustainability? In fact, bringing debt ratios below 90 % may be desirable from the perspectives of both long-term economic growth and sustainability of public finances (Reinhart and Rogoff, 2009), but the fiscal restraint involved might be thought to place an unfair burden on current generations.

The problem of guaranteeing fiscal sustainability also involves the question about whether or not to account for implicit liabilities. Typically, the government liabilities entering the calculation of government debt only include explicit liabilities. However, if we think of these liabilities as requiring future revenues in order to avoid default, using an explicit debt crite-

tion only by itself can be highly misleading. If implicit liabilities are ignored, it means failure to account for the budgetary impact of future liabilities originating from, notably, ageing populations, despite the fact that future revenues will be needed to cover the benefits that have been promised to existing workers and beneficiaries.

Several papers, including Kotlikoff (2006) and Davig et al. (2010), have emphasized the fiscal “overhang” posed by the uncovered expected financial liabilities associated with public pension schemes and likely health and social support costs in most OECD economies. A recent paper by IMF (2009a) has put this problem into dramatic form by showing that the financial stress caused by the great financial crash of 2007-10 was probably only about 10% of that likely to be caused by future age related spending in economies with a shrinking labor force. Against that, if fiscal sustainability is now the objective, it makes sense to search for fiscal rules capable of ensuring the sustainability of public finances *given* ageing populations, shrinking labor forces and greater implicit liabilities.

In fact, the fiscal compact fails to account for those serious concerns. In that sense, balanced budget rules, such as the fiscal compact, may not be appropriate. Instead, more sophisticated fiscal rules are needed which allow for the implicit liabilities that are generated by projected changes in the age-structure of the population. The implication is that a government facing a demographic change, or the need to adjust to more social spending, will have to adjust their fiscal plans to accommodate those changes. Therefore, forward-looking rules are likely to call for even more severe austerity measures than those already made necessary to resolve the sovereign debt crisis in the euro area.

#### **4. Further Empirical Evidence on Fiscal Rules and Government Policy Actions**

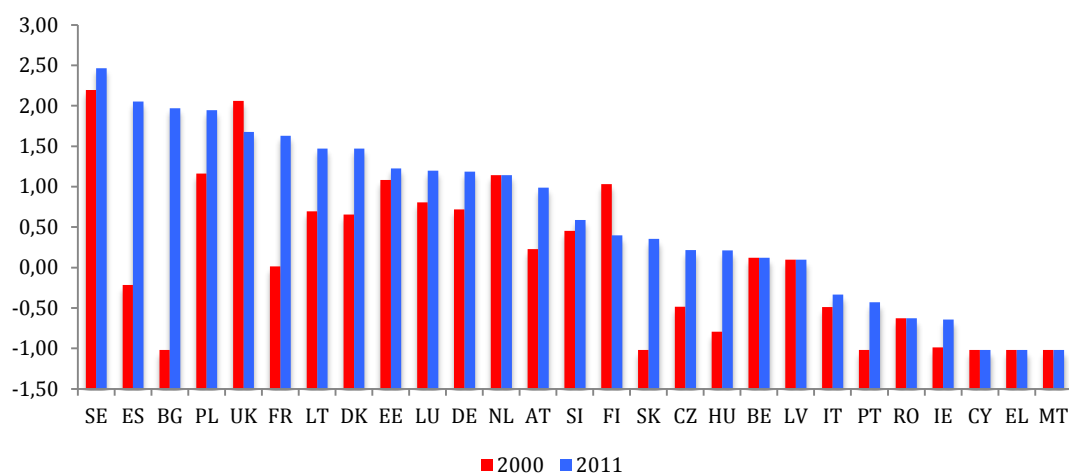
In this section we present empirical evidence on the link between fiscal rules and fiscal policy. The conclusion from the earlier literature reviewed above is that there is indeed a strong relation between fiscal frameworks and fiscal policy such that countries with stricter fiscal rules also are those countries with more solvent public finances. While this relation may only reflect the preferences of voters and government it is still very often argued that the empirical evidence suggests that fiscal rules, if they are implemented and credible, will have a profound effect on the long-run sustainability of public finances. To illustrate this, we show



in Figure 1 the numerical fiscal rule indicator constructed by the EU Commission.<sup>8</sup> Note that this index only covers national fiscal rules, supranational rules such as the rules defined in the Stability and Growth Pact, are not included. It should also be noted that recent attempts to strengthen the national fiscal frameworks in many EU countries are not included as the sample ends in 2011. The numerical fiscal rule indicator should be interpreted as a measure of the quality of the institutional design, not as a measure of the effectiveness of the rules. This implies that our empirical evidence below only reveals differences in the quality of the rules.

In the graph we show the value of the Fiscal Rule Index for each EU country in 2000 and in 2011. From this figure we find that Sweden, Spain, Bulgaria and Poland have relatively tight fiscal rules, whereas Cyprus, Greece and Malta have much looser fiscal frameworks. It is noteworthy that all SWEAP countries except Spain have relatively loose fiscal rules. It is tempting to draw conclusions based on the figure above and the observation that SWEAP countries have been drawn into a debt crisis. There also seem to be an upward trend in most countries to design more strict fiscal rules. Some of the new member states such as Estonia and Bulgaria have put more emphasis on designing and implementing stricter rules, moving from among the less strict rules to the strictest in a European comparison. There are two exceptions from this trend; both Finland and the UK have both less strict rules in 2011 compared to in 2000.

Figure 1: The EU Commission numerical Fiscal Rule Index in 2011.



<sup>8</sup> The numerical fiscal rule index developed by the EU Commission has been downloaded from [http://ec.europa.eu/economy\\_finance/db\\_indicators/fiscal\\_governance/fiscal\\_rules/index\\_en.htm](http://ec.europa.eu/economy_finance/db_indicators/fiscal_governance/fiscal_rules/index_en.htm). The index is on an annual basis and only covers national fiscal rules. The sample is 1990-2011.

One should, however, interpret the graph with caution. Even though the index includes measures of the statutory base of the rules and monitoring as well as enforcement, the index cannot reveal whether the rules have been implemented in practice. At the same time, even if rules are not that strict in this European comparison a country such as Denmark has very stable public finances. Even with less strict rules, if these rules are credible and enforced they could have a profound effect on the sustainability of public finances. A lesson from this figure comparing the quality of fiscal rules is that tight fiscal frameworks may not be enough in order to attain long-term sustainable public finances. The framework must also be credible and enforced to make a difference. This holds for supranational rules as well. Moreover, the apparent link between stricter rules and better performance of public finances may also only reflect the fact that countries and governments more concerned about long-term sustainability are also likely to implement stricter rules, a reverse causality. There could also be other countries deciding to implement stricter rules in order to solve underlying deficit biases but they may never solve this problem without enforcing the rules that may become difficult in practice.

In Figure 2 we show how the numerical fiscal rule index has changed over time for a selection of countries. In the upper graph we show the fiscal rule index for SWEAP countries whereas in the lower graph we show the index for the countries with the tightest rules in 2011. What stands out clearly is that the fiscal framework in Spain has increased considerably from the early 1990s when Spain had relatively loose fiscal rules comparable to other SWEAP countries to among the tightest fiscal rules in Europe.

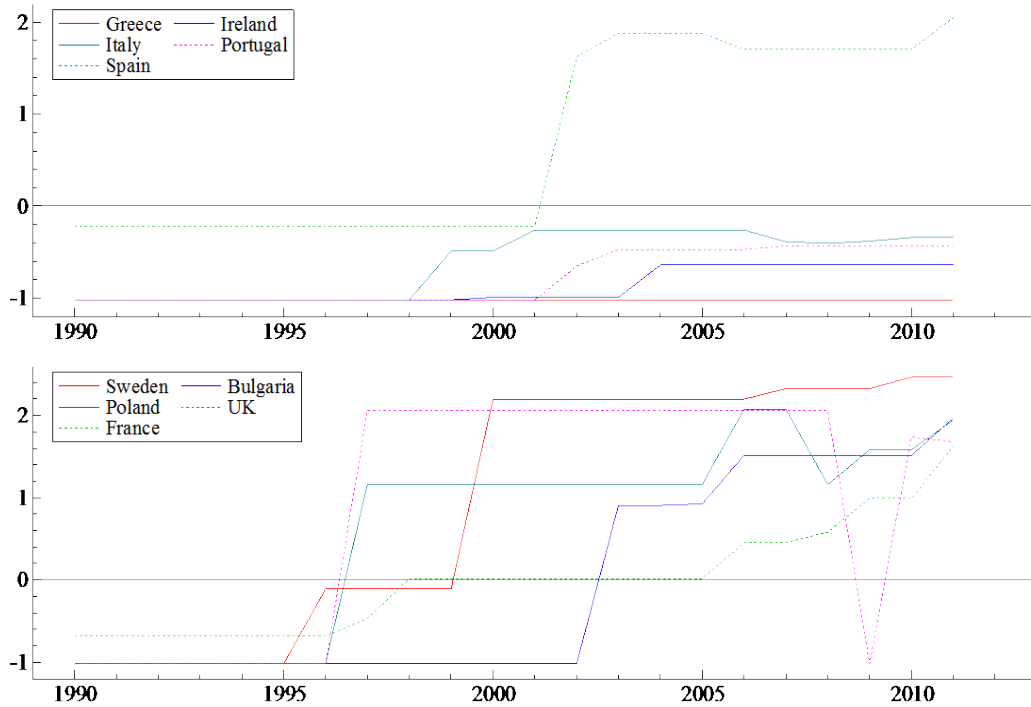
To analyze whether there is a relation between fiscal rules and public policy we follow the convention in the literature (Debrun, Moulin, Turrini, Ayuso-i-Casals & Kumar, 2008; de Haan, Jong-A-Pin & Mierau, 2012; Nerlich & Reuter, 2012 for example) and estimate the following dynamic panel data regression

$$FP_{i,t} = \alpha + \beta_0 FP_{i,t-1} + \beta_2 FR_{i,t} + X_{i,t}' \gamma + \varepsilon_{i,t} \quad (1)$$

where  $FP_t$  is the fiscal policy variable (primary balance, primary government expenditures and government revenues),  $FR_t$  is the numerical fiscal rule index and  $X_{i,t}$  is a vector of control variables. All fiscal policy variables are cyclically adjusted. As control variables we use lagged output gap, lagged debt level, the natural logarithm of total population, the dependency ratio, and inflation. All variables have been downloaded from AMECO. In addition to these economic control variables we also add, as is common in the previous

literature, a number of political variables. These variables are added to control for differences in preferences across countries to fiscal institutions. We use the fragmentation of government and opposition, year's left in current term, and the ideology of government measured on a left-center-right scale. These variables are taken from the Database of Political Institutions at the World Bank. The sample is 1990 until 2011.

Figure 2: Fiscal rule index for SWEAP and select non-SWEAP countries.



In our empirical analysis we also distinguish between EMU member states and non-EMU members. The reason is the absence of the exchange rate mechanism that could motivate stronger fiscal rules in the euro area than in the non-euro. We, therefore, define the following dummy variable

$$D_1 = \begin{cases} 1 & \text{if country } i \in \text{EMU at time } t \\ 0 & \text{otherwise} \end{cases}$$

This allows us to compare and contrast the effects of national fiscal rules may have for countries that at the time are members of the EMU.

Table 1 reports the results of panel data estimates. We only report the estimates of the effects of fiscal rules in the table. The overall results are consistent with earlier empirical analyses in the literature. Lagged government debt, lagged output gap, population, the

Table 1: The effect of fiscal rules index on primary balance, primary government expenditures and government revenues.

	Primary balance		Primary expenditures		Revenues	
$FP_{t-1}$	0.708*** (0.047)	0.707*** (0.047)	0.663*** (0.046)	0.661*** (0.043)	0.689*** (0.055)	0.707*** (0.057)
$Debt_{t-1}$	0.036*** (0.006)	0.036*** (0.007)	-0.012* (0.006)	-0.015** (0.006)	0.022*** (0.006)	0.019*** (0.006)
$Gap_{t-1}$	-0.075*** (0.020)	-0.075*** (0.020)	0.116*** (0.026)	0.116*** (0.026)	0.040** (0.018)	0.039** (0.017)
Dependency	-0.132** (0.062)	-0.134** (0.064)	0.176*** (0.054)	0.157*** (0.058)	0.034 (0.058)	0.010 (0.060)
Openness	0.904 (0.711)	0.909 (0.716)	-1.945** (0.751)	-1.896** (0.740)	-1.012 (0.765)	-0.908 (0.720)
Inflation	0.058** (0.030)	0.058* (0.030)	-0.050 (0.036)	-0.049 (0.034)	0.016 (0.018)	0.017 (0.016)
Population	-33.996*** (9.394)	-33.737*** (9.922)	43.675*** (9.915)	46.644*** (9.764)	6.870* (4.089)	9.292** (4.132)
Ideology	-0.140 (0.114)	-0.142 (0.116)	0.066 (0.107)	0.052 (0.100)	-0.074 (0.094)	-0.091 (0.093)
Years left in office	0.205*** (0.072)	0.205*** (0.072)	-0.106*** (0.040)	-0.110*** (0.040)	0.096** (0.048)	0.093* (0.048)
Government fragmentation	-0.007 (0.005)	-0.007 (0.005)	0.006** (0.002)	0.006** (0.003)	-0.002 (0.004)	-0.001 (0.004)
Opposition fragmentation	0.004 (0.008)	0.004 (0.008)	0.006*** (0.002)	0.005* (0.003)	0.010 (0.007)	0.008 (0.006)
$FR$	0.466*** (0.134)	0.450*** (0.168)	-0.698*** (0.162)	-0.863*** (0.130)	-0.196 (0.210)	-0.358** (0.175)
$D_1 \times FR$		0.052 (0.250)		0.514** (0.247)		0.561** (0.233)
Sargan test	0.112	0.110	0.073	0.088	0.171	0.179
AR(2) test	0.867	0.835	0.076	0.122	0.436	0.310

**Note:** The table reports one-step Arellano-Bond estimates of unbalanced dynamic panel data regressions (1) with country fixed effects. Robust standard errors are reported within parentheses below each estimate. Sargan is the test of overidentifying restrictions whereas AR(2) is a test of second order autocorrelation. Only p-values are reported for these two tests.

number of years left in office are always significant regardless of the measure of public policy we use as the dependent variable. The fiscal rule index is also statistically significant at conventional levels when using primary balance or primary expenditure but not when using revenue. The parameter is positive for primary balance regressions indicating that a country with more strict fiscal rules as measured by the EU Commission numerical indicator, also are likely to have larger primary surpluses. The parameter is negative when regressing primary expenditures implying that stricter rules are associated with lower primary expenditures.

According to these estimates fiscal rules seem to work and they have a statistically significant positive effect on primary balance and a restrictive effect on primary expenditures, these results are consistent with earlier studies, see for example the Ayuso-i-Casals (2012).

There is no significant effect on government revenues, a result consistent with our finding that there is a positive effect on the primary balance and a negative effect on primary expenditures.

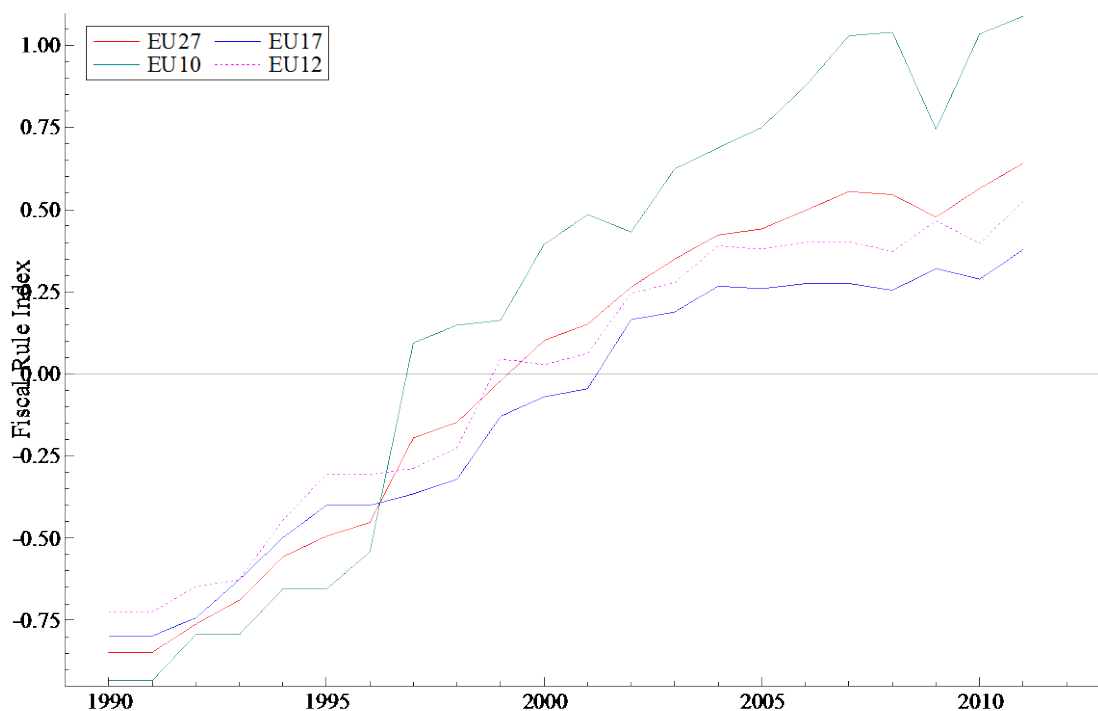
When distinguishing between EMU member states and other EU countries we find that there is no additional effect of being an EMU country on the primary surplus, the interaction term between fiscal rules and the EMU dummy defined above is not significant. Turning to primary expenditures and revenues we find that EMU countries systematically have higher levels of primary expenditures than non-members as well as higher levels of revenue (which must be the case since EMU members do not differ from other EU countries when using primary balance). More strict fiscal rules do not have the same restrictive function on primary expenditures for euro area countries when compared to non-euro area Member States. At the same time, our results suggest that the effect on primary balance is the same regardless of whether the country is in the euro area or not.

Another perspective on the differences between euro area countries and non-euro area Member States is the developments of the fiscal rule indicator over time. In figure 3 we show the simple averages of the fiscal rule indicator for EU27, the initial 12 euro area countries (EU12), the current 17 euro area countries (EU17) and the 10 non-euro area Member States (EU10). As can be seen in the graph, there is a common pattern suggesting that all countries make efforts in strengthening the fiscal framework. From 1996, there is a notable difference between euro area countries and those that remain outside the euro area in that the latter group seem to have put into force more rules and regulations on public policy than the former group of countries.

Judging from this graph, the average strength of the fiscal framework in euro area countries lag behind the outsiders and even lag behind the EU average. One explanation is that some of the new euro area countries have fairly weak fiscal frameworks that will tend to reduce the average. Another possible explanation is that countries remaining outside the euro area have stronger need to reform its national fiscal framework in order to attain credibility in public policy. On the other hand, the graph also suggests that there is a potential for improvements of the fiscal frameworks and there may be lessons learned from the outsiders. One should also keep in mind that while we control for a number of relevant variables in our empirical analysis above, we have not included a measure of the support to the banking sector in countries such as Spain and Ireland. It is clear that extensive rescue packages implemented in these two countries for example have profound effects on budget deficits and government

debt breaking the links between the strength of fiscal rules and the behavior of public finances.

Figure 3: Numerical fiscal rule index for groups of EU countries.



## 5. Market Perceptions of Default Risk

### 5.1. Do markets accurately measure sovereign default risk?

An alternative to using fiscal frameworks to prevent unsustainable public finances is to rely on signals from financial markets. Market signals could potentially provide both surveillance as well as direct and automatic sanctions in terms of higher borrowing costs when debt developments become unsustainable. Moreover, market responses may serve as important indicators of the perceived credibility of government and central bank announcements, such as new policies, regulations and debt purchases, designed to shore up longer-term fiscal sustainability. The question is whether market signals can be relied upon. In order for market signals to be useful they must accurately price sovereign default risk. As new information becomes available, the market should respond consistently. Several empirical questions arise in this context. Do financial markets accurately price sovereign risk? Are market price responses to economic news relating to sovereign debt risk systematically predictable across

time, even during crisis periods? Is there evidence that markets accurately price the probability of sovereign default risk during relatively tranquil periods but seemingly fail to do this during crisis periods, switching from a “good” to “crisis” equilibrium? Do financial markets respond systematically to policy announcements about new regulations and fiscal rules that should, in principle, shore up debt sustainability?

There is a large literature on these topics, considering the issues from several vantage points. One approach taken by several empirical studies is to analyze whether changes in credit ratings are reflected in CDS spreads and in interest rate differential, see for example Caceres, Guzzo and Segoviano (2010), Arezki, Candelon and Sy (2011), Afonso, Furceri and Gomes (2011), Missio and Watzka (2011), De Santis (2012), Cassola and Morana (2012) and Mink and De Haan (2012). The main conclusion from this literature is that markets seem to price credit rating downgrades appropriately. In these studies it is also common to analyze contagion. Most empirical studies find evidence of contagion, in particular across southern European countries. The general conclusion is that there are strong contagious effects, the Greek crisis spread to Portugal, Spain and Italy but they very seldom find significant contagious effects on core EU countries.

Dooley and Hutchison (2009) study the transmission of news announcements concerning the US economy during the crisis on emerging markets. Collecting news announcements and categorizing these into different groups allow them to study the effects of, for example the Lehman Brothers failure, on a selection of emerging markets. The main result from this study is that news announcements do lead to responses in CDS spreads. The Lehman Brothers failure and news associated with this failure raised CDS spreads in all 14 countries studied and the effect ranges from 7 basis points increase for the Chinese sovereign spread to over 100 basis points for Argentinian spreads.

Beetsma, Giuliadori, de Jong and Widiyanto (2012) study the transmission of news on SWEAP countries on euro area and non-euro area Member States. They collect news announcements from the Eurointelligence newsflash and construct a number of groups of news, for example the number of times the word Greece is mentioned in a newsflash. They also distinguish between good and negative news. The main result is that more news tends to increase the interest rate spread in SWEAP. The magnitude is related to the bank holdings across countries. Even non-SWEAP countries seem to be affected, in particular since mid-2009 where both the 5-year and the 10-year spreads increased significantly. Splitting the news into good and bad news they find significant effects of bad news (an increase in the

spread) but no significant effect from good news. Again, bank holdings across countries interact with bad news. Similar results hold for non-SWEAP countries, they are also significantly affected by bad news but not by good news. In this respect it seems that market signals cannot be relied upon because of this asymmetry. Comparing effects across SWEAP and non-SWEAP countries they find smaller effects on the latter group of countries.

Another strand of the literature focuses on the determinants of CDS spreads or interest rate differentials. The relationship between CDS spreads and fundamentals, including fiscal stance, is studied by Aizenman, Hutchison and Jinjark (2012) who find that fundamentals explain spreads but that default risk in periphery euro area countries are priced too high given current fundamentals during the crisis period, and perhaps too low during the pre-crisis period. European Commission (2012) presents an analysis of the determinants of CDS spreads in Europe using quarterly data. The results suggest that macro variables such as the debt level, output growth, fiscal balance significantly affect the spreads, results that are consistent with empirical evidence presented previously by Barrios, Iversen, Lewandowska and Setzer (2009). Yet a significant part of the recent surge in sovereign spreads in some Member States cannot be explained by traditional macroeconomic variables, prompting a search for other factors that determine sovereign debt pricing.

The novelty of the analysis by European Commission (2012) is that they also include measures of uncertainty and global risk. They find that a first principal component of the CDS spreads accounts for about 60% of the variation of CDS spreads. Other measures of global risk also tend to increase the fit of the regressions significantly. This suggests that other factors than macro fundamentals may explain the developments in CDS spreads in Europe. Global factors as measured by principal components or the European Policy Uncertainty index are important according to the results. Such indicators, in particular if they measure unanticipated changes, conform closely to the news announcements that we consider in the next section.

The empirical literature has also studied the linkages between sovereign risk and the vulnerability of the banking sector. De Bruyckere, Gerhardt, Schepens and Vander Vennet (2012) focus on the relationship between bank and sovereign risk spillovers in Europe and they find a considerable correlation of bank CDS spreads and CDS spreads on sovereigns. They focus on the question whether bank specific or country specific factors drive contagion. Even though they find evidence of contagion between banks and sovereigns they also find a significant home bias, as the link from domestic banks on the sovereign is stronger than the



transmission across countries. Alter and Beyer (2012) study the spillover effect between banks and sovereigns. They find stronger contagion from banks to sovereigns than vice versa and that these linkages tend to grow over time. In addition to this analysis they also consider specific news announcements and find that the establishment of EFSF and the two LTROs decided upon in December 2011 tended to reduce contagion somewhat. On the other hand, the bailout of the Spanish bank Bankia, had the opposite effect, and tended to increase contagion.

The overall conclusion from the empirical literature studying the effects of news announcements is that the market can provide accurate signals in particular of credit rating changes and bad news. It is an open question whether these signals are accurately enough to be used by policy makers when formulating and designing public policy. The apparent asymmetry between good and bad news is critical. If there are no market signals reflecting good news, there will be no response from policy makers. The transmission of news from SWEAP countries to other countries may also reflect an inconsistency. If markets price sovereign risk accurately, then there should be no direct spillover effect from other countries. On the other hand, the empirical evidence suggest linkages between sovereign risk and banking risk and it may well be the case that increased sovereign risk will spillover to increased domestic banking risk and also on banks in other countries. These linkages are, however, not very well understood. There is also scant literature considering how markets respond to new programs, regulations and other policy announcements by the ECB and EC, even when these are designed to restore confidence in the ability of countries to restore debt sustainability. In the next section we describe our approach to analyzing the effects of news announcements.

### *5.2. Empirical approach to measuring market responses of default risk?*

Building on the previous literature discussed in the previous section we focus on the response of CDS spreads to news announcements. Our main contributions are to examine how SWEAP countries in particular respond to news announcements, the market responses to a host of EU policy and regulatory changes, and the nature of contagion across the EU. In particular, we are not aware of other work that has undertaken a detailed analysis of the market effects of a multitude of EU policy initiatives and changes in various regulations and fiscal rules.

Our analysis of the impact of news announcements on interest spreads is influenced by Dooley and Hutchison (2009) who study the transmission of news from the US on emerging markets and Beetsma, Giuliadori, de Jong and Widijanto (2012) who study the transmission of news on SWEAP countries on euro area and non-euro area Member States.

We use daily data on CDS prices taken from Markit.<sup>9</sup> The data are five-year on-the-run CDS spreads in USD. The quoting convention for CDSs is the annual premium payment as a percentage of the notional amount of the reference obligation. The sovereign CDS spreads are reported in basis points, with a basis point equals to \$1,000 to insure \$10 million of debt.<sup>10</sup>

In Figure 4 we show daily observations of CDS spreads in the 16 EMU countries (there is no CDS spread for Luxembourg) from January 1, 2001 until September 4, 2012. To illustrate the large differences across the countries we use the same scale for all countries except Greece (the upper left graph).

It is a striking feature in Figure 4 that CDS spreads are almost constant until the failure of Lehman Brothers. As the credit crunch developed, CDS spreads in all EMU countries started to rise and when the credit crunch later developed into a European debt crisis, CDS spreads in the SWEAP countries and in some of the periphery countries also became affected. The Estonian CDS spread increased considerably during the 2008 crisis, much more than in the SWEAP countries. The Cypriot CDS spread became heavily affected from 2010 and onwards as a consequence of its close connections to Greece. The CDS spread increased to similar levels as the Portuguese spread as can be seen in Figure 4. Core EMU countries were not affected to the same degree as can be seen in the lower right graph. It increased somewhat. Even among these countries there are some notable differences. Belgium and Austria were more affected than other core countries and France somewhat more than Germany and Netherlands.

These developments can be compared to EU countries not participating in the monetary union. Figure 5 shows the CDS spread for the remaining 10 EU countries. We are using the same scale as for the EMU countries except Greece in Figure 4. Looking first at the 6 former

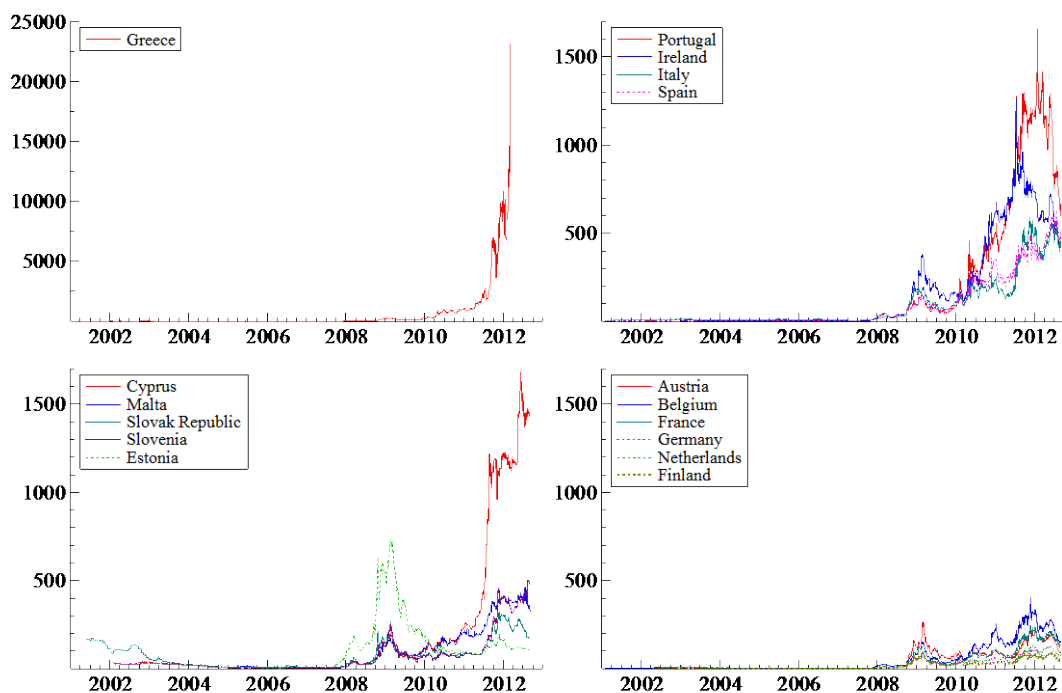
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<sup>9</sup> Markit receives contributed CDS data from market makers from their official books and records. According to the company, Markit “cleans” this data, testing it “...for stale, flat curves, outliers and inconsistent data”. If a contribution fails any one of these tests, they discard it. Markit states that they ensure superior data quality for an accurate mark-to-market and market surveillance.

<sup>10</sup> For example, a spread of 197 basis points means that it costs 197,000 USD to insure against 10,000,000 in sovereign debt for 10 years; 1.97% of notional amount needs to be paid each year, so  $0.0197 \times 10 \text{ million} = \$197,000$  per year.

East European countries we first find a strong convergence in CDS spreads in other EU countries, a rise during the credit crunch and high CDS spreads during the 2009 to 2010 period. Czech Republic also stands out as an exception in this group with persistently lower spreads, comparable to the other group of outsiders shown in the lower graph. Poland has been more affected by the international crises than the other three countries, on a level comparable to the Czech Republic and Belgium and Austria. Denmark, given its fixed exchange rate policy has been more affected than Sweden and the UK.

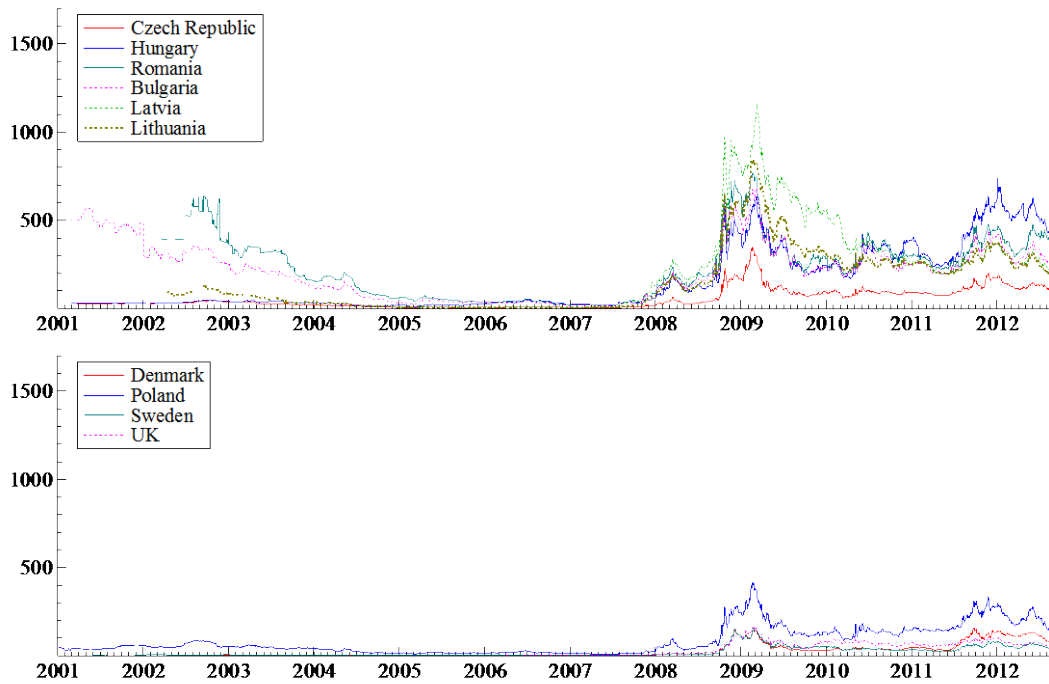
Figure 4: CDS spreads in EMU countries 2001-2012.



The overall picture when looking at the CDS data is that it seems that both EMU and outsiders have been affected and that being an outsider has not insulated the economy from shocks related to the credit crunch and the debt crisis. EU countries are integrated regardless of whether they have adopted the euro or not. At the same time it is clear that there are differences and our previous empirical analysis on the links between fiscal rules and public finance performance suggested that tighter fiscal rules are associated with better public finances and therefore these countries have been affected less by the debt crisis in the SWEAP countries. Contagious effects to the smaller EMU and non-EMU countries may also explain why these countries have been more affected than the larger EU countries.

Before turning to the method, we start by defining and describing the “news” variables we use.

Figure 5: CDS spreads in EU countries not participating in EMU.



### 5.3. News announcements

The news announcement variables are collected from four different sources. First, we use three different chronologies of the recent financial crisis and the key developments in the European economies including policy measures both at a national level as well as on a pan-European level; “Key dates in financial crisis” published by the ECB, “Timeline: The unfolding Eurozone crisis” published by BBC, and “Europe's Debt Crisis” published by Wall Street Journal. In addition to these three sources we use Bloomberg news announcements. From the three chronologies we classify 267 events as “news”. These news events are then coded into 42 different categories. The categories are described and we provide examples of events for each category in Table 2.

In the *upper panel* of the table we list the news categories for the five SWEAP countries. AP (announcement of austerity plans), Good (positive news about a SWEAP country), Neg (negative news about a SWEAP country), SUPPORT (EU/IMF financial assistance to a SWEAP country), CR (Fitch Rating downgrades of a SWEAP country sovereign) and CR Bank (Fitch Rating downgrade of large banks in a SWEAP country) are all country specific. We use, as indicated above, credit rating downgrades by Fitch as our measure of the CR news announcements. These announcements also include cases when the credit rating is unchanged but the outlook for a particular country has been downgraded.

Since the literature reviewed above suggests that there is a link between the health of the banking sector and public sector solvency we include credit rating downgrades on the largest banks in the SWEAP countries. We focus on the two largest banks in each of the SWEAP

Table 2: Definition and examples of news events in the EU.

		SWEAP specific news	
Event Variable	Definition of event	Event example: date and description	
AP	Announcements of Austerity plans in SWEAP	Aug 1, 2012	Leaders of Greece's coalition government have agreed on 11.5bn euros in new spending cuts.
Good	Positive news about SWEAP countries fiscal situation	November 23, 2010	Positive statement by EC, ECB and IMF on second review mission to Greece
Neg	Negative news about SWEAP countries fiscal situation	April 22, 2010	The Greek government's budget deficit increased more than expected to 13.6% of GDP
Support	Announcement of EU/IMF financial assistance to SWEAP governments	May 2, 2010	Loan package for Greece agreed.
CR	Credit rating downgrades of SWEAP sovereigns	June 7, 2012	Fitch downgraded Spanish bonds from A to BBB.
CRBanks	Credit rating downgrades of SWEAP banks	November 26, 2011	Fitch downgraded Allied Irish Banks from BB to B.
EU policy initiatives: monetary			
MP	General announcements of monetary policy loosening by ECB	July 5, 2012	ECB has reduced its key interest rate from 1% to 0.75%, a record low for the euro area
ECBGOV	ECB balance sheet government debt purchases or direct liquidity support to governments	08 Mar 2012	ECB reactivates eligibility of Greek bonds as collateral
ECBGOVSUSPEND	ECB suspension of government purchase programs or limits eligibility for government debt as collateral	20 Jul 2	012 ECB suspends Greek bonds as collateral
ECBBAL	Policy announcements that will expand the ECB'S balance sheet to support banking sector	Mar 1, 2012	ECB allots 530 billion euros to 800 banks in second 36-month longer-term refinancing operation.
SWAP	Expansion of ECB swap lines and international liquidity shortage	Aug 25, 2011	Prolongation of swap line with Bank of England.
RECAP	Announcement of recapitalization of euro area financial institutions	March 30, 2010	Extra capital that will need to be injected into Bank of Ireland, Allied Irish Bank, EBS and Irish Life and Permanent
EU policy initiatives: Changes in financial and fiscal regulations			
FREG	Important tightening in euro area financial regulations	Oct 26, 2012	From 1 Nov. traders and investors will be unable to buy insurance against sovereign-debt defaults, unless they hold the underlying bonds.
REGESM	Tightening of fiscal rules in Europe: ESM	February 2, 2012	European leaders decide to establish ESM
REGESFSF	Tightening of fiscal rules in Europe: EFSF	May 9, 2010	European leaders decide to establish EFSF
REGSix	Tightening of fiscal rules in Europe: Six-pack	December 13, 2011	European leaders sign six-pack
REGTSCG	Tightening of fiscal rules in Europe: Treaty on Stability	March 1, 2012	European leaders sign Treaty on Stability, Coordination and Governance
REGOther	Tightening of fiscal rules in Europe: Other announcements	October 28, 2010	European Council announces plans to tighten the SGP

countries except for Spain where we use credit rating downgrades for the three largest banks. The reason is that there are relatively few downgrades of the two largest Spanish banks over the sample, which is not reflecting the state of the banking sector properly. Therefore, we use credit rating downgrades for the third largest Spanish bank. The largest banks in Ireland are

Bank of Ireland and Allied Irish Banks; in Spain Banco Santander, Banco Bilbao Vizcaya Argentaria and Banco Popular Español; in Greece National Bank of Greece and EFG Eurobank Ergasias; in Italy Unicredito Italiano and Intesa Sanpaolo; and in Portugal Banco Espirito Santo and Banco Comercial Português. The dates on credit rating downgrades are taken from Fitch Ratings homepage.

As our major objective is to analyze the effects of news from the SWEAP countries as well as the existence of contagion, we code separate categories of austerity plans, good and negative news, bailouts, and credit ratings of sovereigns and banks for each of the five SWEAP countries. In this way, we can analyze the effects of a new austerity plan in Portugal on both the Portuguese CDS spread as well as on the Spanish CDS spread, where the latter effect is our measure of contagion. In total we have six news categories specific for each SWEAP country implying that we have 30 categories of domestic SWEAP news announcements.

The *middle panel* of Table 2 shows six different indicators of EU policy initiatives. These include monetary policy as well as other policy initiatives (for example the covered bonds program), changes in financial regulations and changes in fiscal regulations. The monetary policy news variable MP only includes cases of expansionary monetary policy, for example interest rate cuts. The ECB also use other measures such as balance sheet government debt purchases or direct liquidity support as well as support to the banking system. We distinguish between these measures and also take into account that the ECB suspended the government debt purchase program and then reactivated it again. In Table 2 these news indicators are ECBGOV, ECBGOVSUSPEND and ECBBAL. Expansion of central bank swap lines (SW) and recapitalization of financial institutions (Recap) are also included as separate categories.

The *lower panel* of news announcements in Table 2 shows six different EU policy initiatives focusing on changes in financial and fiscal regulations in the EU. We distinguish between six types of changes. FREG denotes tightening of financial regulations in the EU. Two important new mechanisms, the EFSF (REGFSF) and the ESM (REGESM), have been established in EU in order to provide financial support to countries in need. To these we also add the tightening's of fiscal regulations, the six-pack (REGSix) and the Treaty on Stability, Coordination and Governance. Note that we include two events for each of these, the first event being the announcement that there would be a tightening of fiscal rules whereas the second event is when the agreements were signed.

Table 3 reports the number of events for each news announcement for the full sample as well as for two subsamples that we use below in our empirical analysis. The number of news announcements for each subsample is 126 for the earlier period and 141 for the latter. As expected there is more news on Greece than on other countries reflecting only that the problems in the Greek economy are much more severe than in other SWEAP countries. Note also that for some indicators and for some countries there are no news announcements at all, for example there is no bailout for Italy and there are no good or bad news for Italy in the earlier period.

It is important to use precise definitions as well as excluding the possibility that a news announcement we code is a response to market developments. We have used a conservative interpretation of the events in order not to contaminate our estimates. Therefore, we may end up with too few events. However, this should be weighted against the possibility that we end up including news events that are simply a response to the developments on financial markets. We have also excluded news announcements reflecting general market conditions such as the announcement by EU that it endorses Greece's austerity plan that was announced on Feb. 3, 2010, for example. The occurrence of strikes are not classified as news even though it can be regarded as negative news increasing the uncertainty about whether a planned austerity plan for example will be implemented or not.

Having defined the categories we define a dummy variable taking the value one on the date when the news was announced, otherwise the dummy is equal to zero. Such a definition excludes the possibility that some news announcements are anticipated implying that there is a market reaction prior to the actual announcement. It may also well be that the market does not respond immediately on the same day but respond the next day. For this reason we utilize event windows.

We follow the standard approach in event studies and define a two-day window, i.e., we let the dummy variable be equal to unity on the day of the event, the previous day and the following day.<sup>11</sup> Using wider windows runs the risk of contaminating our results as other news or events may also affect our measures. A too narrow event window could imply that we exclude anticipation effects and are not taking into account that the market may not respond immediately. Many of the news announcements we study are related to policy

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<sup>11</sup> We have also estimated models with no window, i.e., we have a dummy variable taking the value one on the day of the event and zero otherwise. In general the sign of the point estimates are unaffected but the standard errors are considerably larger than when using a two-day window.

initiatives that are discussed in public prior to any decision. The closer to the expected policy decision, the more likely it is that the market anticipates the particular announcement. This is particularly relevant for EU policy initiatives, for example the decisions to establish ESM, where the decision may be anticipated and the effect therefore may be spurious. This is a problem that is unavoidable since we do not have data allowing us to distinguish between the anticipated and the unanticipated news announcement.

Table 3: Number of news announcements.

SWEAP news									
	Greece			Portugal			Ireland		
	2009-2012	2009-2010	2011-2012	2009-2012	2009-2010	2011-2012	2009-2012	2009-2010	2011-2012
AP	12	9	3	8	7	1	3	3	0
Good	14	5	9	4	0	4	6	0	6
Neg	21	13	8	1	1	0	3	0	3
Support	15	9	6	3	0	3	5	3	2
CR	10	5	5	6	3	3	13	9	4
CR Banks	11	6	5	5	2	3	13	9	4
	Italy			Spain					
	2009-2012	2009-2010	2011-2012	2009-2012	2009-2010	2011-2012			
AP	4	1	3	6	5	1			
Good	0	0	0	0	0	0			
Neg	1	0	1	2	2	0			
Support	0	0	0	7	0	7			
CR	4	0	4	10	2	8			
CR Banks	4	0	4	10	2	8			
EU policy initiatives									
	2009-2012	2009-2010	2011-2012						
MP	7	4	3						
ECBGOV	5	2	3						
ECBGOVSUSP	3	1	2						
ECBBAL	9	7	2						
SW	7	4	3						
RECAP	10	2	8						
Change in financial and fiscal regulation									
FREG	14	5	9						
REGESM	2	1	1						
REGFSF	2	1	1						
REGSix	1	0	1						
REGTSCG	1	0	1						
REGOther	5	3	2						



#### *5.4. CDS spreads as an indicator of default probabilities*

We measure the market perception of sovereign default risk by the spreads on sovereign credit default swaps (CDS) at five-year maturity (tenors).<sup>12</sup> CDS instruments are mainly transacted in over-the-counter (OTC) derivative markets. The spreads represent the quarterly payments that must be paid by the buyer of CDS to the seller for the contingent claim in the case of a credit event, in this case non-payment (or forced restructuring) of sovereign debt, and is therefore an excellent proxy for market-based default risk pricing.<sup>13</sup>

The total CDS market grew from about 10 trillion USD in 2004, when statistics were first systematically reported, to a peak prior to the global financial crisis of almost 60 trillion USD in 2007, and then fell sharply to around 32 trillion USD in mid 2011 according to BIS surveys. The share of sovereign CDS has grown since 2008 from around 15% (10%) to almost 25% (20%) in December 2011 of total net notional (total gross notional) amount (International Organization of Securities Commission, 2012).

Sovereign CDS provide a market-based real time indicator of sovereign credit quality and default risk. We consider sovereign CDS spreads with five-year maturities, as this is the most liquid part of the CDS market. Despite the low probability of a credit event in most advanced economies, CDS markets are still active in most markets as buyers can use the sovereign CDS as a hedge and for mark-to-market response.<sup>14</sup> Buyers of the sovereign CDS may or may not own the underlying government bonds. The latter case is termed 'naked' sovereign CDS, and frequently labeled as a speculation.

#### *5.5. Estimation equations*

We will focus on the sample 2009-01-01 until 2012-09-04 using daily data. This is the period following the sub-prime crisis where the global economy was hit by the credit crunch that later developed into the debt crisis in Europe. We will focus on the SWEAP countries

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<sup>12</sup> See Packer and Suthiphongchai (2003) and Fontana and Scheicher (2010) for discussions of sovereign CDS markets.

<sup>13</sup> An alternative proxy for default risk is the interest rate spread of sovereign debt. From an empirical standpoint, there are three main advantages of using CDS spreads rather than interest rate spreads. Firstly, CDS statistics provide timelier market-based pricing with larger coverage of industrial and developing countries than sources for national bond market rates. Secondly, using CDS spreads avoids the difficulty in dealing with time to maturity as in the case of using interest rate spreads (of which the zero yields would be preferred). Recent estimates from the Bank for International Settlements suggest that the average original and the remaining maturities of government debt instruments vary markedly across countries. Thirdly, interest rate spreads embed inflation expectations and demand/supply for credit conditions as well as default risk. We are only interested in default risk.

<sup>14</sup> Sovereign CDS can also be used to supplement corporate CDS to hedge for country risk.

first and then we compare results with select EMU and non-EMU countries. There are missing observations in the dataset but we have decided not to delete observations or to use a proxy for these missing observations. Instead, we use all available observations in our estimations below implying that the sample and/or the number of observations are not the same across all countries. Our general approach is to run regressions of the following type:

$$\Delta CDS_{i,t} = \alpha + \beta_0 \Delta CDS_{i,t-1} + \underbrace{\beta_i X_{i,t}}_{\text{Domestic news}} + \underbrace{\sum_j \gamma_j X_{j,t}}_{\text{News from other SWEAP}} + \underbrace{\delta_k Z_{k,t}}_{\text{Common news}} + \varepsilon_{i,t} \quad (2)$$

where  $\Delta CDS_{i,t}$  is the change in the CDS spread in SWEAP country  $i$ ,  $X_{i,t}$  denotes news announcements in country  $i$ ,  $X_{j,t}$  denotes news announcements in SWEAP country  $j$ ,  $j \neq i$  and  $Z_{k,t}$  denotes EU policy initiatives or changes in financial or fiscal regulations, i.e., all other news announcements listed in Table 2. The own effect of news is measured by  $\beta_i$ , contagion from other SWEAP countries is captured by  $\gamma_j$  and  $\delta_k$  measures the effects from other news announcements including changes in fiscal and financial regulations. Note that we include the lagged change in the CDS spread as in Dooley and Hutchison (2009) and Beetsma, Giuliodori, de Jong and Widiyanto (2012).

We expect the effect on the change of the CDS spread from the implementation of austerity plans to be negative (a falling CDS spread), the effect from negative news should be positive (an increase in the CDS spread), and that tighter fiscal rules should be negative (a falling CDS spread). The contagious effects from Greece (or other SWEAP) that are measured in our regression above by  $\gamma_j$  depend on the type of news. For example, we expect a Greek austerity to lower CDS in Spain if markets expect less turmoil transmission to Spain from Greece. Bad news in Greece raises CDS in Spain if market expects transmission of Greek troubles to Spain, etc. Tighter fiscal rules in EU generally should cause lower CDS spreads. An even bigger effect is expected if a country-specific rule is adopted.

In addition to analyzing the effects of news announcement on SWEAP CDS spreads we also run the regression above for other EU and euro area countries, i.e., we run regressions of SWEAP news announcements (the  $X_t$  variables) and EU news announcements (the  $Z_t$  variables) on several countries outside the SWEAP group. In particular, we estimate the following regression equation for six EU countries outside the SWEAP group, of which three are in the Euro Zone:

$$\begin{aligned}
\Delta CDS_{i,t} = & \alpha + \beta_0 \Delta CDS_{i,t-1} + \overbrace{\gamma_j X_{j,t}}^{\text{SWEAP news}} + \underbrace{\beta_i X_{i,t}}_{\text{Common EU news}} + \\
& \overbrace{\delta_j X_{j,t} \times D_2}^{\text{SWEAP news}} + \underbrace{\eta_i X_{i,t} \times D_2}_{\text{Common EU news}} + \varepsilon_{i,t} \tag{3}
\end{aligned}$$

$$D_2 = \begin{cases} 1 & \text{if country } i \in \text{EMU} \\ 0 & \text{otherwise} \end{cases}$$

where  $X_t$  is a vector of SWEAP news announcements and  $Z_t$  is a vector of EU-wide news announcements. We include interaction terms that capture whether membership in EMU ( $D_2=1$ ) changes the response of CDS spreads to news emanating from either the SWEAP area or to common EU news announcements. (Statistically insignificant interaction terms indicate that responses to news announcements do not depend on whether or not the country is an EMU member).

Our regression analysis allows us to examine the effects of news announcements from several different perspectives. Firstly, we consider risk pricing during two periods to investigate whether the response to “news” is fairly stable across time and serves as a reliable signal of sustainable public finances and other economic indicators. In particular, we investigate the commonly held view that financial markets may have systemically incorporated news announcements in a predictable and economically meaningful way during the early period, but not during the European sovereign debt crisis period. Secondly, we empirically measure the direct effect of changes in regulations. We consider both fiscal and financial markets regulations at the EU level and at the same time compare the responses in countries with more lax national fiscal rules to countries with tighter rules. Thirdly, we consider contagion by measuring how news in particular SWEAP countries affects other SWEAP countries, as well as how these announcements are transmitted to EU countries inside and outside of the euro area.

### 5.6. Estimation methodology

It is well known that a fixed effects model will correct for the group effects that make OLS estimates from a pooled regression inconsistent. However, it is still the case that the demeaned dependent variable in the fixed effects model is correlated with the residuals through the group mean, implying that the residual influences the dependent variable and therefore

also the mean for all  $t$ . Several methods produce consistent estimates of a dynamic panel data, including the difference and system GMM approach suggested by Arellano and Bond (1991) and Blundell and Bond (1998). Both these methods apply to the case of large  $N$  and small  $T$  panels, i.e., many individuals and few time periods. The basic idea of these methods is to use more instruments and can improve efficiency significantly. A potential problem when implementing the GMM methods is that the number of instruments explodes with  $T$ , overall the number of instruments is quadratic in  $T$ . Roodman (2009) discusses many of the potential pitfalls of instrument proliferation and its consequences, including over fitting of endogenous variables, bias in estimates and the weakening of Sargan tests.

These issues have not been fully analyzed in the literature and there exists very little guidance on how to handle this problem in GMM estimation of dynamic panel data models, see the discussions in Hall and Peixe (2003), Roodman (2009) and Bontempi and Mammi (2012). At the same time we know that as  $T \rightarrow \infty$  the bias disappears in the fixed effects model. Given the lack of solid methods and the fact that we have a panel with small  $N$  and large  $T$  we assume that inefficiency is likely to be small. Hence, we use the fixed effects estimator when analyzing the effects of news announcements.

## 6. Empirical Results on Market Perceptions of Risk and Policy

In this section we focus on the effects of domestic news announcement on CDS spreads for the SWEAP group excluding Greece (i.e. Italy, Portugal, Spain, and Ireland).<sup>15</sup>, then we discuss the effects on these CDS spreads from EU related news, monetary policy initiatives and changes in both fiscal regulations and financial regulations. We also estimate contagion across the SWEAP countries as well as measure the effects on other EU countries.

### 6.1. How do markets price sovereign risk?

Tables 4 and 6 report panel regressions that include fixed effects, and also correct for unbalanced panel data and heteroscedasticity. Table 4 reports results for the groups of variables categorized as either “Domestic news” or “Transmission from other SWEAP”.

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<sup>15</sup> In the appendix we report analogous regression results in a panel including Greece and with time series regressions with Greece alone. These results indicate that the market pricing of sovereign risk in Greece, especially in the period leading up default, was substantially different than the other four countries in the SWEAP group, invalidating the assumption of common responses underlying the panel regression approach. This is not surprising since Greece was close to default on its sovereign bonds during much of the sample, and eventually a “credit event” occurred (i.e. a default). The high likelihood of default meant that Greek CDS spreads moved quite differently to news, whether from domestic or EU/ECB sources, than other SWEAP countries.

Table 6 continues the presentation of the results from the same panel regressions, and overall regression summary statistics, for categories of news classified as “EU policy initiatives” and “Changes in financial and fiscal regulations.”

The first column in both tables reports the full-sample results (daily data from January 1, 2009 to September 4, 2012), the second column reports the pre-sovereign debt crisis period (January 1, 2009 to December 31, 2010) and the third column reports results for the crisis period (January 1, 2011 to September 4, 2012). These sub-periods do not exactly correspond

Table 4: Effects of news announcements in SWEAP countries except Greece.

	SWEAP countries excl. Greece		
	2009–2012	2009–2010	2011–2012
Domestic news			
AP	-0.92 (0.67)	-1.04 (1.36)	-4.85*** (0.86)
Good	4.16 (3.70)	—	4.64 (4.54)
Neg	2.55*** (0.57)	2.75** (1.10)	1.97*** (0.54)
Support	-0.64 (2.95)	11.12*** (1.20)	-2.39 (1.52)
CR	-1.31 (1.20)	-1.65** (0.74)	-1.63 (1.46)
CR Bank	1.27* (0.66)	4.55*** (1.51)	0.06 (2.15)
Transmission from other SWEAP			
AP	-0.19 (0.42)	1.12*** (0.32)	-3.93*** (1.38)
Good	0.90*** (0.30)	-3.60*** (1.10)	2.65*** (0.95)
Neg	1.81*** (0.32)	1.16** (0.51)	2.01*** (0.65)
Support	-0.95* (0.53)	1.92*** (0.60)	-2.78*** (0.51)
CR	1.69*** (0.63)	0.03 (0.09)	2.60** (1.11)
CR Bank	1.47** (0.62)	1.94*** (0.21)	2.28* (1.23)

**Note:** The table reports estimates of the fixed effects panel data regression in equation (2). Fixed country effects are not reported in the table. All standard errors reported within parentheses below each estimate are corrected for heteroscedasticity using the method suggested by Arellano (2003).

to the financial crisis or sovereign crisis as the first Greek and Irish bailouts took place in 2010. At the same time we are interested in the question whether the response of CDS spreads tends to change over time which means that we need to have relevant news

announcements for as many categories as possible in both sub-samples. These considerations lead us to the two samples indicated above.

Domestic news in the upper panel of Table 4 consists of announcements of country-specific *austerity programs* in the focus country (AP), positive (Good) and negative (Neg) domestic economic news announcements, announcement of EU or IMF financial assistance packages for the focus country (Support), Fitch credit rating downgrades of domestic sovereign debt (CR), and Fitch credit rating downgrades of domestic banks (CR Bank). The lower panel in Table 4 focuses on the transmission of these same news categories from other SWEAP countries to the focus (SWEAP) country, e.g., a Spanish bank credit downgrade transmission to Portuguese sovereign debt CDS ratings. This allows us to examine the transmission or contagion of economic news across the SWEAP area to the market pricing of risk on domestic bonds.

Overall, the results shown in Table 4 reveal several interesting and surprising findings. Firstly, austerity programs reduced perceptions of SWEAP country default risk during the crisis period. Secondly, market participants generally responded to negative economic news during this period, but not to positive news. Thirdly, markets did not respond to many economic announcements in the crisis period that had previously been important in pricing risk. Fourthly, the transmission of news from other SWEAP countries seemed to play a larger role on balance than domestic news.

Specifically, in terms of domestic news announcements, the five *austerity programs* announced in the SWEAP area (excluding Greece) during the crisis period (2011-12) significantly lowered CDS spreads — by about 4.8 points — but apparently had no effect during the pre-crisis period (2009-10). The lack of significance in the earlier period may be due to the large number of announcements (16), perhaps reducing the credibility of the plans, or that markets had already widely anticipated the announcements.<sup>16</sup> Another feature is that negative news was always important in raising risk perceptions while markets entirely discounted positive news.

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<sup>16</sup> We do not have a quantitative or continuous measure of the magnitude of an “unexpected” policy announcement. Due to data limitations we employ the date of the announcement itself (as a dummy variable on the day of announcement) and measure the effect on CDS spreads. This follows the event study in related literature on the effects of general policy announcements on financial assets prices (e.g. Dooley and Hutchison, 2009). There is no generally accepted methodology or systemic data source on market expectations of austerity plans or other policy actions. Hence, a result of “no significance” or even a directional sign that is not anticipated, may be due to either to the policy being fully expected or disappointing to market participants in that a more forceful policy action was anticipated by the market.

Announcements of *support from the EU or IMF*, by contrast with austerity programs, did not have the desired effect of restoring market confidence in government's fiscal solvency, and downgrades of banking risks only seemed to play a role in the pre-crisis period. In fact, it is striking how several factors that played a role in changing perceptions of sovereign default risk in the pre-crisis period were no longer a factor during the crisis period (i.e. support, CR or CR Bank). This may suggest a failure of markets in crisis periods to work effectively, seemingly unable in periods of duress to accurately and systematically incorporate news into risk assessment in a nuanced way.

Another interesting feature of the results, shown in the lower panel of Table 4, is that *news emanating from other SWEAP countries* played an economically and statistically significant role in market perceptions of domestic sovereign default risk. In fact, announcements in every listed news category transmitted from one SWEAP country to the others during the crisis period. The impact of an austerity plan in other SWEAP countries lowered domestic CDS spreads by an amount (-3.93) almost as large as the impact of domestic austerity package announcements (-4.85). Clearly, austerity plans in any given SWEAP country were “contagious” and helped restore market confidence throughout the area. The same is true of announcements of EU and IMF support packages — a support package in a given SWEAP generated lower perceptions of default risk throughout the SWEAP area.

While *good news and negative news announcements* transmitted throughout the SWEAP in the expected way during the pre-crisis period, any economic news — good or negative — raised CDS spreads in the crisis period. Good domestic economic news either has no effect, while foreign “good” news lower spreads in the earlier period (as expected) but has a perverse effect by raising spreads in the latter period. Apparently, no SWEAP economic news was good enough in the crisis period to offset general market pessimism as the crisis unfolded. And this effect on market risk perceptions is even more apparent with negative economic news, whether domestic or “foreign” in origin, and consistent in both the early and crisis periods. Remarkably, negative domestic economic news and negative foreign news in the crisis period had the same effect, each raising CDS spreads by 1.97 in the latter sample 2011-2012. Clearly, the transmission effect of negative economic news is strong and persistent in the region.

The effects of *credit rating downgrades* by Fitch show again that, during the crisis period, a rating downgrade in a particular SWEAP country transmits forcefully to the perception of sovereign risk in other SWEAP countries. The effect of a credit downgrade in the crisis

period is raise spreads by 2.6 and is statistically significant at the 99% level of confidence. The contrast between the direct effect and the transmission effect is striking — the insignificance of the direct effect (CR in the upper panel) during the crisis period probably indicates that domestic CDS market prices had already incorporated the negative news that led to the Fitch downgrade, but foreign CDS market prices had not.

## 6.2. *Banking fragility and sovereign default risks*

Our measure of increased *banking fragility* is credit downgrades by Fitch of either major banks in the focus country or major banks in SWEAP but outside the focus country. These coefficient estimates, also shown in Table 4, paint a very consistent story — banking sector fragility matters for the pricing of country default risk, and downgrades of the banking system translate into higher CDS spreads. For the full period, both domestic and foreign bank downgrades appear to have an almost identical effect, both raising CDS spreads on sovereign bonds by about 1.3 – 1.5 points.

However, this similarity disappears when looking at the two sub-sample periods. During the first period, downgrades of large domestic banks had a very large effect, raising spreads by 4.6 points, suggesting that the downgrades were unexpected and conveyed important information not just about banks but also the perception of national debt solvency. Moreover, credit downgrades of large banks transmitted strongly to other SWEAP countries both in the pre-crisis (1.94) and crisis periods (2.28). But while domestic bank downgrades played a very large effect in raising market perceptions of domestic sovereign default risk during the pre-crisis period (4.55), they seeming played no role during the crisis — perhaps because banking problems were well-known by this time and credit downgrades of banks were expected. By contrast, information about problems in banks in other SWEAP countries may not have been widespread so that Fitch downgrades were surprising to some extent.

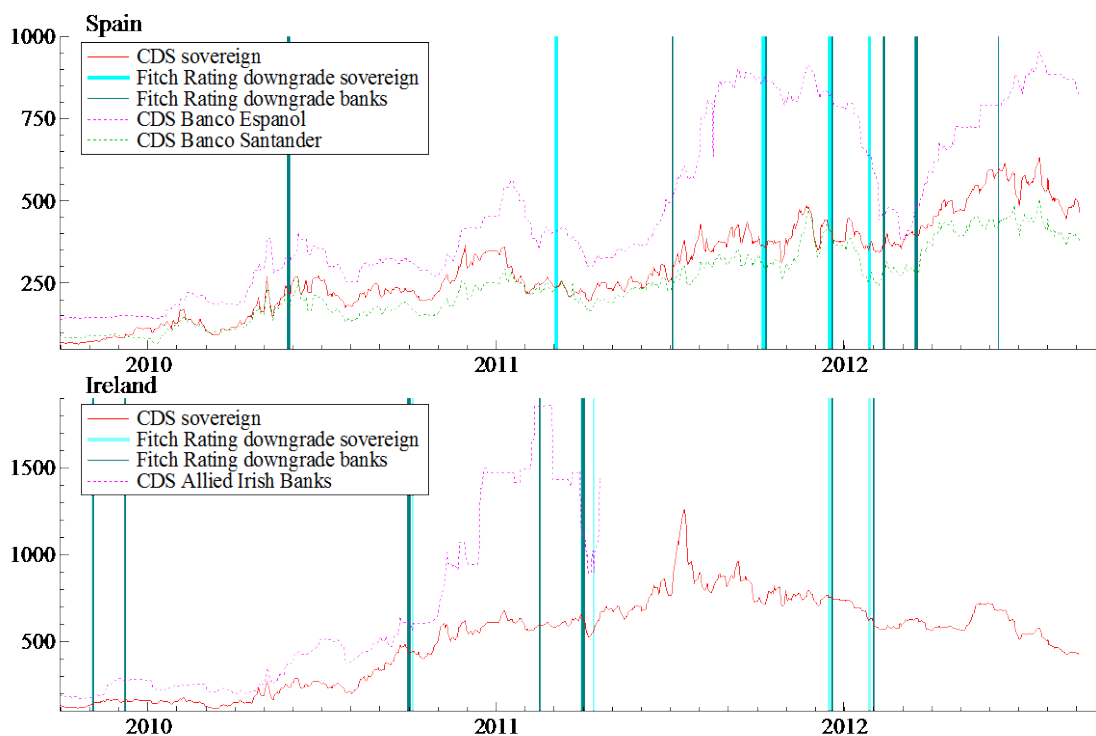
To further illustrate the links between banking fragility and sovereign risk we show, in Figure 6 the CDS spreads in Spain and in Ireland together with credit rating downgrades of both the largest banks and the sovereign. As in our empirical tests we use only Fitch Rating downgrades. In addition we also show the CDS spread for two (one) banks in Spain (Ireland). In accordance with the CDS spreads for the sovereigns, we use spreads on five-year senior debt downloaded from Datastream. The sample is 2009-10-01 to 2012-09-04. Clearly, bank and sovereign CDS spreads are highly correlated, usually moving in the same direction



simultaneously and it is difficult to see any leading or lagging effects. The contemporaneous correlation between banks and sovereigns in these two countries is above 0.9.

To analyze the relations between bank and sovereign CDS spreads we use standard Granger causality tests aimed at revealing explanatory power of lagged bank CDS spreads on sovereign CDS spreads, and vice versa, in the two countries. Note that Granger causality tests essentially provide information about the marginal contribution of a variable in forecasting another variable given its past history and vice versa. We estimate standard bivariate Vector Autoregressive Models (VAR) using the data shown in Figure 6. The results are reported in Table 5. The results for Ireland reveal that neither CDS spread is useful in predicting the other, i.e. there seems to be no Granger causality between bank and sovereign CDS spreads. This is surprising since the Irish government took a majority stake in the Allied Irish Banks.

Figure 6: CDS spreads in Spain and Ireland with Fitch Rating downgrading of both sovereign and large banks.



The result for Spain, by contrast, indicates that sovereign CDS spreads add useful information when predicting bank CDS spreads (i.e. the p-values reported in the table are very small). However, CDS spreads on Banco Santander help predict Spanish sovereign CDS spreads, at least at the 10 percent level.

A similar, though less clear, relationship is evident from Figure 6. Credit rating downgrades on sovereigns are usually followed by credit downgrades of banks, while not responding much to their own credit downgrades, i.e., sovereign downgrades increase the likelihood of a bank credit downgrade. Fitch Rating publications explaining credit rating changes also suggest banks are often downgraded as a result of an earlier downgrade of the sovereign.

Table 5: Granger non-causality tests of sovereign and bank CDS spreads in Ireland and Spain.

		GC banks to sovereign	GC sovereign to banks
Ireland	Allied Irish Banks	0.633	0.328
Spain	Banco Español	0.245	0.000
	Banco Santander	0.087	0.002

**Note:** The Granger non-causality tests (GC) are performed in VAR models with 4 lags and a constant term using first differences of the data. The null hypothesis is that there is no Granger causality. The test statistics are  $F(4,750)$  and  $F(4,392)$  distributed for Spain and Ireland, respectively. Only p-values are reported in the table.

### 6.3. Have EU and ECB policy measures affected market pricing of sovereign risk?

The upper panel of Table 6 looks at news announcements that may be characterized as “EU policy initiatives” and consists of six separate news types. *Monetary policy easing* by the ECB (MP) had the desired negative effect in the first sub-sample but was correlated with higher spreads during the crisis period, probably because ECB actions themselves were taken in response to deteriorating financial circumstance. *Swap agreements* between foreign central banks and the ECB (SWAP) clearly restored some market confidence that the crisis in financial markets, and presumably distress in SWEAP government bond markets, would abate and this effect is evident in the full as well as subsample periods. When the ECB announced that it was expanding *government debt purchases* or direct liquidity support to governments (ECBGOV), this was very important in lowering perceptions of risk across all sample periods and the magnitude was large, ranging from -11.3 to -15.8 points. Although announcements that the ECB was expanding its balance sheet to provide *assistance to the banking sector* (ECBBAL) seemed to calm markets in the pre-crisis period, in the crisis period they had the opposite effect and led to higher perceptions of sovereign default risk. Also, during the crisis period, when the ECB announced that it was *suspending government bond purchase* programs (ECBGOVSUSPEND), it had a very large positive impact on CDS spreads (12.4). (Oddly, suspensions seemed to have a small negative effect during the tranquil period, reflecting lack of market confidence in the program at that time). *Recapitalizations* (RECAP) also reduced sovereign risk perceptions during the crisis period

and had no measurable impact during the tranquil period. In summary, most EU policy initiatives had the desired effect during the crisis period in lower expectations of sovereign default risk (SWAP, ECBGOV, RECAP) but notable exceptions were announcements by the ECB, either of general monetary policy expansion (MP) or expansion of its balance sheet to support banking sectors (ECBBAL).

Table 6: Estimates of the effects of EU policy initiatives and changes in financial and fiscal regulations in SWEAP countries excluding Greece.

	2009–2012	2009–2010	2011–2012
EU policy initiatives			
MP	-0.34 (0.47)	-2.39*** (0.39)	2.65*** (0.37)
SWAP	-7.18*** (1.07)	-4.15*** (1.04)	-12.30*** (2.32)
ECBGOV	-11.26*** (2.24)	-15.84*** (3.39)	-11.26*** (1.96)
ECBGOVSUSPEND	5.50*** (1.74)	-2.52** (1.02)	12.16*** (3.72)
ECBBAL	1.04* (0.56)	-3.20*** (0.93)	1.74*** (0.23)
RECAP	-3.00** (1.19)	0.92 (0.72)	-3.79* (1.75)
Changes in financial and fiscal regulations			
FREG	-0.13 (1.40)	-3.15 (2.58)	-2.99* (1.57)
REGESM	-7.52 (6.50)	11.50*** (4.40)	-26.27* (14.27)
REGFSF	10.07*** (2.14)	1.89** (0.86)	18.29*** (3.48)
REGSix	8.86*** (0.73)	—	10.01*** (1.06)
REGTSCG	0.69 (1.78)	—	2.12 (2.23)
REGOther	-3.85*** (1.26)	0.00 (0.61)	-7.24* (3.88)
$\Delta CDS_{t-1}$	0.27*** (0.01)	0.26*** (0.00)	0.26*** (0.01)
$\bar{R}^2$	0.10	0.12	0.10
DW	1.96	1.97	1.97
#obs	3832	2084	1744

Note: see Table 4.

#### 6.4. Changes in financial and fiscal regulations

The lower panel of Table 6 shows six news announcements related to changes in EU financial or fiscal regulations. The nature and examples of these announcements are described in detail in the lower panel of Table 2 and consist of tightening euro area *financial regulations* (FREG), the announcement of the *European Stability Mechanism* or ESM (REGESM), the announcement of the *European Financial Stability Facility* or EFSF (REGEFSSF), the tightening of fiscal rules in the so-called “*six-pack*” (REGSix), the *Treaty on Stability, Coordination and Governance* designed to tighten fiscal rules (REGTSCG) and other announcements related to tightening of fiscal rules (REGOther). Of course, five of these announcements are focused on restricting fiscal policy and attempting to restore fiscal sustainability, while one is focused on financial regulations.

These policies have had decidedly mixed effects in terms of their market responses. While tightening financial rules and the ESM, together with several other measures to tighten fiscal rules, had the desired effect of lowering CDS spreads, other measures did not. In particular, the EFSF and “six-pack” announcements had the effect of increasing perceptions of default risk and the Treaty on Stability, Coordination and Governance had no measurable impact.

Of course, the Treaty was widely anticipated and likely already incorporated into market prices. However, the negative effects on market confidence associated with the announcements of the EFSF and six-pack is somewhat puzzling. These programs were anticipated and may have been expected to go further in terms of their policy import, and hence moved markets in the opposite direction from that anticipated. The six-pack, for example, is a set of European legislative measures, bundled into a “six-pack” of regulations, to reform the SGP and was the culmination of a year of negotiations. Given the ineffectiveness of the SGP, it is possible that the market did not interpret these new measures as credible i.e. low likelihood that the measures would significantly reduce public deficits and address macroeconomic imbalances.

Nonetheless, market “disappointments” in the EFSF and six-pack were followed by the announcement of the ESM in February 2012 (established in September 2012), which reduced CDS spreads substantially. Since the European Stability Mechanism replaces the two existing temporary EU funding programs, the European Financial Stability Facility (EFSF) and the European Financial Stability Mechanism (EFSM), this institutional policy action seems to have finally brought some confidence that fiscal distress would be resolved.

### *6.5. Transmission of EU news announcements to other EU countries on the periphery*

The question we address in this section is how common EU news announcements impacted three EMU countries outside of SWEAP (Cyprus, Malta and the Slovak Republic) and three non-EMU countries that are members of the EU (Czech Republic, Hungary and Romania). All of the countries may be considered outside of the EU “core”, i.e., in the periphery, and may in some respects be comparable to the SWEAP area. The objective here is to determine whether EU policy and regulatory announcements (the same news variables listed in Table 6) impacted these EU countries differently than the SWEAP countries, and whether EMU membership makes a difference in measured responsiveness. We report these results in Table 7. (Analogous to Table 6 that shows the response of CDS spreads in the SWEAP area to EU news announcements).

The impact of eight EU news announcements during the crisis period, from a group of twelve total, are quite similar (sign and statistical significance) to the SWEAP, i.e. MP, ECBGOV, RECAP, FREG, REGESM, REGFSF, REGSix and REGOther. REGTSCG is insignificant for both groups of countries during the crisis sample. In the remaining three cases, however, the results differ. Three news announcements that relate to the ECB did not seem to play a role in moving CDS spreads outside of the SWEAP area. In particular, SWAP agreements played an important role in reducing perceptions of default risk in SWEAP but not in the non-SWEAP; the suspension of the ECB government purchase program (ECBGOVSUSPEND) also played a role in raising spreads in SWEAP but not elsewhere; and, finally, policy announcements expanding the ECB’s balance sheet to support the banking sector (ECBBAL) increased perceptions of sovereign default risk in the SWEAP area but not otherwise.

Some nuances emerge when the EMU members from the group of six EU countries is considered separately from the non-EMU members, reported in the three right columns of Table 7. These columns report estimates (and associated statistics) of the interaction terms (shift in the point estimates) for the EMU group. In three cases, the interaction terms are statistically significant — monetary policy announcements (MP), recapitalization announcements (RECAP), and the six-pack regulations (REGSix). Monetary policy stimulus (MP) seemed to increase spreads during the crisis period in SWEAP (Table 4, point estimate equals 2.65) and in our sample of EU countries that are not in EMU (Czech Republic, Hungary and Romania), shown in the third coefficient estimates column of Table 7 (estimate equals 3.74). However, the significantly negative interaction term shown in the last column of

Table 7: Effects of EU policy initiatives and changes in financial and fiscal regulations on three EMU countries (Cyprus, Malta and Slovak Republic) and three non-EMU countries (Czech Republic, Hungary and Romania).

	2009-2012	2009-2010	2011-2012		2009-2012	2009-2010	2011-2012
EU policy initiatives							
MP	1.64	-1.48***	3.74***	$D_2 \times MP$	-2.24	-1.34**	-3.88***
	(1.20)	(0.43)	(1.35)		<b>[-0.61]</b>	<b>[-2.82***]</b>	<b>[-0.13]</b>
					(1.85)	(0.62)	(1.49)
					<b>[0.64]</b>	<b>[0.46]</b>	<b>[0.55]</b>
SWAP	8.27	0.42	13.53	$D_2 \times SWAP$	-7.59	-1.67**	-15.27
	(7.44)	(0.50)	(14.04)		<b>[0.68]</b>	<b>[-1.25***]</b>	<b>[-1.74]</b>
					(7.73)	(0.71)	(14.25)
					<b>[1.51]</b>	<b>[0.45]</b>	<b>[1.95]</b>
ECBGOV	-2.13**	-2.10***	-3.52***	$D_2 \times ECBGOV$	0.82	-1.48*	0.13
	(0.87)	(0.32)	(0.98)		<b>[-1.31]</b>	<b>[-3.58***]</b>	<b>[-3.39]</b>
					(2.21)	(0.87)	(2.87)
					<b>[2.00]</b>	<b>[0.82]</b>	<b>[2.66]</b>
ECBGOVSUSPEND	3.52	0.15	5.13	$D_2 \times ECBGOVSUSPEND$	0.95	3.67**	-0.36
	(2.64)	(0.52)	(3.88)		<b>[4.47**]</b>	<b>[3.82***]</b>	<b>[4.77***]</b>
					(3.31)	(1.47)	(4.11)
					<b>[1.83]</b>	<b>[1.35]</b>	<b>[1.17]</b>
ECBBAL	5.04	-1.07***	6.33	$D_2 \times ECBBAL$	-1.93	-2.99	-3.02
	(3.88)	(0.23)	(4.95)		<b>[3.11]</b>	<b>[-4.06*]</b>	<b>[3.31]</b>
					(4.83)	(2.13)	(5.96)
					<b>[2.59]</b>	<b>[2.14]</b>	<b>[3.19]</b>
RECAP	-1.06***	-0.97	-1.09***	$D_2 \times RECAP$	1.60***	1.50	2.08***
	(0.32)	(1.46)	(0.17)		<b>[0.54*]</b>	<b>[0.53]</b>	<b>[0.99***]</b>
					(0.45)	(1.56)	(0.36)
					<b>[0.30]</b>	<b>[0.48]</b>	<b>[0.31]</b>
Changes in financial and fiscal regulations							
FREG	-1.16	0.13	-3.10*	$D_2 \times FREG$	2.16**	1.93***	1.92
	(1.02)	(0.36)	(1.85)		<b>[1.00***]</b>	<b>[2.06]</b>	<b>[-1.18***]</b>
					(1.07)	(0.64)	(1.88)
					<b>[0.26]</b>	<b>[0.51]</b>	<b>[0.31]</b>
REGESM	-2.78**	1.15	-4.86***	$D_2 \times REGESM$	-0.13	-2.04**	-1.51
	(1.36)	(0.70)	(0.40)		<b>[-2.90***]</b>	<b>[-0.90*]</b>	<b>[-6.37***]</b>
					(1.70)	(0.90)	(2.18)
					<b>[1.11]</b>	<b>[0.54]</b>	<b>[2.15]</b>
REGFSF	3.80***	1.41	5.98***	$D_2 \times REGFSF$	9.79***	18.11***	0.49
	(0.77)	(1.15)	(1.42)		<b>[13.59***]</b>	<b>[19.52***]</b>	<b>[6.48***]</b>
					(3.71)	(6.13)	(2.10)
					<b>[3.61]</b>	<b>[5.89]</b>	<b>[1.54]</b>
REGSix	6.52***	—	5.93***	$D_2 \times REGSix$	1.38	—	-2.77**
	(1.16)		(1.10)		<b>[5.14***]</b>		<b>[3.16***]</b>
					(1.10)		(1.11)
					<b>[0.16]</b>		<b>[0.23]</b>
REGTSCG	-1.04	—	-1.24	$D_2 \times REGTSCG$	-3.26*	—	-2.65
	(1.13)		(0.98)		<b>[-4.30***]</b>		<b>[-3.90***]</b>
					(1.66)		(1.83)
					<b>[1.14]</b>		<b>[1.48]</b>
REGOther	-1.16	0.04	-1.56***	$D_2 \times REGOther$	-5.62***	-8.10***	0.04
	(0.76)	(1.15)	(0.38)		<b>[-6.77***]</b>	<b>[-8.06***]</b>	<b>[-1.52***]</b>
					(1.26)	(1.66)	(0.50)
					<b>[0.96]</b>	<b>[1.14]</b>	<b>[0.36]</b>

**Note:** The table reports estimates of fixed effects panel data regression in equation (3). The regression also includes fixed country effects not reported in the table.  $D_2$  is a dummy variable equal to unity if the country is an EMU member, zero otherwise. All standard errors (reported within parentheses below each point estimate) are corrected for heteroscedasticity using the method suggested by Arellano (2003). The first bracketed term (in bold) below the point estimates of the interaction terms (right-hand-side columns) report the sum of the point estimates, i.e. the total effect on the EMU countries. The second bracketed term (also in bold) reports the t-test that the sum of the coefficients equal zero, i.e. whether the new has a significant impact on the EMU countries in the sample.

coefficient estimates (-3.88), and the failure to reject the null that the sum of the two coefficients [-0.13] is equal to zero [0.55] indicates that these monetary policy actions did not affect the non-SWEAP EMU countries of our sample (Cyprus, Malta and the Slovak Republic).

Recapitalizations led to a reduction of CDS spreads in the non-SWEAP EU group during the crisis period, as it did in the SWEAP area, but had the opposite effect in the non-SWEAP EMU members of our sample during the crisis, i.e. spreads in Cyprus, Malta and the Slovak Republic rose on average with RECAP announcements. Finally, spreads in these three countries also rose (3.16) substantially in response to the REGSix announcements during the crisis period but less so than was the case in CHR.

#### *6.6. Transmission of SWEAP news announcements to other EU countries on the periphery*

In this section we address how SWEAP news transmits to these same six countries during the crisis period. Again, the issue we investigate is whether these countries respond differently to news announcements, in this case emanating from the SWEAP, than do countries within the SWEAP group. These results are reported in Table 8. (The lower panel of Table 4 reported how CDS spreads in particular SWEAP countries were impacted by news announcements from other SWEAP countries.)

Of the four news announcements investigated, only EU/IMF financial assistance to SWEAP governments is statistically significant with an impact effect (-2.06) that is very close to that seen in the SWEAP area (-2.39). The impact effect also appears uniform across the EMU and non-EMU groups. SWEAP austerity programs, good news and bad news were not transmitted outside of the area during the crisis. Turning to the group of EMU countries in our sample shows that negative SWEAP news was very important in raising CDS spreads, i.e. negative news announcements in the SWEAP area increase spreads on average by about 4.13 during the crisis period but had no discernible effect in the non-EMU group.

Table 8: Transmission of news from SWEAP countries except Greece to three EMU countries (Cyprus, Malta and Slovak Republic) and three non-EMU countries (Czech Republic, Hungary and Romania).

	2009-2012			2009-2010			2011-2012		
APSWEAP	-1.07	-0.43	-4.09	$D_2 \times$ APSWEAP	-0.03	-0.67	3.18		
	(0.76)	(0.30)	(3.09)		[ <b>-1.10***</b> ]	[ <b>-1.10***</b> ]	[ <b>-0.91**</b> ]		
					(0.83)	(0.42)	(3.12)		
					[ <b>0.36</b> ]	[ <b>0.31</b> ]	[ <b>0.37</b> ]		
GoodSWEAP	-2.77	—	-3.12	$D_2 \times$ GoodSWEAP	0.67	—	1.73		
	(2.16)		(2.64)		[ <b>-2.11</b> ]		[ <b>-1.39</b> ]		
					(2.87)		(3.12)		
					[ <b>1.70</b> ]		[ <b>1.51</b> ]		
NegSWEAP	-0.11	0.41	-1.34	$D_2 \times$ NegSWEAP	2.24**	0.19	5.47**		
	(0.80)	(0.27)	(2.44)		[ <b>2.13***</b> ]	[ <b>0.61***</b> ]	[ <b>4.13***</b> ]		
					(1.05)	(0.32)	(2.77)		
					[ <b>0.23</b> ]	[ <b>0.19</b> ]	[ <b>1.25</b> ]		
SUPPORTSWEAP	-0.30*	1.76***	-2.06***	$D_2 \times$ SUPPORTSWEAP	-0.45	-0.39	-0.68		
	(0.16)	(0.41)	(0.11)		[ <b>-0.74***</b> ]	[ <b>1.37***</b> ]	[ <b>-2.75***</b> ]		
					(0.33)	(0.66)	(0.77)		
					[ <b>0.27</b> ]	[ <b>0.52</b> ]	[ <b>0.75</b> ]		
$\Delta CDS_{t-1}$	0.11***	0.14***	0.07**						
	(0.05)	(0.05)	(0.03)						
$\overline{R}^2$	0.03	0.06	0.02						
DW	2.00	1.94	2.01						
#obs	5742	3120	2616						

**Note:** See Table 7. Note that GoodSWEAP news is excluded in the subsample 2009-2010 due to exact collinearity.

## 7. Conclusions and further perspectives

This paper discusses the balance between market pressure and fiscal rules in order to obtain sound public finances. The critical factors are the financial markets' ability to provide reliable signals of fiscal insolvency and the availability of enforceable rules to act as effective constraints on fiscal policy. Reviewing the record of EU countries we find both that fiscal rules are associated with better performance of public finances and that the supranational rules stated in the SGP have not been fully implemented.

However, we also find that countries that complement supranational fiscal rules with national fiscal frameworks to a larger extent attain long-term sustainable public finances. In our empirical analysis using the EU Commission Fiscal Rules index we find a significant positive effect from tighter fiscal rules on public policy variables such as primary balance and primary expenditures. Countries with tight fiscal rules have larger primary balance surpluses and lower primary expenditures as a percentage of GDP.

An alternative to fiscal rules is to let public policy be guided by signals from financial markets. For financial markets to provide appropriate signals it is necessary that they price



risk appropriately. New information should be reflected by valid responses that can be used by policy makers when designing economic policy. We analyze whether financial markets are nuanced enough to provide such signals by undertaking an empirical analysis of the effects of news announcements on CDS spreads. We distinguish between 42 different types of news, national as well as EU wide news, e.g., the implementation of austerity programs, good and bad news, changes in monetary policy, other policy initiatives at the EU level, tightening of fiscal as well as financial regulation and credit downgrading of both sovereigns and banks.

Focusing on four southwest euro area periphery (SWEAP) countries (Portugal, Ireland, Italy and Spain) we find that market signals may not be fully reliable and the market response to policy announcements is at times inconsistent, depending upon whether the actions were anticipated and credible in light of their stated objectives. In general we find that CDS spreads react to news announcements in the expected way. For example, negative news and credit rating downgrades lead to increases in the CDS spread whereas the establishment of ESM led to a sharp fall in CDS spreads. The covered bonds programs had a calming effect on CDS spreads; they fell significantly whereas the suspension of these programs increased the spread. Increased bank fragility, reflected by credit downgrades of banks, greatly increased risk perceptions of sovereign bonds.

However, we also find changes in the responses over time, both the size and the sign change for a number of the news announcements. For example, over the full and early samples, increased bank fragility increased CDS spreads substantially but seemingly played no role during the crisis period. By contrast, the announcement of national austerity programs did not move spreads during the pre-crisis period but played an important role in lowering the perception of sovereign default risk during the crisis period.

Even though markets often send proper signals, we find that they also tend to overreact and at times may send confusing or inconsistent signals. This may be explained, in part, by a structural shift in how markets respond to news in crisis periods compared to more tranquil periods. For example, good news did not seem to move market perceptions while bad news moved spreads substantially higher during the crisis. However, expectations and the credibility of policies may also play a role. Announcements of the EFSF and “six-pack” led to increases in sovereign risk assessments by the market, perhaps because markets had expected stronger action and questioned whether they would prove effective. The response to the ESM announcement, replacing the EFSF and EFSM, was much more positive, reducing

CDS spreads substantially and setting up expectations for a resolution of the sovereign debt crisis in Europe.

One of the most striking findings in this study is how markets respond to developments across national boundaries, i.e. the importance of contagion across EU countries. Austerity programs in one SWEAP country transmitted strongly and lowered CDS spreads throughout the group. Increased fragility of one nation's banks transmitted immediately throughout the SWEAP. Two examples highlight differential responses across the pre-crisis and crisis periods. Good news in a SWEAP lowered risk perceptions in other SWEAP during the pre-crisis period but seemingly raised assessments during the crisis period, while bad economic news always caused spreads to rise elsewhere. Similarly, credit downgrades one SWEAP country did not transmit to other SWEAP during the pre-crisis period but transmitted strongly during the crisis, raising sovereign default risk perceptions.

Overall, we conclude that market signals may not fully reliable, especially during crisis periods. But market signals are clearly important, as evidenced by the rapid and strong transmission of events from one SWEAP country to the others, emphasizing the linkages between national markets and policies. Moreover, mixed signals emanating from markets may partly be attributable to how expectations are formed, making the "surprise" element difficult to measure, as well as the credibility of policy actions.

In this sense, policymakers providing clear and consistent signals to markets — in terms of well-designed, internally consistent, and credible regulations and fiscal reforms that have broad political support — may be at least as important to calming markets as the role of markets in providing signals to policymakers in guiding policy. In sum, our empirical evidence on the response of CDS spreads to news suggests that market signals can be used as complement to fiscal rules but they should not be used as substitutes. Supranational fiscal rules complemented by national fiscal frameworks are more efficient ways to attain long-term sustainable public finances.

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## Appendix A: Is Greece different?

In the main text we focused on the SWEAP countries excluding Greece with the argument that the behavior of CDS spreads and the effects of news announcements differ significantly. In this appendix we focus on whether Greece stands out as an exception among the SWEAP countries. Our analysis is based on estimates of equation (2) in the main text and including Greece in the panel as well as regression results when only using Greek data.

In Table A1-A2 (corresponding to Tables 4 and 6) we report the results of fixed effects estimation of equation (2). When comparing the results we find that parameter estimates are smaller in size and have smaller standard errors in general when excluding Greece. The explanation is simple, over the sample studied the Greek CDS spread increased from 228.078206 basis points on January 1, 2009 to 23188.53 basis points when Greece had a credit event on March 8 in 2012. The largest increase on a daily basis over the sample is 9025.8 basis points whereas the largest fall is 4225.1. These numbers could be compared to the largest increase of 170.7 basis points and the largest fall of 167.2 basis points for the other four SEAP countries. The effect of introducing Greece in the panel is that the variance increases considerably. Moreover, as can be seen from the estimates of the lagged change in the CDS spread that we include in all models, there is negative autocorrelation when including Greece and positive when excluding Greece. A negative autocorrelation implies that a large increase in the CDS spread is likely to be followed by another large increase.

Looking more closely at the estimates in Tables A1 and A2 on the one hand and Tables 4 and 6 on the other, we find that the number of significant parameters increase considerably for the full sample and for the latter subsample when excluding Greece. This again can be explained by the very large swings in the Greek CDS spread that would lead to larger standard errors and therefore less significance. On the other hand, when considering the point estimates we find that they are almost always of the same sign. Using data only for the latter subsample we find that the effects of EU policy initiatives and changes in financial and fiscal regulations tend to have different signs depending on whether we include or exclude Greece. This is also natural since it was apparent that the public finances in Greece were not long-term sustainable and that this situation only could be solved by a default. For this reason we should not expect either policy initiatives or other news announcements to have sizable effects. Indeed, the number of significant parameters when excluding Greece increases considerably, in particular for the latter subsample. An exception is that when estimating the

model for the earlier subsample, we actually find that one or two additional parameters become significant when including Greece.

A similar pattern is apparent in Tables A3 and A4 where we report estimates of our basic equation but only use Greek data. These models are estimated using OLS. Again we find large to extremely large parameter estimates. For example, only the parameter associated with negative Greek news and the parameter associated with the establishment of the Fiscal Compact are significant and have the correct sign. The effect of the decision to tighten the fiscal rules within the framework of the Fiscal Compact lead to extremely large increases in the Greek CDS spread as can be seen from Table A4. It seems again that news announcements related to the Greek economy or other SWEAP countries are relatively unimportant. In addition, there is no significant response to policy initiatives other than the decision to tighten the fiscal rules that had a tremendous effect. This leads us to conclude that either the market already anticipated a Greek default or it is the case that market signals cannot be relied upon. In this respect, we argue that the Greek economy is different from other SWEAP countries. Since the parameters seem to be highly dependent on the Greek data where some parameter estimates become highly distorted in size and standard errors we decide to exclude Greece from our basic models.



Table A1: Effects of news announcements in SWEAP countries including Greece.

SWEAP countries			
	2009–2012	2009–2010	2011–2012
Domestic news			
AP	-11.19 (8.07)	-1.76 (1.30)	-18.20 (14.61)
Good	-13.56 (12.61)	-4.03*** (0.25)	-23.93 (19.91)
Neg	93.85*** (29.98)	7.56*** (1.89)	209.81** (94.55)
Support	17.58* (10.38)	-1.63 (4.34)	54.17 (50.26)
CR	20.88 (20.56)	-1.30* (0.79)	33.41 (33.00)
CR Bank	-7.55 (9.00)	4.77*** (1.36)	-22.01 (19.98)
Transmission from other SWEAP			
AP	4.16 (3.85)	0.37 (0.74)	34.67 (34.67)
Good	-3.69 (4.37)	-3.19** (1.40)	-8.14 (8.78)
Neg	2.33 (1.45)	1.26*** (0.48)	-10.90 (11.16)
Support	-2.70* (1.58)	3.05** (1.25)	-7.88** (3.27)
CR	-9.79 (11.96)	0.17 (0.16)	-26.86 (30.28)
CR Bank	3.62** (1.83)	1.58*** (0.44)	2.44 (1.88)

**Note:** The table reports estimates of the unbalanced fixed effects panel data regression in equation (2). Fixed country effects are not reported in the table. All standard errors reported within parentheses below each estimate are corrected for heteroscedasticity using the method suggested by Arellano (2003).

Table A2: Estimates of the effects of EU policy initiatives and changes in financial and fiscal regulations in SWEAP countries including Greece.

	SWEAP countries		
	2009–2012	2009–2010	2011–2012
EU policy initiatives			
MP	-7.03 (8.76)	-3.04*** (0.66)	-14.05 (28.95)
SWAP	-7.45** (3.44)	-6.31*** (2.17)	-8.50 (11.80)
ECBGOV	14.08 (26.25)	-24.01*** (7.46)	46.19 (54.45)
ECBGOVSUSP	-6.52 (8.78)	-7.92 (5.12)	-21.44 (28.64)
ECBBAL	42.77 (39.42)	-4.16*** (1.06)	46.75 (46.63)
Recap	-5.87** (2.45)	1.15** (0.56)	-4.37 (5.52)
Changes in financial and fiscal regulations			
FREG	21.73 (16.39)	-3.40* (1.90)	38.69 (34.44)
REGESM	-23.50** (10.50)	15.21*** (5.34)	-40.24** (17.83)
REGESFSF	20.96*** (6.63)	4.48* (2.34)	30.55*** (8.11)
REGSix	27.11** (13.54)	—	41.04 (26.03)
REGTSCG	560.81 (519.37)	—	547.44 (505.20)
REGOther	-42.79 (37.42)	1.65 (1.46)	-103.55 (88.37)
$\Delta CDS_{t-1}$	-0.34*** (0.03)	0.17*** (0.04)	-0.34*** (0.03)
$\bar{R}^2$	0.12	0.09	0.13
DW	2.00	2.01	2.01
#obs	4662	2605	2052

Note: See Table A1.

Table A3: Estimates of the effects of news announcements in SWEAP countries on Greece.

	2009–2012	2009–2010	2011–2012
Domestic news			
AP	-22.44 (42.20)	-6.34 (6.16)	-76.38 (154.22)
Good	-14.83 (40.16)	-5.74 (7.23)	2.64 (96.64)
Neg	148.00* (76.63)	10.79* (5.97)	312.30* (179.32)
Support	20.84 (107.68)	-2.69 (12.12)	201.36 (303.66)
CR	115.36 (101.40)	2.18 (6.66)	165.23 (188.91)
CR Bank	-59.23 (59.45)	3.99 (3.90)	-152.16 (122.27)
Transmission from other SWEAP			
AP	25.24 (51.04)	-3.35 (5.50)	386.26** (175.66)
Good	-50.29 (117.02)	—	-84.19 (127.33)
Neg	-3.47 (55.58)	6.33 (5.51)	-59.22 (148.93)
Support	-15.11 (28.68)	12.38 (7.68)	-11.90 (48.34)
CR	-57.35* (31.74)	0.46 (2.97)	-210.45** (104.96)
CR Bank	5.91 (28.83)	-0.36 (2.97)	-9.76 (69.08)

**Note:** Standard errors reported within parentheses below each estimate are corrected for heteroscedasticity and autocorrelation

Table A4: Estimates of the effects of EU policy initiatives and changes in financial and fiscal regulations in SWEAP countries on Greece.

	2009–2012	2009–2010	2010–2012
EU policy initiatives			
MP	-47.80 (90.69)	-5.40 (5.23)	-299.10 (364.16)
SWAP	-4.19 (114.30)	-16.23 (22.18)	54.59 (108.70)
ECBGOV	195.69 (302.08)	-54.19 (42.44)	457.80 (567.29)
ECBFGOCSUSP	-17.66 (58.35)	-32.21*** (8.61)	-99.74 (193.45)
ECBBAL	201.33 (127.66)	-6.95 (4.55)	251.52 (189.52)
RECAP	-70.66 (58.07)	1.33 (3.30)	—
Changes in financial and fiscal regulations			
FREG	76.38 (83.64)	-10.24* (5.90)	169.88 (154.05)
REGESM	-37.16 (49.55)	38.31** (16.66)	-22.50 (55.84)
REGSEFSF	52.77* (31.59)	14.60*** (4.80)	76.20 (48.29)
REGSix	90.74 (58.55)	—	153.50 (141.48)
REGTSCG	3295.41*** (829.71)	—	3249.38*** (925.08)
REGOther	-210.40 (143.77)	7.76 (10.09)	-450.09 (359.48)
$\Delta CDS_{t-1}$	-0.49*** (0.16)	0.07 (0.07)	-0.51*** (0.17)
$\bar{R}^2$	0.24	0.08	0.23
DW	2.26	2.06	2.28
#obs	830	521	308

Note: see Table A3.

