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Performance-sensitive government bonds - A new proposal for sustainable sovereign debt management*

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Abstract

We argue that current sovereign debt management lacks important incentives for governments and politicians to fulfill it in a sustainable and long-term orientated way. This paper outlines that the mechanisms to solve sovereign debt problems within the EMU are not only missing the right incentives but also setting the wrong ones. In contrast to current policy, we argue that only an instrument which is sufficiently sensitive to the performance of a country (i.e. its debt level) will motivate the players to engage in sustainable debt management. Specifically, we propose performance-sensitive government bonds (PSGB) where coupon payments are closely linked to debt policy, giving strong incentives to limit debt levels and to timely restructure the economy.

JEL classification: G12, G13, H62, H63

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1 Introduction

In democratic countries there has been a long-run tendency for increasing sovereign debt ratios since the early 1970s.[1] This is to some extent the result of political business cycles. Moreover, in case of economic and financial crises, tax-related shortfalls in the budgets are financed by additional debt without cutting the expenditures, thereby strongly increasing debt ratios. The major problem is that governments (and politicians) have virtually no particular short-term incentives to reduce expenditures, since this would reduce their probability to be re-elected. In case of a debt-related crisis, implementing and executing the appropriate measures (e.g. sharp expenditure cuts, higher taxes, etc.) to overcome the crises normally destroy much value and may lead to severe recessions.

Elections or crises are, however, only the trigger of higher deficits and debt. The appropriate question is why debt ratios do not decline after elections or after a crisis. From an empirical point of view the most promising answers can be found in theories based on political business cycles, political institutions and budget institutions. First, it can be shown that budget deficits tend to be higher in election years to some extent. There is also a negative effect on deficits in the year following the election. But this latter effect is quite small, thus resulting in increasing debt levels over time. Second, theories based on political institutions show that no player in the political game (parties, interest groups, etc.) wants to bear the cost of a budget consolidation (war of attrition). As everybody waits until another player bears the cost, the budget consolidation will take place too late or not at all. In this sense, budget consolidations have similar characteristics as public goods. Third, theories based on budget institutions look at the framework of the budgeting process in parliament and government. All phases of the budget process are subject to problems well known from common pool resources. There is some evidence, in many cases based on Swiss data, on the disciplining effects of budget institutions (e.g., debt ceilings, transparency of the budget or voters' ability to monitor the budget). It can also be shown that EU countries consolidated their budgets in order to fulfill the Maastricht criteria and to enter EMU. In contrast, theories based on the structure of government (i.e., political

[1] If we take a look at the advanced economies as a whole we can see a rising overall debt ratio from 1970 until the beginning of the 1990s, then there is a decreasing or at least stabilizing debt ratio until the outbreak of the financial crisis. During the crisis the debt ratio has increased to levels not seen since World War II (Reinhart & Rogoff (2011)).

fragmentation of the government) or on preferences of the political actors (e.g., partisan approach, strategic debt policy) are either rejected by a majority of studies or have only weak evidence. Recent literature reviews can be found in Eslava (2011), Bayar & Smeets (2009), and Mikosch & Übelmesser (2007).

The described problems are amplified when many democratic countries issue debt which is in some sense guaranteed by a coalition of these countries. In this case we expect to see free-riding behavior of the rather weak countries leading to excessive borrowing and higher debt ratios. Usual market effects on a nation's interest rate do not take place or are of minor importance. Moreover, such free-riding behavior destroys incentives for strong countries to limit debt ratios. In the end, overall higher debt ratios will increase the interest rate. The institutional structure of the EMU (centralized monetary policy and decentralized fiscal policies) leads to this free rider problem and calls for a limit on deficits and debt (Feldstein (2005)). Indeed, EMU member countries which are no longer able to access the international debt market (i.e., Greece, Ireland, and Portugal) rely on guarantees and loans of still strong member countries. In return, these already weak countries have to show substantial consolidation efforts leading to a higher probability for political instability and economic recessions.

Our hypothesis states that as long as the fundamental incentive structure for governments (and politicians) is not changed in a substantial way, we will continue running into steadily higher sovereign debt ratios and eventually into new sovereign debt crises. Our question is simply whether there is an applicable incentive structure for governments and politicians which prevents this spiral for higher debt-ratios and helps to implement a long-term sustainable debt management. On the one hand, the goal should be to minimize the probability of a sovereign debt crisis, to mitigate the magnitude of the crisis, and to avoid the implied large costs. On the other hand, a timely restructuring of the economy will boost long-term economic growth and increase welfare. In this sense, the incentive structure has preventive effects, but it is not capable to solve a severe sovereign debt crisis.

Our proposal for such an incentive structure relies on what we call performance-sensitive government bonds (PSGB). The idea is simply to relate the coupon payments with regard to the total outstanding debt to changes in the indebtedness of the country. As we will discuss below in more detail, such bonds will give

governments a strong incentive (i) to timely restructure the economy, and (ii) to limit additional debt, in order to not only avoid higher coupon payments for total outstanding debt but also to reduce financing costs. A major objection against PSGB, which could be brought forward, is surely the amplified pro-cyclical effect of coupon payments. But as we argue below this feature is rather a strength and not a weakness of PSGB.

The remaining part of the paper is structured as follows: Section 2 discusses the sovereign debt crisis within the EMU which includes the political measures, the development and effects of interest rate spreads as well as the sanction mechanisms. In section 3 we propose the concept of PSGB, the implied positive incentives, pricing issues of this financial instrument and objections against it. Finally, section 4 concludes.

2 Sovereign debt crisis within EMU

2.1 Political measures

On 24/25 March 2011 the European Council agreed upon the European Stability Mechanism (ESM), a tightening up of the Stability and Growth Pact (SGP), a so called "Euro Plus Pact" and reforms of the banking sector (European Council (2011)). This comprehensive package of measures aims to stabilize financial markets, i.e. to lower the interest rate spreads of GIPS countries (Greece, Ireland, Portugal and Spain).[2]

A critical look at the package shows the following crucial points: A permanent crisis mechanism, called ESM, will be installed, the no-bail-out clause is bust, and there is still no insolvency order for sovereign countries. In contrast to these crucial points, the reforms of the stability pact and the banking sector are more or less cosmetic. The fundamental problems still exist, as the deficit procedure depends on political decisions and consequently there is no effective and credible sanction mechanism.

It is worth to look more closely at the two new institutions, the ESM and

[2]All of these measures are subject to votings within the EU and its member countries. We concentrate our discussion on the crucial points and do not go into the details of the ongoing decision-making process.

the "Euro Plus Pact": The conditions of the ESM will not differentiate between debtors according to their default risk. The interest rate of ESM loans will consist of the funding cost and a charge of 200 bps (European Council (2011)). Such a pricing structure does not offer reasonable incentives for debtor countries. In the end all countries in need of ESM help will have the same conditions. In our point of view this characteristic - undifferentiated interest rates - is the main problem of the ESM.

The "Euro Plus Pact" was former called "Pact for Competitiveness" and was proposed by Germany and France. To prevent future crises countries should commit to reforms: e.g. national debt brakes, wage policy geared to productivity, higher retirement ages, harmonization of the corporate tax. This is basically an attempt to control the fiscal and economic policies of euro member countries in return for guarantees and bail-outs. Such a pact is either ineffective or a big step towards a fiscal union. The conclusions of the European Council show that the pact will be more or less ineffective as individual countries will be responsible for the policy measures.

In spite of all the decisions the real problems are still unsolved. In the meantime there are massive speculations about a debt restructuring in Greece and Ireland as well as Portugal got help out of the European Financial Stability Facility (EFSF) because of sharply rising interest rate spreads. Both developments show a lack of credibility: Without doubt the EFSF and the ESM work for small countries (e.g., Greece, Portugal and Ireland), but for large countries (e.g., Spain and Italy) the funds are probably not large enough. In addition, it is uncertain whether a majority of voters in the creditor countries supports the crisis mechanism. Sooner or later this will put pressure on the governments in the creditor countries (Gros & Mayer (2011)). Because of this lack of credibility a sovereign default is still possible. It is obvious that in the long run such a system calls for some form of fiscal union, maybe a political union.

In contrast to the decisions at the end of March 2011, a stable fiscal union can only be the result of a long-lasting process of discussions and democratic decisions. In no case a fiscal union is an adequate emergency solution for the debt crisis. It is much more reasonable to stay with the original concept of a monetary union and a decentralized fiscal policy. In this case differentiated interest rates are needed to guarantee an efficient allocation of capital.

2.2 Development of interest rate spreads

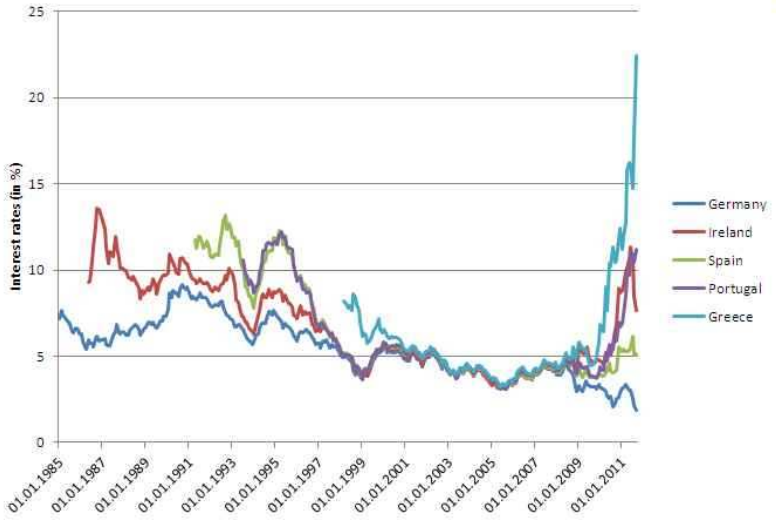


Figure 1: Interest rates.

Source: Thomson Reuters Datastream. Note: These interest rates are given by the redemption yields which are observed on the basis of the long-term (10 years) benchmark government bonds of the corresponding country.

Since the introduction of the euro became credible in 1996/97 until the insolvency of Lehman Brothers in 2008 we can see almost no interest rate spreads between euro area countries (see figure 1). This lack of differentiation results from an underpricing of default risk for long-term government bonds. At first sight this is astonishing because the SGP of 1996 contains a no-bail-out clause. Therefore interest rates should depend on the credibility of individual debtors. A closer look reveals that the no-bail-out clause was never regarded as binding and therefore did not result in the required spreads. There was an implicit bail-out assumption based on actual EMU policy: Sanctions within the SGP were never imposed and the pact was even changed to avoid sanctions for Germany and France (Feldstein (2005), Gros & Mayer (2011)). In the wake of Lehman Brothers' insolvency, however, doubts about the credibility and the bail-out of sovereign countries arose. The interest rate spreads increased in order to compensate for the default risk. Not even rescue actions could really eliminate the

spreads since financial markets were not sure about the extent and credibility of the actions.

Politicians interpreted the high spreads as indicators for the crisis and therefore they have been trying to reduce them. But spreads are not the root of all evil. They are needed for an efficient allocation of capital and to prevent a crisis. It should be noted that spreads were already high before the introduction of the euro. They disappeared because the no-bail-out clause had never been credible. Now they are back again because the rescue actions are not credible at all (EEAG (2011)).

A very similar explanation of events in terms of currency crisis models can be found in Arghyrou & Tsoukalas (2011). In their view the Greek debt crisis is due to deteriorating macroeconomic fundamentals and a double regime shift in market expectations. Expectations shifted from a credible EMU commitment under an implicit bail-out guarantee to a non-credible commitment under no guarantee. These shifts led to the massive rise of interest rate spreads.

2.3 Allocative effects of interest rate spreads

From an allocative point of view differentiated interest rates fulfill several important functions on the capital market. Interest rates are a signal about the relevant risk of a credit and deliver the necessary incentives for the decisions of debtors and creditors. If there are no differences in the interest rates and an explicitly or implicitly guaranteed bail-out by other countries exists, investors will get completely wrong signals from the capital market. In addition, within the EMU there is no longer an exchange rate risk for investments in countries with low competitiveness. The result was an excessive flow of capital to risky projects in non-competitive countries (Sinn (2010)). This situation leads to a mispricing of bonds, a misallocation of capital, and finally threatens the EMU. Undifferentiated interest rates and a bail-out guarantee will allocate too much capital in relatively risky investment projects, and too little capital in investments with low risk. Debtors with a high default risk are subject to a moral hazard problem. There are no market incentives to lower the debt level as the individual debt level has no effect on the price of capital and in addition a final bail-out is guaranteed. For the whole EMU this mechanism is fatal: The overall debt level could get out

of control and the bail-out guarantee will probably get incredible.[3]

The lack of interest rate spreads led to low financing costs for countries with low credibility. This looks advantageous in the short run. The countries are now in a position to attract the capital needed for their investment projects. Rising wages and prices will even dampen the relevant real interest rates. But step by step countries lose their competitiveness on international goods markets. The capital account surplus is followed by a current account deficit. In the end this all results in large trade and budget deficits. Countries with low credibility will import too much capital because of the mispricing of capital (EEAG (2011)).

Summing up, we need differentiated interest rates to get the right incentives on the capital market. In the following, we will show that these allocative effects are rather weak in the short run and should be strengthened and speeded up.

Changes in the interest rate are only relevant for rolling over debt or issuing new debt. This is extremely important for countries which have liquidity problems or which are near default (e.g., Greece, Ireland and Portugal). For these countries (and only in the long run for all countries) the opportunity cost of debt reduction rises with the interest rate. For countries with sound public finances rising interest rates do not have a strong effect as in the short run no (or only a small) part of total debt is rolled over or newly issued. The fixed interest rates on the existing debt stock are not affected. In this case, it takes a rather long time until higher interest rates actually have an impact on the opportunity cost of debt reduction. In the short run, this opportunity cost is the interest rate paid on the retired debt. This rate is approximated with the average interest rate paid on debt which is measured with the interest-to-debt ratio. This is the relevant short-run cost for restructuring decisions of politicians (i.e., whether to lower debt levels or not).

In the last 15 years the interest-to-debt ratio was decreasing in the Euro area countries in general. The development in Germany and the GIPS countries can be seen in Figure 2. The lower ratio is mainly the result of generally lower interest rates since the introduction of the euro. In the years before the introduction of the euro interest rates were relatively high (see Figure 1). During the years decreasing interest rates have also reduced the average interest rate on outstanding debt.

[3] An opposite opinion can be found in De Grauwe (2011*b*). He doubts that the debt crisis is caused by moral hazard. Therefore he does not believe that sanctions can help to prevent future crises.

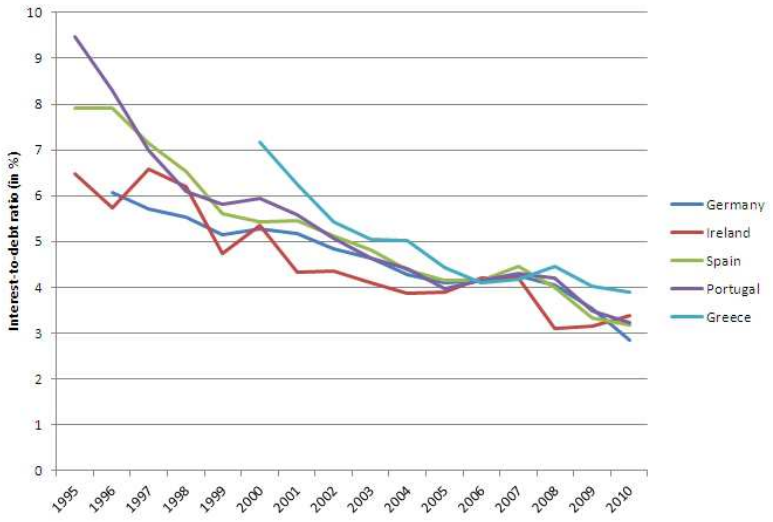


Figure 2: Interest-to-debt ratio (in %).

Source: Eurostat and own calculations. Note: The interest-to-debt ratio is the relation of interest payments on public debt to the gross debt.

Although we are now confronted with very high debt levels the incentive for restructuring measures is even lower than some years ago. High interest rates only have to be paid for rolling-over debt or issuing new debt. For short-term orientated politicians it is irrelevant that existing debt has to be repaid or rolled over at possibly higher interest rates in the long-run. We should keep in mind that the actual debt policy would only be influenced by an instrument which increases the average interest rate as soon as possible.

Let us discuss the effects of increasing interest rate spreads on the average interest rate a bit more in detail. These effects depend on the maturities of outstanding debt. A look at the maturity structures in the discussed countries shows that the proportion of very-short-run debt (under one year) increased in the last years (see Figure 3). In Germany this proportion increased from about 5% to 12% of total outstanding debt. In Spain the development is a bit more accentuated with a low value in the years before the financial crises and a recent jump to rates of 15% and above. In Ireland we can see a highly volatile proportion with very high values in the last years (up to 37%). In Portugal the proportion of short-run debt has been about a quarter of total debt since several years. Unfortunately, no data for Greece is available. Without much doubt, the increased proportion is

the result of low short-run interest rates in recent years. Countries restructured their debt from longer to shorter maturities to lower their interest payments.[4] In return, countries are exposed to higher interest rate risks. Now that the interest rate spreads have risen this high amount of short-run debt is a heavy burden for the GIPS countries. An exceptionally high proportion of total debt has to be rolled over at high and even increasing interest rates. This is one of the reasons for the liquidity problems and impending insolvency.

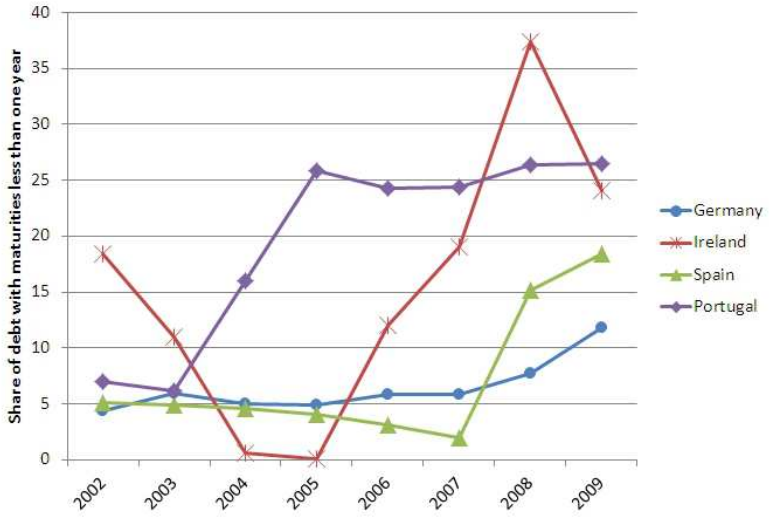


Figure 3: Proportion of very short-run debt (maturity less than one year).

Source: Eurostat. Notes: The figure shows the amount of very short-run debt (maturity less than one year) as a percentage of the overall sovereign debt. Values for Portugal (2004), Spain (2003, 2004) and Greece (all years) are not available. In the case of Spain and Portugal the missing values are linearly interpolated.

2.4 Other objectives

At this point reasonable objections against our sole concentration on allocative aspects could be raised. In a monetary union undifferentiated interest rates could

[4]The higher proportion of very-short-run debt can be a consequence of disproportionate amounts of new or rolled over debt in the form of short-run debt or of a disproportionate amount of maturing long-run debt which is not rolled over. In times of increasing debt levels, i.e. in the last years, the latter argument is unlikely.

help to fairly distribute interest and fiscal burdens between countries and to stabilize the economy of less competitive countries. In the following, we discuss whether the agreed crisis mechanisms will lead to these favourable effects.

EMU countries with a low competitiveness (e.g., Greece) can no longer depreciate their currencies. This is a well-known cost of a monetary union (De Grauwe (2009)) and in this sense a burden for the affected countries. There remain three other possibilities to improve the competitiveness: First, the country can cut wages and prices in order to get a real depreciation. This strategy comes along with high political cost and the danger of a recession. Second, the workers of the country can move to more competitive countries with a high labor demand. This mechanism is so far not important within the EMU due to differences in language and culture (Feldstein (2005)).[5] Third, transfers can be paid to the less competitive countries. When we think of the current discussion in the EMU there are two different kinds of such transfers: On the one hand, there are "hidden" transfer payments via guarantees and credits with interest rates below the market level. This will result in negative effects and distortions on the capital market (see above and EEAG (2011)). In the long run this is no viable solution as it undermines the interest rate spreads and results in negative effects for all countries. But in the short run such "hidden" transfers are politically feasible. On the other hand, the more competitive countries (e.g., Germany) can make direct payments to the less competitive countries (e.g., Greece). This can be done bilaterally or via a common budget. Such direct transfers do not distort the capital market, but they are politically not feasible. To conclude, in the long run "hidden" transfers are no solution. What is necessary is a mixture of lower prices and wages, higher labor mobility and direct transfers.

We think that a discussion about direct transfer payments from rich to poor countries within the EMU should be a starting point for a long-lasting process towards a fiscal union. However, the agreed crisis mechanism has perverse distributional effects: A relatively poor country (e.g., Slovakia) has to pay or guarantee for a relatively rich country which has broken the rules (e.g., Ireland). This system is neither incentive-compatible nor fair and will cause political problems.

At first sight, the stabilization of less competitive countries with interest rates

[5]If these differences are not present, labor mobility in the EMU can be quite high, e.g., the high number of German workers in Austria. The number of Germans employed in Austria sky-rocketed from 18.000 (1999) to 74.000 (2009). Data: Statistics Austria.

below the market level seems reasonable. But the effects of this instrument on effective demand will be low. Let us discuss the effects with the help of an example: Assume Greece is the less competitive country and the subsidized credits are guaranteed by Germany. First, Greece can no longer afford credits at the usual interest rates. To service debt at the moment it accepts the subsidized credits and has to cut wages and prices, increase taxes and cut public expenditures in order to get the guarantees. This strategy will lower effective demand and could result in a recession. A better way to stabilize demand would be a well-regulated conversion of Greek debt. Second, the subsidized credits are needed to service debt. Effectively, they are a payment from German taxpayers to German banks if Greece will not be able to service debt in the end. The important point is that Greek consumers do not get a huge share of these resources. Therefore effective demand in Greece will hardly increase and the stabilizing effect is very low. A more effective instrument would be direct transfer payments to poor people in Greece financed by German taxpayers. These poor people have a high marginal propensity to consume. In this case the transfers will increase Greek effective demand in the best possible way. Again, both reasonable proposals (debt conversion and direct transfers to poor people in another country) are politically not feasible.

Let us summarize: Neither distribution nor stabilization arguments are strong enough to doubt the importance of interest rate spreads. But how can we guarantee that we get the necessary differentiation of interest rates? What we need are effective sanction mechanisms that change the incentive structure of governments (and politicians) as early and as definitely as possible (EEAG (2011)).

2.5 Are sanction mechanisms effective?

The above mentioned measures of the EU against the sovereign debt crisis are mainly focused on short-run effects. In the long-run many of these instruments could have adverse incentive effects. Sanction mechanisms are effective if they result in differentiated interest rates and therefore set the right incentives. In the following we discuss whether the various measures (SGP, ESM, eurobonds) against the sovereign debt crisis fulfill this criterion.

The well-intentioned SGP failed because sanctions were never imposed. Gov-

ernments disregarded the no-bail-out clause because creditor countries decided to save their own banks and were afraid of contagion effects. Although the no-bail-out clause was a conditio sine qua non in the Maastricht treaty it had little effect on the fiscal discipline of governments after the introduction of the euro. The irrelevance of the SGP was demonstrated in the discussion about the fiscal deficits of Germany and France in 2002 and the following years. As a result of a "political wrangling" the rules of the SGP were watered down in 2005 (Feldstein (2005)). We should learn from the first decade of the common currency that sanction mechanisms depending on political decisions simply do not work.[6] The only mechanism which disciplines the governments has been the capital market. Therefore, we should strengthen the disciplining effects of the capital market (EEAG (2011)).

The characteristics of the ESM do not look any more promising. We have already mentioned that it does not differentiate between debtors. The new crisis mechanism can calm financial markets in the short run if it is credible enough. But it does not use the disciplining power of financial markets. In contrast, it is designed as a counter measure to market effects. In the long run it will set the wrong incentives and could even lead to a worse situation. The same is true for the often advocated eurobonds. In the meantime there exist several proposals for this kind of bonds but there is always an issuance of securities jointly guaranteed by all EMU member states. In general, there is no differentiation between debtors for these securities. In recent contributions a differentiation between debtors or at least debt levels is considered. In Delpla & von Weizsäcker (2010) and De Grauwe (2011*a*) common bonds ("blue bonds") are only issued to finance sovereign debt up to a certain threshold debt level (e.g., 60% of GDP), above this threshold only national and therefore junior debt ("red bonds") could be issued. Obviously, this proposal would lead to differentiated interest rates above the threshold level. Differentiated interest rates for blue bonds are possible through membership fees depending on the fiscal stance of a country. The major advantage of eurobonds (high liquidity of a common government bond market) does not solve the underlying problem of setting the right incentives for a sustainable debt management.

[6]This is also the view of De Grauwe (2011*b*), but he does not agree with our conclusions. He interprets the SGP as a failed attempt to circumvent national parliaments. If national politicians have to choose between political sanctions by their voters or breaking the rules of the SGP they will choose the latter.

A similar proposal can be found in Brunnermeier et al. (2011). According to their blueprint a European Debt Agency buys sovereign bonds of member nations and issues securities with the right to a senior claim (European Safe Bonds) and a junior tranche (risky securities). In contrast to Delpla & von Weizsäcker (2010) there is no joint and several liability of the member countries, but a guarantee provided by the pool of bonds. However, all three above mentioned proposals lack important incentive effects. There is neither an automatic mechanism to adjust interest rates nor are there effects on the interest rates of existing debt.

In the literature we can find incentive compatible proposals for rescue actions within the EMU. In EEAG (2011) a three-stage crisis mechanism is proposed which draws up a plan for illiquidity, impending insolvency and full insolvency of sovereign countries. Without doubt such a mechanism will also have effects on the decisions in the pre-crisis time. Milne (2011) proposes to issue "limited liability" government debt. The idea is to make the level of debt service state-contingent. In this proposal the whole debt service cannot exceed a certain maximum level (in % of GDP). As a result, the path of debt restructuring is known in advance. This should increase risk premia of highly indebted countries and improve the discipline of fiscal policies. In contrast to Milne (2011) our proposal is not based on the final option of sovereign default. We employ an early adjustment mechanism which also has effects on outstanding debt.

In the next section we propose an innovative form of sovereign debt financing, the so called performance-sensitive government bonds (PSGB). The main characteristic of this instrument is the expansion of the disciplining effects to the formerly emitted debt. The counter-argument that higher borrowing costs will result in higher debt levels is not really conclusive. The proposed bonds will strengthen the incentives to consolidate the budget in due time and therefore reduce debt levels. A similar argument can be found in EEAG (2011). PSGB do not solve urgent debt crisis, but they should be implemented as soon as possible to change the incentive structure of politics.

3 Performance-sensitive government bonds

Many forms of structured debt instruments are found in the capital markets where the coupon payments are related to performance. Major examples are inflation-linked bonds (see e.g., Campbell & Shiller (1996) or Deacon et al. (2004)), GDP-linked bonds (see e.g., Borensztein & Mauro (2004) or Schröder et al. (2007)), or debt-level related corporate bonds (see e.g., Koziol & Lawrenz (2010) or Manso et al. (2010)).

We propose a new class of debt-level related sovereigns bonds which we call "performance-sensitive government bonds" (PSGB) implementing three-fold incentives for borrowers, i.e. politicians or governments: (i) To limit the indebtedness of their countries, (ii) to take proactive, self-interested actions in order to restructure the economy, and (iii) to build-up long-term reputation in order to lower financing costs. Furthermore, such PSGB would presumably form a completely new asset class if they constitute a broad and liquid market. This would give (long-term institutional) buy-and hold investors a strong buying incentive since they are compensated for changes in the default risk over time.

The construction of a PSGB is very simple and directly comparable to corporate rating-trigger step-up bonds (see, for instance, Manso et al. (2010)). The regular coupon payment of PSGB is a function of some verifiable underlying variable such as the ratio of debt outstanding to GDP or some form of price information (e.g., CDS spread). Similar to the construction of a standard floating rate note, the coupon rate is adjusted over time based on a pre-specified schedule, agreed upon at the time of issuance. Hence, PSGB combine a short-term adjustment of the risk-related interest rate with the possibility of a very long-term maturity. If, for example, the ratio of debt outstanding to GDP increases from 60% to 65%, the schedule may imply that the coupon rate has to be increased by, say, 20 bps. Yet, when the ratio eventually goes down from 65% to 60% after some time the coupon rate should go down by 20 bps back to the initial level.

Thus, according to the evolution of the underlying, coupon payments may go down or up. But most importantly, good or bad economic policy driving the value of the underlying is almost instantaneously reflected in the overall coupon payments of a debitor. This implies that politicians would also be directly confronted with either additional interest payments (bad policy) or lower interest payments (good policy). PSGB would therefore implement a much more direct

link between economic policy and economic consequences, thereby immediately influencing the current budget available as well as indeed the probability of re-election for politicians. The voluntary issuance of PSGB would give investors a credible signal of keeping low debt balances and promoting economic growth, simply because self-interested incumbents want to be re-elected.

But of course, why should governments voluntarily issue PSGB at all? They have to give up valuable options for renegotiation at the expense of investors, and the freedom of possible decisions would shrink considerably. One could argue that such options are valuable and already priced in equilibrium as an additional premium, giving room for potentially lower interest rates. Thus, in the case of PSGB investors are faced with overall lower risk levels, resulting in lower risk premiums. The voluntary usage of PSGB could be interpreted as a powerful self-binding device. Analogies can be drawn to inflation-linked bonds, which commit to maintain low inflation rates (see Campbell & Shiller (1996)). Governments who deny using PSGB would implicitly signal to investors and voters that they are not able or do not want to limit debt levels and promote higher long-term growth rates. Investors would punish such debitor countries with higher risk premiums. This would presumably constitute a form of separating equilibrium, distinguishing between good and bad policy countries. In corporate finance, Koziol & Lawrenz (2010) found such an equilibrium for companies that issue rating triggered bonds. But indeed, these theoretical propositions are not yet empirically tested.

We proceed as follows: In section 3.1 we demonstrate how costly short-term interests of politicians can be and that the use of straight bonds fosters this postponing. In section 3.2 we claim cost advantages of PSGB (i.e., lower coupon payments) by analyzing the pricing based on an arbitrage-free setting. Finally, in section 3.3, we discuss possible objections against PSGB.

3.1 The economic costs of postponing restructuring

We identify at least two drivers of economic costs of postponing restructuring, which are short-term orientation of politicians and their limited willingness to restructure. The first driver, as mentioned above, is that politicians act mostly in a short-term orientated manner within political business cycles. Certain incentives

like maximizing the probability of re-election tilt politicians towards a rather short-term economic policy, leaving the economic rents of their voters largely unaffected or even improved. Such a policy comes with huge opportunity costs, though. Given that timely structural changes result in a higher growth path for the whole economy the foregone long-term gains or, equivalently, the present value of the expected additional values of futures goods and services could be extremely high. For example, we assume that the GDP follows a geometric Brownian motion with the following characteristics

$$\frac{dY}{Y} = \mu_l dt + \sigma dw, \tag{1}$$

where dw is the increment of a Wiener process and μ_l and σ are constants. When we set the initial value of the GDP, $Y_0 = 1$, the present value is given by

$$PV(Y_l) = \frac{1}{r - \mu_l}. \tag{2}$$

Using the same token, the present value of GDP with a higher drift rate μ_h is given by

$$PV(Y_h) = \frac{1}{r - \mu_h}, \tag{3}$$

where $\mu_h > \mu_l$. Suppose $\mu_l = 0.01$, $\mu_h = 0.02$ and $r = 0.04$. Thus a difference of 1 percentage point in the expected growth rate alone increases the PV from 33.33 to 50, an increase of 50%.

From the reasoning above it is obvious that postponing restructuring from year to year is extremely costly for the society, but such a policy may well serve short-term re-election interests of politicians and lobbying groups. Thus, linking long-term needs of the whole society to the short-term self-guided interest of politicians as it is proposed via PSGB, turns out to be very helpful.

The second driver is the limited willingness of politicians to undertake restructuring. Assume that if exactly because of restructuring actions the short-term growth rate is expected to be (slightly) lower (say for the next one or two years, before a sustainable higher growth path is reached), available short-term budgets will shrink immediately. In this situation, politicians have generally two options (which may be combined): To cut spending or to increase the deficit. Clearly, the first option immediately impacts the probability of re-election whereas the

second postpones the problems at rather low costs for the politicians. To see this, assume the outstanding debt has an average maturity of 10 years, such that every year 10% must be rolled-over. Thus, only a small fraction of the outstanding debt is re-priced every year. Postponing restructuring may increase the re-financing costs immediately, but the effect of higher interest rate payments on the total outstanding debt is smoothed over a long time. If the average coupon of the total outstanding debt is 5% and the new coupon rate for the rolled-over debt (10% of total outstanding debt) and additional debt (e.g., 5% of total outstanding debt) is 6% or 100 basis points higher, the resulting new average coupon rate after transactions is 5.14%. Given that 50% of total outstanding debt is structured as PSGB, then 55% (i.e., all PSGB and 10% of the remaining straight debt) of the total outstanding debt as well as the additional 5% would be re-priced, yielding a new average coupon rate of 5.57%. Given that 75% of total outstanding bonds are PSGB, then the average coupon rate will rise to 5.79%.

Therefore we expect that PSGB implement incentives towards a sustainable debt management and lead to a long-term growth orientated policy.

3.2 Pricing issues

Although PSGB encourage politicians to limit relative debt levels it is not clear why they should imply positive incentives to restructure the economy since short-term growth rates and hence the available budget are expected to fall. But there is a direct connection between expected long-term growth rates and the financing costs of debt: Given the observable willingness (e.g., by using PSGB) for restructuring is creditable from the investors' point of view, higher expected long-term growth rates should lead (ceteris paribus) immediately to lower required cost of capital. Investors value the decision to restructure early positively and will thus demand lower coupon payments compared to the case of no restructuring. Given our postulated dependency, re-pricing of PSGB and moderate additional debt could perform at a lower coupon rate, immediately decreasing the overall interest rate payment. From a politician's point of view a higher share of the budget would be available for other tasks. Similar considerations can be found before the issuance of inflation-linked bonds which may eliminate the inflation risk premium and thus result in lower financing costs (Sack & Elsasser (2004)).

Additional to these considerations, we propose in this section a pricing model for PSGB. Our aim is to clarify the advantages of PSGB in the case of timely preventing debt crises like for instance in Greece or Portugal. A rising debt-to-GDP ratio would have led early to increasing costs of debt and thus forced important structural changes in the economy in due time.

Consider the following simple model for a PSGB to illustrate pricing issues. Let us introduce the state variable s which is defined, say, as the ratio of outstanding debt to GDP. We assume that s is best described by a geometric Brownian motion:

$$\frac{ds}{s} = \mu_p dt + \sigma dw, \tag{4}$$

where μ_p is the drift parameter under the physical probability measure, dw is the increment of a Wiener process, and σ scales the risk. This approach is along the lines of Jeanneret (2009) who uses a standard corporate finance continuous-time model in order to value a country's debt and sovereign net wealth (equity) position. Observe that s has a reflecting barrier at $s = 0$, so the process cannot become negative, i.e., there is always some kind of government debt around. Moreover, we assume that there is an exogenous upper threshold s_d (e.g., 1.5 or 150%) at which default has to be declared. Our goal is to price government debt as a derivative with respect to the state variable s.

Let us focus only on perpetual government bonds with continuous coupon payment k and, if applicable, a variable component ms, where m is the additional cash flow for $s = 1$.[7] Since s varies over time, the variable component is sometimes higher or lower. Applying risk-neutralized pricing techniques allows us to state the drift under the risk-neutralized probability measure as

$$\mu = \mu_p - \phi\sigma, \tag{5}$$

where ϕ is the market price of cash flow risk.[8]

Utilizing Ito's lemma enables us to derive the dynamics of any derivative $F(s)$

[7] We use the assumption of a perpetual government bond since we expect PSGB as a long-term debt instrument with maturities of about 30 years.

[8] The market price of cash flow risk can be attained by risk neutral expectations with two assets (Ingersoll (1987), for instance, derives the market price of risk for nonprice variables).

with respect to s as follows:

$$\begin{aligned} dF &= F_s ds + F_t dt + \frac{1}{2} F_{ss} (ds)^2 \\ &= \left(\frac{1}{2} \sigma^2 s^2 F_{ss} + \mu_p s F_s + F_t \right) dt + \sigma F_s dw \\ &= \left(\frac{1}{2} \sigma^2 s^2 F_{ss} + \mu s F_s + F_t \right) dt + \sigma F_s dw^Q. \end{aligned} \tag{6}$$

Observe that line 3 is, relative to line 2, adjusted twofold. Switching from the physical probability measure to the risk-neutralized probability measure means to adjust the drift rate from μ_p to μ and simultaneously to substitute the increment of the initial Wiener process dw with an equivalent one, dw^Q.

Since in market equilibrium the expected return under the risk-neutralized probability measure must be equal for all securities, we can simply assume that this rate is r, the risk-free rate. Taking expectations using the risk-neutralized probabilities we get

$$E^Q \left[dF + (ms + k) dt \right] = rF dt. \tag{7}$$

Using our expression dF and observing that for a perpetual bond $F_t = 0$, we are able to write down the following ordinary differential equation (notice that $E^Q[dw^Q] = 0$):

$$\frac{1}{2} \sigma^2 s^2 F_{ss} + \mu s F_s - rF + ms + k = 0. \tag{8}$$

The general solution for this equation is

$$F(s) = \frac{k}{r} + \frac{ms}{r - \mu} + A_1 s^{\beta_1} + A_2 s^{\beta_2}, \tag{9}$$

where $\beta_1 = \frac{-2\mu + \sigma^2 - \sqrt{4\mu^2 - 4\mu\sigma^2 + \sigma^4 + 8\sigma^2 r}}{2\sigma^2}$, $\beta_2 = \frac{-2\mu + \sigma^2 + \sqrt{4\mu^2 - 4\mu\sigma^2 + \sigma^4 + 8\sigma^2 r}}{2\sigma^2}$, and A_1 as well as A_2 are arbitrary constants.

In order to receive a reasonable solution for $F(s)$, we set A_1 equal to zero to make sure that the specific solution is bounded. We have two boundary conditions for our bond: (i) If $s \to 0$ it should follow that $F(s) \to \frac{k}{r}$. (ii) If $s = s_d$ it should follow that $F(s_d) = Z$, where Z is the recovery value in case of default.

Thus, the closed-form solution for a performance-sensitive bond is given by

$$F(s) = \frac{k}{r} + \frac{ms}{r-\mu} + \left[Z - \frac{k}{r} - \frac{ms_d}{r-\mu}\right]\left(\frac{s}{s_d}\right)^{\beta_2}. \tag{10}$$

Note that the overall payments a country has to pay in the case of PSGB will be $k + ms$.

Alternatively, the coupon payments for straight debt are k'. The closed-form solution, which is a special case when $m = 0$, is given by

$$F^{straight}(s) = \frac{k'}{r} + \left[Z - \frac{k'}{r}\right]\left(\frac{s}{s_d}\right)^{\beta_2}. \tag{11}$$

These solutions allow us to compare both bonds in a straightforward manner. For an illustration we assume a coupon payment of $k = k' = 3$ and a risk free interest rate of $r = 0.03$.[9] The standard deviation of the debt-to-GDP ratio process is given as $\sigma = 0.02$. The default threshold is, e.g., determined as $s_d = 1.5$ and the recovery value is $Z = 50$. In this example, we assume the variable component to be equal to $m = 2$, which means that if, e.g., $s = 1$, the additional cash flow is 2 and the overall coupon payment of the PSGB will be 5.

Figure 4 shows the value of performance-sensitive debt and straight debt. Since for PSGB, the coupon payments will increase with a rising debt-to-GDP ratio, the value of the proceeds will increase too. Nonetheless it is worthwhile to see the rather different states of the value for straight and performance-sensitive debt. At figure 4a, the value of both bonds depending on the debt-to-GDP ratio s (x-axis) and on the drift rate μ (y-axis) is depicted. Figure 4b shows the value for PSGB depending on the debt-to-GDP ratio for three different parameter values of μ (i.e., $\mu = -0.02$, $\mu = 0$ and $\mu = +0.02$). The value of PSGB is quite sensitive with respect to s for all values of μ. This is the case since in the pricing of these securities the variable component as well as μ is included. Figure 4c in turn plots the value of straight bonds depending on the debt-to-GDP ratio for the same three different parameter values of μ. In the case of a negative μ, the value is very insensitive with respect to s since it is quite unlikely that the default threshold s_d is hit. Only for a positive μ, the function seems to loose

[9] A considerably higher risk-free interest rate may remove the positive effects of PSGB. The payments in the far future are much less valued and thus the long-term effects of this instrument may become negligible.

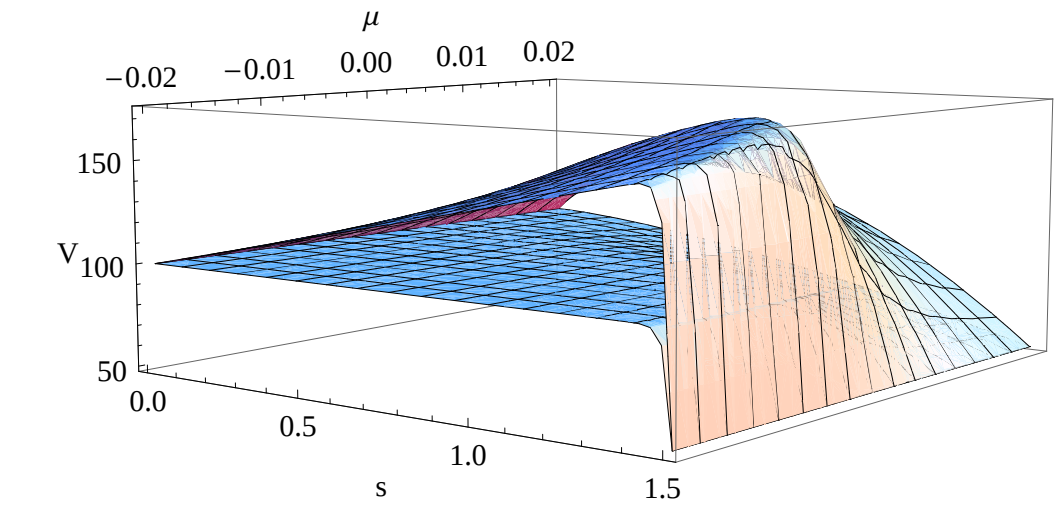
this insensitivity. It should also be noted for a proper interpretation that the illustrations in figure 4 reflect a static case in which μ will not change its level over time.

In the following we analyze two different scenarios: (i) one uniform drift rate μ, regardless of whether straight bonds or performance-sensitive bonds are issued, and (ii) two different drift rates μ_{PSGB} and $\mu_{Straight}$, where $\mu_{PSGB} < \mu_{Straight}$. Scenario (i) can be the case when only straight bonds are issued and the treasury considers to introduce PSGB. The drift rate has to be the same since PSGB have not yet been issued. In contrast, the second scenario reflects the situation in which PSGB are already issued. The issuance of PSGB will lead to a better sovereign debt management and also to a timely restructuring of the economy. In the medium- and long-term, all these activities should lead to a decrease in the ratio of outstanding debt balance to GDP. Therefore scenario 2 covers the case where $\mu_{PSGB} < \mu_{Straight}$.

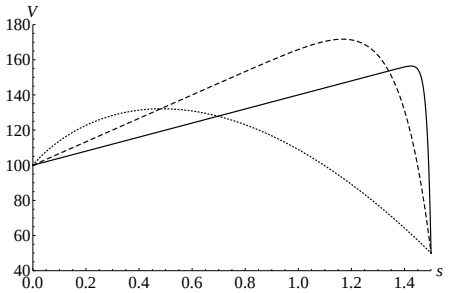
3.2.1 Scenario 1: One uniform drift rate $\mu_{overall}$

We take the same assumptions as in the illustration above and assume in addition a uniform drift rate of the debt ratio of $\mu_{overall} = 0.02$. The value of the performance-sensitive debt for $s = 1$ is 108.92 and the coupon payments are 5 (3 fixed and 2 variable coupon). We then compute the equivalent coupon payment for straight debt in order to receive the same proceeds as in the case of PSGB. The coupon payment for a straight bond is 5.39 and thus when $s = 1$, the initial coupon payment for PSGB is lower (-0.39) compared to the payment of straight bonds. Note that within this exercise, we only compare the pricing of initial coupon payments for the first period after issuance. Whereas the coupon payments for straight debt will be constant for, e.g., the following 9 years (i.e., a bond with ten years maturity), the coupon payments for PSGB will change over time - depending on the ratio of debt to GDP. Thus if the politicians will be able to decrease the debt-to-GDP ratio, even lower payments in the case of PSGB are the consequence. Table 1 compares the initial coupon payments for different debt ratios.

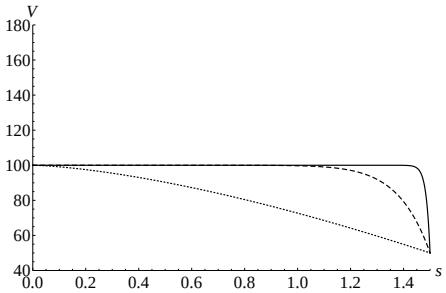
The last column in table 1 indicates that in almost all cases, the initial coupon payment for the performance-sensitive debt is lower than for the straight sovereign



(a)



(b) performance-sensitive debt



(c) straight debt

Figure 4: Value of performance-sensitive and straight debt depending on debt-to-GDP ratio s and drift rate μ.

Source: Own calculations. Notes: 4a shows the value of PSGB (upper layer) and straight bonds (lower layer) depending on both, debt-to-GDP ratio (s) and drift rate (μ). 4b shows the value of PSGB for different parameter values of μ (i.e., $\mu = -0.02$ (thick line), $\mu = 0$ (dashed line) and $\mu = +0.02$ (dotted line)). 4c shows the value of straight bonds for different parameter values of μ (i.e., $\mu = -0.02$ (thick line), $\mu = 0$ (dashed line) and $\mu = +0.02$ (dotted line)). The chosen parameter values are: $r = 0.03$, $\sigma = 0.02$, $k = 3$, $k' = 3$ and m=2.

s	$F(s)$	k_{PSGB}	$k_{Straight}$	Δ
0.01	101.80	3.02	3.05	-0.03
0.10	113.85	3.20	3.45	-0.25
0.20	122.71	3.40	3.79	-0.39
0.30	128.32	3.60	4.08	-0.48
0.40	131.33	3.80	4.33	-0.53
0.50	132.10	4.00	4.56	-0.56
0.60	130.86	4.20	4.75	-0.55
0.70	127.80	4.40	4.94	-0.54
0.80	123.05	4.60	5.10	-0.50
0.90	116.72	4.80	5.25	-0.45
1.00	108.92	5.00	5.39	-0.39
1.10	99.70	5.20	5.52	-0.32
1.20	89.15	5.40	5.65	-0.25
1.30	77.31	5.60	5.76	-0.16
1.40	64.25	5.80	5.87	-0.07
1.49	51.48	5.98	5.97	+0.01

Table 1: Comparative statics of scenario 1.

Source: Own calculations. Notes: The table shows the results from scenario 1. We compute the initial coupon payment of PSGB, k_{PSGB}, and the value of debt $F(s)$ for different s. Then we solve for the equivalent initial coupon payment for a straight bond, $k_{Straight}$, and compare both coupon payments. The chosen parameter values are: $r = 0.03$, $\sigma = 0.02$, $k = 3$, $m = 2$ and $\mu_{overall} = 0.02$. Remember: $k_{PSGB} = k + ms$ and $k_{Straight} = k'$.

debt. Only very near to the default threshold s_d, the coupon rate will be lower for the straight bond. Thus introducing PSGB would lead in almost all cases of this scenario to lower initial coupon payments for the government. As argued earlier in this section, investors may additionally demand lower coupon payments per se since politicians commit themselves to early structural changes which minimize the risk of a default.

Short-term orientated politicians should be tempted to issue PSGB because of their lower initial coupon payments. As soon as they have issued such bonds they are bound to their own decissions. If they do not commit to a solid fiscal policy the drift rate μ and the coupon rate will increase. This will force governments to restructure their policy.

3.2.2 Scenario 2: Distinct drift rates μ_{PSGB} and $\mu_{Straight}$

This scenario addresses the case in which we assume that depending on the debt instrument, the drift rate of the debt ratio s is different. In particular this means that we assume a negative drift rate of the debt ratio ($\mu_{PSGB} = -0.01$) for the performance-sensitive bonds and a positive drift rate ($\mu_{Straight} = 0.02$) for the straight bonds. It is important to note that these parameter values are chosen just as an illustration and only for clarification of the pricing behavior.

We repeat the exercise of scenario 1 and compare the initial coupon payments (table 2). In this case observe that the coupon payments of PSGB will decrease over time because of the negative drift rate. In addition, in most cases the initial coupon payments are lower for performance-sensitive debt than for straight debt; only for very low debt ratios (i.e., $s = 0.1$ and $s = 0.2$) the initial payments will be smaller for conventional debt.

A debt-to-GDP ratio of more than 50% implies considerable savings in terms of initial coupon payments for PSGB. This results from the negative drift rate already being priced into the coupon payments of the performance-sensitive debt, but supposing μ_{PSGB} will remain constantly negative, the payments will decrease even more over time.

These scenarios show that PSGB offer in fact both short-term and long-term incentives. In the short run there will be lower initial coupon payments and in the long run there is the prospect for even lower payments through timely restructuring.

3.2.3 Budget-relevant costs for both bond classes

Let us take a closer look on the budget-relevant cost after issuing bonds. Let us focus on the next, say, 5 years since this time frame reflects a normal election period. For simplicity we ignore the possibility that the default threshold is hit and the coupon payments are stopped.

Consider an initial debt-to-GDP ratio of $s = 0.8$. From table 1 ($\mu = 0.02$) we know that for an initial coupon payment of $k_{PSGB} = 4.6$ in the case of PSGB, the straight bond has to offer $k_{Straight} = 5.1$ to get the same proceeds from investors. The (expected) cumulated cash outflows K over the next five years (i.e., $T = 5$)

s	$F(s)$	k_{PSGB}	$k_{Straight}$	Δ
0.01	100.50	3.02	3.02	$\pm$0.00
0.10	105.00	3.20	3.18	+0.02
0.20	110.00	3.40	3.39	+0.01
0.30	115.00	3.60	3.64	-0.04
0.40	120.00	3.80	3.94	-0.14
0.50	125.00	4.00	4.29	-0.29
0.60	130.00	4.20	4.72	-0.52
0.70	135.00	4.40	5.25	-0.85
0.80	140.00	4.60	5.94	-1.34
0.90	145.00	4.80	6.84	-2.04
1.00	150.00	5.00	8.11	-3.11
1.10	155.00	5.20	10.00	-4.80
1.20	160.00	5.40	13.15	-7.75
1.30	164.94	5.60	19.43	-13.83
1.40	166.94	5.80	37.35	-31.55
1.49	87.27	5.98	114.05	-108.07

Table 2: Comparative statics of scenario 2.

Source: Own calculations. Notes: The table shows the results from scenario 2. We compute the initial coupon payment of PSGB, k_{PSGB}, and the value of debt $F(s)$ for different s. Then we solve for the equivalent initial coupon payment for a straight bond, $k_{Straight}$, and compare both coupon payments. The difference to scenario 1 is that we use different drift rates: $\mu_{PSGB} < \mu_{Straight}$. The chosen parameter values are: $r = 0.03$, $\sigma = 0.02$, $k = 3$, $m = 2$, $\mu_{PSGB} = -0.01$ and $\mu_{Straight} = +0.02$. Remember: $k_{PSGB} = k + ms$ and $k_{Straight} = k'$.

in both cases are:

$$\begin{aligned} K_{Straight} &= \int_0^T k_{Straight} dt = k_{Straight} T = 25.5 \\ \mathbb{E}[K_{PSGB}] &= \mathbb{E}\left[\int_0^T (k + ms) dt\right] = \int_0^T (k + ms_0 e^{\mu_p t}) dt = 23.41 \end{aligned}$$

Note that the physical drift rate is used for calculating real cash flows. The implied assumption for the above calculation is therefore $\mu_p = \mu$. Moreover, it can easily be shown that under scenario 1 the cumulated cash outflows are lower for PSGB compared with equivalent straight bonds for any period up to $T = 26$ years. If we set, for example, $\mu_p = 0.05$ (i.e., an implied risk premium of 3%), this change would reduce the break even period from 26 years to $T = 10.4$ years.

This general result is clearly reinforced under scenario 2, where the introduc-

tion of PSGB allows for assuming a negative physical drift rate ($\mu_{PSGB} = -0.01$) because of changed incentives.[10] According to the initial values in table 2 the cash outflow over the next 5 years is given by:

$$\begin{aligned} K_{Straight} &= 29.7 \\ \mathbb{E}[K_{PSGB}] &= 22.8 \end{aligned}$$

Even better, under scenario 2 the (expected) cumulated cash outflows are *always* (much) lower for PSGB compared with equivalent straight bonds for any given period up to infinity.

To conclude this section, simple calculations showed that the budget-relevant coupon payments are notably lower for PSGB in both scenarios for the next 5 years (and beyond). This should give a strong incentive for governments and politicians to opt for such bonds.

3.3 Objections against PSGB

Notwithstanding their positive incentive effects, using PSGB could presumably lead to more financial instability. Higher debt levels would increase coupon payments, which in turn would further increase deficits. This could perhaps lead to a downward spiral with no escape. This argument does, however, ignore the long-term incentive effects of PSGB. Rational politicians have an incentive to react immediately to a negative external shock. This should maintain required interest rates at a low level, since investors discount long-term expectations. Moreover, politicians have no short-term incentive to let fiscal deficits escalate because they are immediately punished by higher borrowing rates for new debt and higher coupon payments on PSGB. Since PSGB make overall interest payments much more sensitive to good or bad economic policy, politicians are well advised to smooth debt balances, to build up a reputation as a reliable borrower, and to tackle structural problems very early. Thus, the hope is that the probability for a debt crisis could be significantly reduced.

Another obstacle could be a lack of secondary market liquidity. Indeed, when only a small fraction of outstanding debt levels are PSGB, investors will require a

[10] Again, we assume implicitly $\mu_p = \mu$.

substantial liquidity premium, reducing the potential advantages from lower risk levels compared to straight bonds. Thus, PSGB should be initially introduced with large nominal amounts, allowing for liquid secondary markets. In this regard our proposal could be easily combined with other proposals (e.g. Brunnermeier et al. (2011)). An debt agency could buy already placed PSGB, issued by several countries, directly from investors. Pooled cash flows from these PSGB could be used to service different tranches. Large senior tranches would then constitute a very liquid, and essentially risk-free debt market.

Some minor objections are the complexity of PSGB and the risk of manipulation of the underlying variables as it was done in the case of Greece. We argue that complexity is no real problem, given that the pre-specified pricing schedule is transparent. Professional investors will develop a pricing standard since they have a good sense to price even more complex securities like, for instance, inflation-linked bonds. After a very short time the market will establish a pricing standard for PSGB. Indeed, PSGB must rely on verifiable, manipulation-free underlying variables, such as debt ratios or yearly averages of CDS-spreads. This job could easily be done by an independent agency (such as Eurostat).

4 Concluding remarks

In this paper, we propose a new debt instrument, so called PSGB. This innovative form of sovereign bonds leads to important incentives for politicians and governments in order to reach the following goals: (i) To limit the indebtedness of their countries, (ii) to take proactive, self-interested actions in order to restructure the economy, and (iii) to build up long-term reputation in order to lower financing costs.

We discuss why the current debt management is lacking important incentives or - in some cases - even gives wrong incentives which reinforce the moral hazard problem. We fully agree on the importance of interest rate spreads between the EMU countries. PSGB, however, could additionally strengthen and speed up consequences. Whilst a rising interest spread only has an effect on new or rolled-over debt, PSGB influence all debt outstanding, leveraging the consequences of policy decisions directly on governments or politicians.

At first glance, issuing PSGB makes little sense for politicians since they give up many possibilities to serve their interest groups. Instead, we show that the issuance of PSGB makes sense since it lowers the coupon payments and therefore lowers budget constraints and reduces the long-term default risk premium.

To sum up: We argue that PSGB are a promising new debt instrument which helps to set strong incentives for policy makers to limit debt levels and to timely restructure the economy.

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Performance-sensitive government bonds - A new proposal for sustainable sovereign debt management

Abstract
We argue that current sovereign debt management lacks important incentives for governments and politicians to fulfill it in a sustainable and long-term orientated way. This paper outlines that the mechanisms to solve sovereign debt problems within the EMU are not only missing the right incentives but also setting the wrong ones. In contrast to current policy, we argue that only an instrument which is sufficiently sensitive to the performance of a country (i.e. its debt level) will motivate the players to engage in sustainable debt management. Specifically, we propose performance-sensitive government bonds (PSGB) where coupon payments are closely linked to debt policy, giving strong incentives to limit debt levels and to timely restructure the economy.

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