Credit and Capital Markets, 47. Jahrgang, Heft 1, Seiten 79–101
Abhandlungen

Performance-Sensitive Government Bonds

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Abstract

Steadily growing debt ratios indicate that current sovereign debt policy lacks important incentives for governments and politicians to fulfill it in a long-term sustainable way. To implement proper incentives, we propose the concept of 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. In addition, we show that the current mechanisms used to solve sovereign debt problems within the EMU are not only missing the right incentives but also setting the wrong ones.

Performance-sensitive Staatsanleihen

Zusammenfassung

Derzeit haben Regierungen und Politiker nur wenige Anreize, die Staatsschuldenpolitik in einer langfristig nachhaltigen Weise auszuüben. Der Einsatz von performance-sensitiven Staatsanleihen, welche wir in diesem Aufsatz vorschlagen, schafft wichtige Anreize, die Verschuldung zu reduzieren und notwendige Reformen frühzeitig durchzuführen. Dieser Artikel diskutiert die Anreizwirkungen sowie die Ausgestaltung solcher Anleihen, welche sich durch Kuponzahlungen auszeichnen, die an die Schuldenpolitik des Landes gekoppelt sind. Zusätzlich

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An earlier version of this paper has been presented at the Midwest Finance Association 2013 Annual Meeting (Chicago, USA), the CEUS (Center for EUropean Studies) Workshop 2012 (Vallendar, DE) and the conference Crisis Aftermath of the University of Szeged (HU). We thank Katrin Wibmer and Rupert Sausgruber for helpful comments and the anonymous referee for pointing out potential improvements of the paper. All remaining errors are our own. Kupfer A. gratefully acknowledges financial support from the University of Innsbruck.

wird dargelegt, dass die gegenwärtigen Instrumente zur Bewältigung der europäischen Staatsschuldenkrise zu wenige bzw. die falschen Anreize setzen.

Keywords: Sovereign debt policy, government bond, incentive, contingent debt, EMU

JEL Classification: G12, G13, H62, H63

I. Introduction

In democratic countries there has been a long-run tendency for increasing sovereign debt ratios since the early 1970s.[1] Elections and crises can be seen as triggers for higher deficits and increasing debt levels since, for instance, politicians do not want to reduce their probability of being re-elected by cutting expenditures. In the case of debt-related crises, implementing and executing the necessary measures (e.g., sharp expenditure cuts, higher taxes, more flexible labor markets) to overcome the crises typically destroys much value and may lead to severe recessions. Thus, politicians rather postpone initiatives despite long-term beneficial effects.

Moreover, why do debt ratios not decline after elections or after a crisis in a substantial way? From an empirical point of view the most promising answers can be found in the following two explanatory approaches: First, theories based on political institutions argue that no player in the political game (e.g., parties, interest groups) 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. And second, theories of 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. Recent literature reviews can be found in *Eslava* (2011), *Bayar/Smeets* (2009) and *Mikosch/Übelmesser* (2007).

Monetary unions which jointly guarantee issued debt of their members reinforce these problems since we expect to see free-riding behavior of the rather weak countries leading to excessive borrowing and higher debt ratios. The institutional structure of the EMU (centralized monetary

[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)).

policy and decentralized fiscal policies) supports these free-rider problems and calls for a limit on deficits and debt (*Feldstein* (2005)). A sufficient differentiation of interest rates during times of 'good' or 'bad' policy is of minor importance or may not take place at all. Moreover, such free-riding behavior destroys incentives for strong countries to limit debt ratios as well.

Our starting point for the analysis is that the common observed incentive structure for governments and politicians leads to steadily higher sovereign debt ratios and eventually into new sovereign debt crises. The average costs of debt may stay rather low even when the financial markets will currently demand higher interest rates. Since higher interest rates will only be applied for newly issued and rolled-over debt, the majority of the existing debt is not affected by increasing interest rates. For illustration, suppose an average debt maturity of 10 years[2] and an average interest rate on government debt of 3 %. Assume now that for some reason, the current coupon payment increases to 5 % which are 200 basis points more. However, the higher interest rate is only relevant for rolled-over debt (for simplicity, we assume no issuance of new debt). The average interest rate on debt for the next year will then be 3.2 % which will only lead to marginal higher costs for the government. Thus, we argue that even if financial markets sanction government's policy through higher interest rates, politicians will only be slightly affected by these in the short-term, unwilling to change the policy towards a more sustainable one (except in the case of severe liquidity problems). In addition – due to political competition – governments have virtually no particular short-term incentives to reduce expenditures and implement structural reforms since this would reduce their probability of being re-elected.

We are interested in the following research question: Is there an applicable incentive structure for governments and politicians which prevents this spiral of higher debt-ratios and helps to implement a long-term sustainable debt policy? On the one hand, the goals 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 accelerate long-term economic growth. We argue that an innovative design of sovereign debt instruments could help to reach these goals.

[2] An average maturity of 10 years implies an average debt turnover rate of 10 % per year.

Our proposal for such an incentive structure relies on what we call performance-sensitive government bonds (PSGB) which are one sort of contingent debt. The basic idea is to link the coupon payments with some default risk related indicator reflecting the overall indebtedness of the country as well as expectations and prospects for its future debt situation. We argue that implementing PSGB will change the incentives of borrowers (i.e., politicians and/or governments) in a three-fold way. With PSGB there are stronger incentives (i) to limit the indebtedness of the countries, (ii) to take proactive, self-interested actions in order to restructure the economy in the short-term, and (iii) to buildup 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 (institutional) buy-and-hold investors a strong buying incentive since they are compensated for changes in the level of debtor's default risk over time.

The remaining part of the paper is structured as follows: Section II provides a short overview of other contingent debt instruments in sovereign as well as corporate debt markets. In section III we introduce the concept of PSGB, highlight the economic costs of postponing restructuring and discuss possible objections against the concept of PSGB. Section IV analyzes the current (wrong) incentive structure of politicians within the EMU and presents how PSGB would change this structure towards a more sustainable one. Finally, section V concludes.

II. Contingent Debt in Sovereign and Corporate Debt Markets

Contingent debt can be found in corporate as well as in sovereign debt markets. Indeed, both markets vary considerably with regard to the established financial instruments. In corporate finance the impact of contingencies, realized by various restricting covenants, is rather large and can be found in, e.g., bank loans and bonds. Corporate debt covenants are typically based on firm specific accounting or finance indicators and restrict the borrower in some actions (see *Nikolaev* (2010) for a list of typical covenants). In the first place, debt covenants are implemented to mitigate the conflict between bond- and stockholders (asset substitution) and to reduce asymmetric information (see *Park* (2000) or *Smith/Warner* (1979) for an overview). Recent studies focus on pricing issues (*Asquith* et al. (2005)) and on the relation between debt covenants and the identification of losses (*Nikolaev* (2010)).

One specific type of corporate debt contracts with covenants are rating-trigger step-up bonds whose coupon payments are linked to the rating of the issuer and in case of a downgrading, the coupon payment will rise by a certain amount of basis points. The advantage of this particular financial instrument compared to traditional debt with covenants is that no monitoring on the agreed restrictions by the lender is necessary since the coupon is adjusted automatically in the case of a rating event. A further difference to straight bonds is that renegotiations are very unlikely for rating-trigger step-up bonds since the future schedule in case of a rating event is fixed at issuance. In contrast, debt instruments with covenants are often subject to renegotiations in the case of a violation of the agreements.[3] *Koziol/Lawrenz* (2010) show that rating-trigger step-up bonds are able to mitigate the agency conflict and – with a specific design – to establish a separating equilibrium with respect to the issuers' quality. More generally, *Manso* et al. (2010) discuss and analyze various forms of performance-sensitive debt.

Despite the fact that debt covenants are widely used in the corporate sector, to the best of our knowledge, performance-sensitive agreements are not used at all for government bonds. Other contingent debt structures in sovereign bond markets are rather scarce, too.[4] Inflation-linked bonds (ILB) are the most widely used security in the group of contingent sovereign debt with an outstanding amount at the end of 2011 of 7.4 % and 22.4 % of all government debt in the USA and UK, respectively. Besides the obvious advantage for investors (i.e., inflation protection), ILB will also limit governments' possibilities to decrease sovereign debt via inflation. The issuance of ILB can be interpreted as a self-binding device against high inflation rates or – as Margaret Thatcher once said – an inflation-indexed security is a 'sleeping policeman' (*Campbell/Shiller* (1996)). However, the rationale to introduce ILB was twofold in history: On the one hand, some Latin-American countries wanted to foster the credibility of their fight against inflation, whereas on the other hand, countries with low or moderate inflation rates wanted to lower their financing costs as well as to complete the financial markets (see

[3] *Gârleanu/Zwiebel* (2009) analyze the aspect of renegotiations in debt contracts with covenants. They explain the tightness of debt contracts at the issuance as well as the following renegotiations through a violation of the agreements.

[4] Financial innovations in sovereign debt markets are quite rare since the issuance may face several obstacles (e.g., illiquidity, product uncertainty, etc.). *Borensztein/Mauro* (2004) list a catalogue of possible failures for innovative financial products.

Bekaert/Wang (2010), *Deacon* et al. (2004) or *Campbell/Shiller* (1996) for an overview). Recent studies focus on an accurate determination of the inflation risk premium which is mostly based on term structure models (see *D'Amico* et al. (2010) or *Chen* et al. (2010), for instance).

GDP-linked bonds represent another type of contingent sovereign debt, the coupon payments of which are indexed to the changes in GDP (relative to a certain reference year). They are characterized by their anticyclical feature and subsequent stabilizing effects. However, we argue that these securities do not support an early restructuring of the economy. Recent research can be found in *Schröder* et al. (2007), *Griffith-Jones/Sharma* (2006) or *Borensztein/Mauro* (2004). Commodity-linked bonds have a similar rationale as GDP-linked bonds since they also imply stabilizing effects for countries whose economies rely heavily on the export of a certain commodity (see e.g., *Haldane* (1999) or *Atta-Mensah* (2004)).

To conclude this overview, it is striking that corporate and sovereign debt markets differ so considerably with respect to debt covenants. In the following section we propose our concept of PSGB which will add an agreement concerning country's performance to the payout schedule of government bonds. Since we are dealing with sovereign debt markets, these bonds will need a special design which will be analyzed in the following section.

III. An Analysis of Performance-Sensitive Government Bonds

1. The Concept of PSGB

The construction of PSGB is very simple in principle and directly comparable to corporate rating-trigger step-up bonds (see, for instance, *Manso* et al. (2010)). The basic idea is that the coupon payments are not fixed over time but sensitive to the country's economic performance. Therefore, the regular coupon payment of PSGB will be a function of some verifiable underlying variable representing the current situation of the country as well as expectations for its future situation. In more detail, we think about a combination of statistical indicators representing the current situation (e.g., debt-to-GDP ratio) and a market based metric representing the expectations for the future situation (e.g., a long-term sovereign credit default swap (CDS) spread). The combination of both indicators results in the performance index which is the underlying variable for PSGB. Similar to the construction of a standard floating rate

note,[5] the coupon rate will be adjusted over time based on a pre-specified schedule, agreed upon at the time of issuance. Coupon payments can therefore increase or decrease – depending on the realization of the underlying variable.

The combination of the two indicators is important and necessary, since the sole usage of the debt-to-GDP ratio would lead to higher coupon payments in times of recession and would consequently be very procyclical. On the other hand, only using a market based measure, e.g., the CDS spread, may be too sensitive to short-term market disturbances and therefore also not suitable as an exclusive indicator for a country's performance. As a consequence, we propose the combination in order to avoid pro-cyclicality and to mitigate high sensitivity due to market based metrics.[6] Note that despite the indicators' imperfections, their use here seems justifiable due to their simplicity and common use in the existing literature.[7] Apart from potential problems with statistical fraud (e.g., Greece), the debt-to-GDP ratio is a clear and established measure to depict the indebtedness of a country. Similarly, CDS spreads can only be used with some caution, since, for example, the CDS spreads in the Eurozone were mostly undifferentiated before the financial crisis. In a recent study, *Ang/Longstaff* (2013) decompose sovereign credit risk measured by CDS spreads into a systemic component and a sovereign-specific component. They show that the systemic risk component is higher for Eurozone countries than for U.S. states and that country-specific components for the Eurozone can basically be classified in three different clusters. In general, there is a high correlation of sovereign credit risk (*Longstaff* et al. (2011)), which is shown to be increasing during crises and recessions by *Ang/Bekaert* (2002). Due to globalization, sovereign CDS spreads obviously follow a global risk factor to some extent but at least since the beginning of the financial crisis CDS spreads in the Eurozone

[5] Floating rate notes are characterized by a variable coupon rate which is based on a money market reference rate (e.g., LIBOR) and an additional spread.

[6] A possible market-based indicator could be, for instance, a one-month moving average of the CDS spreads, as proposed by *Hart/Zingales* (2011), who investigate CDS spreads for financial institutions. We refrain from using daily CDS spreads as indicator given its strong sensitivity and their susceptibility to manipulations.

[7] *Hart/Zingales* (2011) propose the use of CDS spreads as a capital regulation for financial institutions. They also call for CDS traded on an exchange instead of an over-the-counter market in order to minimize counterparty risk and to avoid manipulations. In addition, it has been shown that corporate CDS spreads lead other financial securities with regard to the information process (see e.g., *Acharya/Johnson* (2007) or *Blanco* et al. (2005)).

presumably capture meaningful and informative country-specific issues. Table 1 shows sovereign CDS spreads before the crisis, in the middle of the crisis as well as their current levels. Ireland is a good example for the information content of CDS spreads: While CDS spreads were very high in the middle of the crisis, they are now back to a reasonable level. This could be due to credible politicians who have executed necessary structural reforms in their country. We therefore consider CDS spreads as an appropriate indicator to depict countries' future economic situation.

A further aspect is related to credibility: By assessing the future outlook of a country's performance, CDS spreads value the actions of politicians and their policies. If their behavior is not credible, CDS spreads will not decrease when they promise to reform the economy. We argue that by issuing PSGB, politicians commit themselves in a credible way to a sustainable and long-term orientated policy, and therefore it is likely that CDS spreads might decrease due to the issuance of PSGB and different reform promises than in the case of less credible politicians.

Table 1

5 Year Sovereign CDS Spreads (in Basis Points)

	Before the crisis August 1, 2006	*Middle of the crisis* February 1, 2012	*Current spreads* August 1, 2013
Germany	3.50	86.13	26.89
France	2.25	174.44	62.33
Italy	12.83	392.31	245.62
Spain	3.25	354.65	242.18
Portugal	8.13	1374.97	433.91
Ireland	NA	586.62	144.51

(Source: Bloomberg Database)

The simplest possibility to create the combined performance index is to equally weight both indicators, but nonetheless, both of them have to be normalized due to their different scales. Moreover, the performance index should have a certain range (e.g., from 0 to 10) to operate as a schedule for variable coupon payments of PSGB. Low index values mean that the country's performance is rather good (i.e., low debt-to GDP ratios and low averages of CDS spreads) and therefore additional coupon

payments will be low. For an illustrative purpose, potential schedules for coupon adjustments can be seen in Figure 1. The schedules in Figure 1a and 1b have no additional coupon payment until the combined performance index reaches the value 4. Starting with an index value of 4, the additional coupon payment increases linearly (Figure 1a) or stepwise (Figure 1b). Figure 1c represents a schedule with only one single threshold at a certain value (e.g., 7.5) of the index.

One important feature of PSGB is the combination of short-term risk-related adjustments of the coupon rate with the possibility of the principal's long-term maturity. This relation of short-term adjustment and long-term maturity deserves further discussion. The incentive effect of short-term debt is well known from the corporate finance literature (see, e.g., *Jensen* (1986)). Short-term debt forces debitors to pay out cash without contingencies. Indeed, debitors can re-issue short-term debt under the prevailing conditions, but these conditions are subject to change. In order to prevent short-term default, debitors are well advised to limit the overall debt level. Besides these positive disciplining effects, there is a major drawback of short-term debt. Since the debitors must honor the debt coming due there is a potential hold-up problem (see, e.g., *Grossman/Hart* (1986)). Lenders may extort debitors in demanding much higher interest rates for continuing lending due to limited competition in the market. In addition, asymmetric information may challenge the creditworthiness of debitors. It is well known that with asymmetric information credit markets may not function in a proper way (see, e.g., *Stiglitz/Weiss* (1992)). Long-term debt, in contrast, reduces the risk of a hold-up and the dependence on current market conditions. But there is no strong incentive effect to implement a sound debt policy in the case of straight bonds since the interest rates are locked-in for the whole debt maturity.[8]

PSGB thus combine the positive effects of short- and long-term debt and therefore represent a sovereign debt instrument with completely new features. While long-term government bonds have fixed coupon payments which are not adjusted to the current default risk, and short-term bills are adjusted to default risk but they are – by definition – short-term debt instruments, PSGB are long-term debt instruments whose coupon payments are not fixed over time.

[8] Since long-term public debt enables institutional investors, like pension funds or insurance companies, to implement a long-term, low risk investment policy, the social value of long-term debt should not be understated.

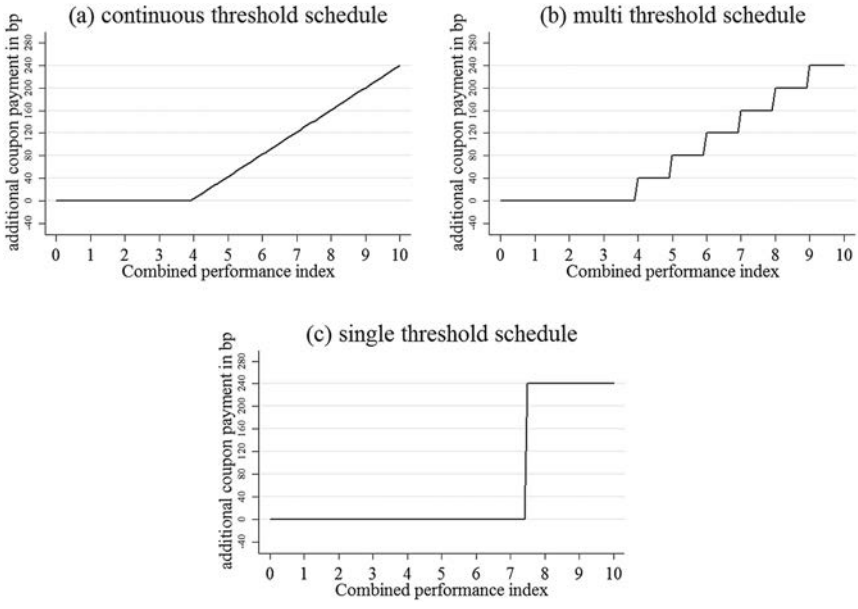

Figure 1: Examples of Potential Schedules

With PSGB the pricing conditions of already issued debt are adjusted in some circumstances (which is beneficial for long-term investors) with only a limited dependence on the current market conditions. In addition, higher coupon payments are applied for all outstanding bonds and not only for rolled-over or newly issued debt. In the case of straight bonds, only the marginal debt (i.e., rolled-over or newly issued debt) is affected by higher interest rates when the performance of the country is worsened and vice versa. Indeed, a mixture of PSGB and straight bonds is also possible and will nonetheless lead to a certain change in politicians' incentive structure.

2. *A Politico-Economic Approach*

a) Economic Costs of Current Policies

Politicians typically aim to maximize their re-election probability which leads to short-term orientated policies, leaving the economic rents of their voters largely unaffected or even improved. This approach is closely related to the concept of political business cycles (*Nordhaus*

(1975)).[9] Such a policy comes with huge opportunity costs, though. Given that timely structural changes and fiscal consolidations result in a higher growth path for the whole economy, the foregone long-term gains or, equivalently, the present value of the expected additional future goods and services could be extremely high.[10]

The costs of postponing necessary policies can be illustrated by calculating the present value of the GDP using the Gordon growth formula in a risk-neutral world: $PV(Y) = \frac{Y_0}{r - \mu}$, where we set Y_0, which represents the initial value of the GDP, to 1. r denotes the interest rate and μ the growth rate of the GDP. Setting the interest rate constant at 2 %, one can compare the present value of the GDP in two different states. State *low* is indicated by a low GDP growth rate, e.g., $\mu_{low} = 0.01$, and state *high* by a higher GDP growth rate, e.g., $\mu_{high} = 0.011$. A difference of 10 basis points in the growth rate alone increases the present value from 100 to 111, an increase of 11 %. Therefore, postponing necessary structural reforms, even with only slightly higher growth rates (on average), is accompanied by high economic costs.

However, despite this advantage, politicians are inclined to postpone necessary reforms since they have a negative impact on their re-election probability: activities to restructure the economy like, for example, expenditure cuts, higher taxes, more flexible labor markets are very unpopular for the majority of the population and structural reforms may lead

[9] *Nordhaus* (1975) shows that vote-seeking politicians will try to influence the macroeconomic performance of a country. Immediately before an election governments will take expansionary steps and in this way maximize their re-election probability. Negative consequences will not set in until after the election and lead to restrictive policies. Voters assess the macroeconomic performance of a country, but they are myopic and do not punish politicians for their opportunistic behavior. *Alesina* et al. (1997) and *Mueller* (2003) offer extensive literature overviews. From an empirical point of view the opportunistic behavior of incumbents can be identified more easily by directly looking at the effects on budget deficits. Recent studies deliver strong but differentiated evidence for the existence of such political budget cycles (e.g., *Brender/Drazen* (2005), *Shi/Svensson* (2006) and *Efthyvoulou* (2012)).

[10] A seminal paper on possible expansionary effects of fiscal consolidations is *Giavazzi/Pagano* (1990). More recently, *Clinton* et al. (2011) show within a dynamic general equilibrium model that fiscal consolidations lead to higher GDP growth rates in the long-run. However, beneficial effects depend on a growth-friendly composition of the required spending and tax reforms. The inevitable short-run output losses can be diminished with a credible consolidation policy. The potential growth-promoting effects of various fiscal consolidation instruments are discussed in *Hagemann* (2012).

in the short-run to lower GDP growth rates. Therefore, the opportunity costs of structural reforms are very high for politicians while their opportunity costs of an increasing deficit are rather low, as already discussed above.

In the case of PSGB, the opportunity costs of debt will considerably increase. On the other hand, the opportunity costs of structural reforms will tend to decrease due to long-term positive GDP growth rates: There is presumably a connection between expected long-term growth rates and the financing costs of debt. Given the observable willingness for restructuring is credible from the investors' point of view (e.g., by using PSGB), higher expected long-term growth rates lead c.p. to lower required cost of capital.[11] Investors value the decision to restructure positively and will thus demand lower coupon payments compared to the case of no restructuring. From a politician's point of view a higher share of the budget would be available for other tasks. Similar arguments 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)). Therefore, with PSGB timely restructuring takes place and debt management will be more sustainable and long-run orientated.

b) Motivation to Issue PSGB

Besides the advantages of PSGB for the whole society, PSGB mainly restrict politicians in their possibility to issue debt and to influence their re-election probability by serving their interest groups. In this section, we will outline why short-term orientated politicians might nonetheless be willing to issue PSGB.

Our starting point is the objective of the incumbents: Following *Nordhaus* (1975), we suppose opportunistic politicians whose aim is to be re-elected. We argue that the re-election probability depends to some extent on the budget available for expenditures to serve their voters. Politicians can obtain more budget funds by (i) shifting the tax rate, (ii) issuing new debt or (iii) increasing tax revenue through higher GDP growth rates by restructuring the economy. While (i) is an option which politicians are

[11] We simulated the pricing behavior of PSGB with a contingent claim model in an arbitrage-free setting to compare initial coupon payments of straight and performance-sensitive bonds. Given that the performance of a country will be better with PSGB, initial coupon payments for PSGB are lower than for straight bonds.

very unlikely to exercise since voters are immediately negatively affected and (iii) could lead to lower GDP growth rates in the short-run due to restructuring, option (ii) is usually rather easy to implement for short-term orientated politicians and will not lead to major resistance among voters. In addition, issuing new debt is attractive for the following two reasons: First, as long as the market does not worry about the country's solvency, the coupon rates will stay on a low level. Second, the financing cost of newly issued debt is distributed over a certain time horizon (i.e., the maturity) and does not affect the population/voters immediately. Therefore, the burdens of newly issued debt are postponed to the next generation and politicians will prefer option (ii) instead of (iii).[12] A situation in which PSGB are available is substantially different. Politicians now have the following additional option: (iv) shifting existing straight debt into PSGB. If PSGB lead to lower coupon payments than straight debt, politicians will receive a considerable surplus of funding which is freely available in their budget.[13] This effect might support a first 'step' into PSGB as government securities. Choosing this option, the politicians attain an additional amount of money without bearing any new costs in the short-run. In addition, politicians increase their reputation by self-binding them through the issuance of PSGB. Hence, we argue that politicians have short-term incentives to exercise option (iv): shifting straight debt outstanding into PSGB increases their current budget considerably and raises their reputation to restructure the economy.

Once PSGB are issued, a more direct link between economic policy and interest payments exists and influences the current budget available as well as the probability of re-election for politicians. Apart from the additional revenue politicians receive by shifting straight debt into PSGB, the issuance of PSGB would give investors a credible signal of keeping low debt balances and promoting economic growth, simply because in-

[12] The only exception is the case when the market is demanding very high interest rates for new debt and hence there is (almost) no access to the capital market.

[13] Suppose that a country has 100 $ debt outstanding and pays 3 $ interest (i.e., 3 % coupon rate on average). Assume further that politicians use the option to change all debt outstanding into PSGB. The new coupon payments for PSGB will c.p. be lower (e.g., 2.5 %), since the self-commitment of the politicians and the creation of incentives for early restructuring should be acknowledged by the market. Holding the interest payments constant at 3 $, the politicians have $120\ \$ \left(= \frac{100}{2.5} \times 3 \right)$ at their disposal by shifting straight debt into performance-sensitive debt which is a surplus of 20 $.

cumbents are interested in low interest payments leading to a higher budget available and thus c.p. to a higher re-election probability.

Therefore, in the case of PSGB, investors are faced with overall lower risk levels, resulting in lower risk premiums. The usage of PSGB could be interpreted as a powerful self-binding device. Analogies can be drawn to inflation-linked bonds, which commit politicians 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 initial risk premiums via lower bond prices. This could presumably constitute a form of separating equilibrium, distinguishing between good and bad policy countries. In corporate finance, *Koziol/Lawrenz* (2010) find such an equilibrium for companies that issue rating-trigger step-up bonds. But indeed, this theoretical proposition is not yet empirically tested and is subject to further research.

3. Objections Against PSGB

One argument against PSGB could be that the linkage between coupon payments and the economic situation of a country might have pro-cyclical effects leading to more instability. This is due to an enforcement of the feedback potential through higher interest rates. Straight debt exhibits only a small feedback component since higher interest rates only count for newly issued or rolled-over debt. In the case of PSGB, on the other hand, higher interest rates through lower performance count for all performance-sensitive debt outstanding. In a debt crisis, for instance, this effect could even deteriorate a country's situation: If a country is facing an external shock on its economy which leads to a recession, coupon payments will rise if the performance index drops. However, if the recession is only due to the external shock and not due to structural problems in the country, and if the country is not at risk to default, at least CDS spreads might not rise. Therefore, the inclusion of two indicators to calculate the underlying performance index mitigates this issue of pro-cyclicality and the enforcement of feedback potential.

Another case in which the feedback component is not negligible is the following: Suppose a country implements some structural reforms which could perhaps lead to a lower GDP growth rate in the short-run. As a consequence, the debt-to-GDP ratio could increase leading to higher

performance-sensitive coupon payments. However, market participants' valuation of these reforms should result in a decrease of the CDS spreads.[14] Altogether, again, due to the combined performance index the country might not be faced with higher coupon payments in the short-run, but will expect lower coupon payments in the long-run.

It is worthwhile to note that the concerns about pro-cyclical effects are only relevant in the short-run and that these effects can create important incentive in the long-run. With PSGB 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 will be (almost immediately) punished by higher borrowing rates for new debt and higher coupon payments on all outstanding PSGB. We expect that within this framework, politicians will try to counter the crisis without the common deficit spending strategy. On the contrary, they will be forced to search for structural reforms which lower deficits and foster growth. 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, in the best case, the probability for a debt crisis can be significantly reduced. In this sense PSGB are not an instrument to solve a crisis but to prevent it in advance.

The effects of pro-cyclicality depend to some extent on the design of the pricing schedule which is shown in Figure 1. A continuous threshold schedule where deteriorations of the performance index will lead to an immediate effect on the coupon rate (Figure 1a) is more exposed to a potential pro-cyclicality than schedules with a single threshold (Figure 1c) or with only a few thresholds (Figure 1b). The idea is, that in the case of a single threshold politicians try to keep a 'safe distance' to the threshold and therefore implicitly avoid pro-cyclicality. Even when a shock deteriorates the performance index for a short time, the distance is large enough in order not to hit the threshold.

Another obstacle is the possibility of a high liquidity risk premium in the yields of PSGB. The problem of lacking secondary market liquidity will be most notably the case when only a small fraction of outstanding

[14] Germany, for example, has very low CDS spreads despite a considerably high debt-to-GDP ratio (see Table 1).

debt levels are PSGB. Investors will require a 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 idea could be combined with other proposals (e.g., *Brunnermeier* et al. (2011)). A debt agency could buy already placed PSGB, issued by several countries, directly from investors. The agency would use these PSGB as collateral to issue different securities. 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.

The idea of PSGB depends on reliable information about the true fiscal stance of a country. Indeed, PSGB should rely on verifiable, manipulation-free underlying variables. As discussed above, possible underlyings are debt-to-GDP ratios or long-term averages of CDS spreads. When using debt ratios the possibility that governments manipulate official statistics could lead to distortions. But, statistical fraud is not a specific problem caused by PSGB. In making their financing decisions creditors will always have to use data on a country's deficit and debt. Of course, in the case of PSGB this problem seems to grow bigger due to the otherwise impending automatic coupon adjustment. In the case of CDS spreads statistical fraud seems to be no issue at first sight. But also the spreads will depend on data about the fiscal stance of a country. It seems impossible to find an instrument which on the one side sets incentives to consolidate the budget and on the other side does not depend directly or indirectly on official statistics. Therefore, the relevant question is how to minimize such fraud. One approach is to strengthen the position of statistical agencies (such as Eurostat), another approach is to install national or international fiscal councils. These councils have to be independent from the political process and could among other things monitor national debt statistics and evaluate whether fiscal rules have been observed. An extensive discussion of the role and independence of fiscal councils can be found in *Calmfors/Wren-Lewis* (2011). Even if statistical fraud could be prevented there still remains the problem of incomplete information about the fiscal stance of a country. It is almost impossible to include all kinds of public debt like contingent liabilities, debt of public enterprises or even future pension payments in a straightforward, consistent manner. Therefore, simply a widely accepted public debt definition, e.g., the general government gross debt in terms of the Maastricht treaty as published by Eurostat, should be used.

A final, but in our view minor objection is the complexity of PSGB. We argue that complexity is no real problem, given that the pre-specified pricing schedule is transparent. We expect that professional investors will develop a pricing standard[15] in due time given that they have proven their ability to price complex securities like, for instance, inflation-linked bonds.[16]

All in all, we particularly expect that the combination of two economic indicators helps to manage the most severe issue with pro-cyclicality and that the change of politicians' incentive structure is worthwhile. In the following section, we outline incentives of current measures within the EMU to solve sovereign debt problems and show that these mechanisms are not only missing the right incentives but also setting the wrong ones.

IV. Analysis of Current EMU Measures

The current debt crisis within the EMU has led to a bundle of stabilization activities to lower the interest rate spreads of GIPS countries (Greece, Ireland, Portugal and Spain). The European Council agreed upon a comprehensive package of measures in March 2011 which consists of 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)).[17] In the present section, we will analyze whether the current incentive structure within the EMU enables a sustainable fiscal policy of the member countries and will lead to earlier structural reforms and an improved debt discipline. From an allocative point of view differentiated interest rates (in a monetary union)

[15] A potential pricing model could be as follows: Suppose that the performance index p can be described by a geometric Brownian motion. The idea is to price PSGB as a derivative (perpetual bond) on this index which includes a fixed coupon c and a variable coupon $p \times s$, where s is the respective pricing schedule. Risk-neutral pricing techniques allow for the derivation of a closed-form pricing solution for the price of a performance-sensitive bond using appropriate boundaries for the coupon adjustment threshold and the default threshold. Politicians may influence the drift term of the Brownian motion, which has an impact on the probability of hitting the coupon adjustment threshold or the default threshold.

[16] An overview of different pricing models for inflation-linked bonds can be found in *Krüger* et al. (2009).

[17] All of these measures are subject to discussions and 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.

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 debitors and creditors. In the following, we will show that these allocative effects are rather weak in the short-run and should be strengthened and speeded up.

Several measures of the EMU against the sovereign debt crisis will be discussed. We will assess whether they set the right incentives by differentiating interest rates. Some of these measures (e.g., ESM) are meant as emergency steps to calm down financial markets. But their allocative effects must not be forgotten, all the more if they will be in force in the long-term.

The well-intentioned SGP failed because sanctions were never imposed. The no-bail-out clause was never regarded as binding and therefore did not result in the required spreads (*Gros/Mayer* (2011), *Feldstein* (2005)). 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. Nevertheless, governments 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. At first sight, the recent intergovernmental agreement on a fiscal compact of December 2011 is much tighter than all former versions of the SGP. But, even a constitutional law can be altered and sanctions between EMU member countries are always a political decision.

The characteristics of the ESM do not look any more promising. The conditions of the mechanism do not differentiate between debitors according to their default risk (*European Council* (2011)). 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 debitors for these securities. In recent contributions a differentiation between debitors or at least debt levels is considered (e.g., *Brunnermeier* et al. (2011), *De*

Grauwe (2011) and *Delpla/von Weizsäcker* (2010)). However, all 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.

Table 2

Implications of Current Measures and PSGB

Measure	*Implications*
SGP	▶ Sanctions never imposed and no-bail-out clause disregarded ▶ No differentiation of interest rates before the crisis ▶ No immediate effect on coupon payments of existing debt ▶ No disciplining effect on the budget before the crisis
ESM	▶ Calms down financial markets in the short-run ▶ No differentiation of coupon payments for debitors covered ▶ No immediate effect on coupon payments of existing debt ▶ No obvious disciplining effect on the budget
Eurobonds	▶ No or only limited differentiation of coupon payments ▶ No immediate effect on coupon payments of existing debt ▶ No obvious disciplining effect on the budget
PSGB	▶ Immediate effect on coupon payments of existing debt ▶ Available budgets are significantly reduced if threshold is hit ▶ A strong disciplining effect on the budget can be expected

Let us highlight the implications of different measures (i.e., SGP, ESM, Eurobonds, and PSGB) on the current budget discipline (see Table 2). The intention of the SGP in 1996 was a limitation of relative debt levels (i.e., debt-to-GDP ≤ 60 %) in order to differentiate budget effective cost due to country specific default risks. But this did not come true since the no-bail-out clause was disregarded. On the contrary, since no differentiation took place before the crisis, much more debt was issued even at lower coupon payments. Thus, the SGP did not impose any budget discipline, at least before 2008. With an intended limitation on coupon rates of rolled-over and newly issued debt the ESM is virtually not able to impose budget discipline as well. Current and future budget relevant coupon payments of debitors covered by the ESM are limited at politically deter-

mined levels. Therefore, the ESM implies no serious incentives for policy makers to restructure the economy in the short-run. Similarly, Eurobonds reduce current and future budget relevant coupon payments at least for weak sovereign debitors. Short-term orientated policy makers have again no serious incentives to change anything.

In contrast to all three measures above, our proposed PSGB may have a considerable impact on current and future budgets since coupon payments are immediately adjusted for the outstanding PSGB, given a certain threshold is hit. Thus, politicians must keep these potential budget relevant payments on the agenda. Since current policy makers could be held responsible for such adverse outcomes they have an incentive to take appropriate measures in order to avoid a substantial shrink of the available budget (after coupon payments).

To sum up, current measures taken (SGP and ESM) or proposed (Eurobonds) do not provide strong incentives, if any, for a long-term orientated debt policy. Some of them may even set worse incentives and increase the moral hazard problem. In contrast, PSGB would set incentives towards a more sustainable debt policy. The proposed bonds would strengthen the incentives to consolidate the budget in due time and therefore reduce debt levels.

V. Summary and Conclusion

In this paper we propose an innovative instrument of sovereign debt financing: Performance-sensitive government bonds (PSGB). Their main characteristic is that coupon payments are linked to debt policy. The discussion has shown that this new instrument could create important incentives for politicians and governments. We expect that PSGB will result in the limitation of a country's indebtedness and an early and sustainable restructuring of the economy. In addition, the issuance of PSGB will build up a country's long-term reputation which will lead to lower financing costs.

We discuss why the current debt policy is lacking important incentives or – in some cases – even gives wrong incentives. Differentiated interest rates are important for an efficient allocation of capital. PSGB, however, could additionally strengthen and speed up consequences. Whilst a rising interest rate spread only has an effect on new or rolled-over debt, PSGB influence all debt outstanding, leveraging the consequences of policy decisions on governments and 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 could make sense since it presumably lowers the average financing costs in reducing the long-term default risk premium and therefore eases budget constraints.

Finally, an analysis of incentive structures within the EMU shows that current emergency measures to stabilize financial markets yield wrong incentives, especially in the long-run. We are confident in saying that PSGB are a promising new debt instrument which would change inefficient structures towards more sustainability.

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