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Conference Paper

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Beiträge zur Jahrestagung des Vereins für Socialpolitik 2010: Ökonomie der Familie - Session: Economic Policy in the EMU, No. F16-V3

Provided in Cooperation with:
Verein für Socialpolitik / German Economic Association

Suggested Citation: Sieg, Gernot; Stegemann, Ulrike (2010) : Strategic debt management within a Revised Stability and Growth Pact, Beiträge zur Jahrestagung des Vereins für Socialpolitik 2010: Ökonomie der Familie - Session: Economic Policy in the EMU, No. F16-V3, Verein für Socialpolitik, Frankfurt a. M.

This Version is available at:
https://hdl.handle.net/10419/37399

Strategic Debt Management within a Revised Stability and Growth Pact

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July 22, 2010

Abstract

Opportunistic politicians use the composition of public debt as a signal for competence. A competent government will not issue long-term nominal debt, as optimal to balance the budget, but long-term inflation-indexed debt. We consider politicians that pursue the objective of a balanced budget subject to the Stability and Growth Pact and reelection. A government's competence is reflected by its ability to produce a public service at a lower cost (taxes). Competence is private information of politicians.

Keywords: Political Budget Cycle; Debt Management; Inflation-indexed Bonds; Stability and Growth Pact

JEL: D72, H63, E32

1 Introduction

Opportunistic politicians can use debt management to credibly reveal their competence. By deviating from the debt structure that minimizes budgetary risks, a politician signals that he or she is able to produce a public output at a lower cost. This paper identifies debt management as a policy to signal competence and therefore complements various approaches, which state that opportunistic politicians may

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use fiscal and monetary policy instruments as a competence signal to attract votes. As pointed out in the studies by Nordhaus (1975) or Persson and Tabellini (1990), opportunistic politicians attract votes by exploiting a Phillips curve. Sieg (2006) shows, that both, left wing and right wing governments with partisan goals signal opportunistically their high competence through an expansionary monetary policy. An increased money supply induces inflation, which stimulates the economy and reduces unemployment. There is not much empirical evidence for an opportunistic monetary cycle. Berger and Woitek (1997) reject empirically such an opportunistic cycle for Germany during 1950 - 1989, and Leertouwer and Maier (2001) find no evidence of cyclical behavior in the short-term interest rate in their panel model for 14 OECD countries. In the European Union (EU), politicians are not empowered to use monetary policy instruments, because this policy is delegated to the independent European Central Bank. The independence of a central bank could be the reason why Wallace and Warner (1984) and Tempelman (2007) provide evidence that the Federal Reserve does not stimulate the economy before a presidential election, even if politicians try to persuade the central banker. However, a political business cycle can arise if an independent central bank has party preferences (Sieg 1997). Evidence for a political monetary cycle is found by Abrams and Iossifov (2006) for the U.S. and Ferris (2008) for Canada, if the government and the Central bank decision maker share the same party affiliation. To sum it up, it could be difficult for governments to use monetary policy as a strategic instrument if the central bank is independent. At least, if the central bank decision maker does not share the government's party preferences, a different channel to signal competence is required.

A second branch of political business cycle theory deals with fiscal policy as a competence signal. Rogoff and Sibert (1988) show that a government can use expansive fiscal policy to signal high competence in budget administration. The deficit is financed by seignorage and the politicians' competence can only be observed ex post. Rogoff (1990) augments this approach by assuming that there are only lump-sum taxes and that the government can call for an early election. Drazen and Limão (2008) find that in a representative democracy a politician chooses an inefficient policy transfer to become elected. However, in reality voters are aware that a reduction in the tax level or a transfer payment before an election may not be permanent, because after being reelected a government is able to raise the tax level again or to cut transfers. Brender and Drazen (2005) give empirical evidence for this thesis and show, that political budget cycles with increased government spendings in election years mainly appear in new democracies, because voters have

little or no experiences with political and economic decisions of politicians. The effect diminishes in established countries.[1] Shi and Svensson (2006) confirm that budget cycles are larger in developing than in developed countries, because strong institutional settings in developed countries restrict the fiscal scope. Akhmedov and Zhuravskaya (2004) discover that the altitude of budget cycles decreases with the level of transparency, i.e., with the level of independence of regional media and the transparency of regional governments. Although no party is bound to its tax announcements, politicians lose their reputation if they repeatedly fail to execute their promises. However, voters are not always able to completely detect the real background of fiscal policy decisions. Politicians can exploit this lack of information by campaigning with a promise of decreasing the tax rate to signal high competence. After the election, they purport nonobservable budget-related reasons, such as higher health-care or national defense costs, and do not change the tax rate. In this scenario, voters cannot ascertain a politician's competence.

To sum it up, neither monetary nor fiscal policy are an entirely convincing medium to gain votes. The following model shows that instead of monetary or fiscal policy an opportunistic government can use debt management to increase its reelection probability. The US presidential elections in 1996 give an example. Before elections, the administration under President Clinton announced a new government bond, an inflation indexed bond with a maturity of 10 years. While the US Treasury declared that the inflation indexed bonds would be an appropriate instrument to increase saving incentives and to support the Federal Reserve in estimating inflation expectations, media and also Republicans presumed that the issuance of inflation indexed bonds would be an election year trick to win votes.

In the same way, EU member states could gain votes by issuing indexed bonds for strategic reasons. Every EU member state is free to modify currency, basis of indexation and maturity of government bonds and therefore possesses a flexible signaling instrument. Because once the bonds are issued, they are normally not bought back, public debt structure satisfies the property of being an irreversible and therefore credible policy. In nonelection years, the government chooses a debt composition that reduces budgetary risks, as proposed by Missale (2001) and Missale et al. (2002). European states that adopted the Euro committed themselves to the medium-term objective of either maintaining a balanced government budget or reaching a budget surplus. If the threshold is missed, a state can be punished by sanctions and fines, as the Stability and Growth Pact constitutes. An appropriate

[1] See, however, Grier (2008), for a different view.

maturity and indexation of government bonds enhances the absorption of shocks in government revenues or of the uncertainty in interest rates.

In recent years, the threat of financial sanctions by the EU Council has lost credibility. For example, a member state does not have to fear the Excessive Deficit Procedure if its deficit appears temporary and exceptional and is near to the threshold. In cases of a natural disaster or a great economic crisis, the Excessive Deficit Procedure is not instituted either. As a consequence, in 2009 public debt to GDP ratios in 11 EU member states exceeded the given convergence criterion of 60%. In the same year, 20 EU member states missed the deficit target of 3% of GDP. Furthermore, even though Greece has systematically not fulfilled the criteria, no sanctions had been implemented. One reason for this may be that sanctions are not automatically imposed, but are a result of a political decision process in which non-complying countries also participate.

In order to restrict the increasing debt to GDP ratios and the excessive deficits, the European Union finance ministers now strive for more severe sanctions against countries that break EU budget rules. The German Federal Government suggests to implement automatic rules for cutting or canceling payments out of the EU structural funds to non-complying countries. Furthermore, it is recommended that countries that grossly violate the convergence criteria should lose their voting rights in the EU Council. A government that loses its right to vote in the EU Council will also lose voter confidence. The public may doubt the government's economic skills. This loss of trust may result in economic costs like a drop in consumption and growth. Furthermore, in some member states, national law determines the deficit. In Germany for example, the parliament has constituted a so called "debt brake", i.e., an annual structural budget deficit limit of 0.35% of GDP. If the German government misses the deficit limit, the budget will be unconstitutional, resulting in severe sanctions.

In the following model, the approach of Missale et al. (2002) has been adopted. The government is bound to a given budget rule and faces an unknown financial requirement. It has to choose a tax level and a debt structure most suitable for absorbing shocks from the budget. Politicians differ in their competence levels. A competent politician is able to provide a publicly produced good at a lower cost than an incompetent politician and therefore faces a lower financial requirement. Because no commitment for election pledges such as the tax level is available, voters are not able to identify the government's competence. Politicians are opportunistic and try to attract votes by deviating from the optimal debt structure. In the separating

equilibrium, a competent government issues not only nominal bonds, as optimal to the budget, but also inflation-indexed bonds. Only competent politicians are able to absorb the resulting higher budgetary risks. Because indexed bonds mature after the election, they serve as a credible and irreversible signal of competence.[2]

2 The model

The voters' objective is to reach a budget target that is part of a multi-year stabilization program or part of the European Stability and Growth Pact of the EU and to avoid distortionary taxation. If the government exceeds the deficit target, it faces a penalty K, which reflects reduced payments out of the EU structural fonds or the loss of the voting rights in the EU Council. Similar to Missale et al. (2002), voters' preferences are represented by a loss function

$$L = \theta K + \frac{1}{2}T^2, \tag{1}$$

where θ is a dummy variable that equals 1 if the deficit exceeds the given deficit limit and zero if the deficit limit holds.[3] High government spending might lead to an excessive deficit: If public costs are high and a government expects to be punished with a fine, it will minimize distortionary taxation by financing the budget through borrowing instead of raising taxes. The deadweight loss of taxation is approximated by a quadratic term in taxes T. Low taxes lead to a low budget. Nevertheless, if the government's budget is low, the government might exceed the deficit limit. Hence, there is a trade-off between taxes and the costs of missing the deficit target.

Two parties constitute the political class: the administration A and the opposition O. No distinction is established between politicians and their parties. Both parties have the same preferences as voters. A party in office additionally earns an ego rent $R > 0$ that arises from the tenure of governance power. Therefore, the

[2]Even if the government is able to buy back bonds, issuing inflation-indexed bonds is a credible signal because signaling costs are sunk. Unexpected variations in interest rates change the market price the government has to pay in period 2.

[3]The fixed costs result in a relatively hard punishment of a small deviation from the deficit target. This is a consequence of automatically imposed fixed fines. However, the German government suggests an independent monitoring of EU member states households by a third party like independent research institutes as part of a revised Stability and Growth Pact. As a result, sanctions like the reduction or cancellation of EU means will be imposed earlier and will turn out more severe.

parties' loss function is represented by the following equation:

$$L^j = \theta K + \frac{1}{2}T^2 - \gamma R \quad \text{with} \quad j = A, O. \tag{2}$$

The dummy variable γ equals 1 if the party is in office and it equals zero if the party represents the opposition.

The government provides an exogenous specified level of public output $\bar{G}$. The cost C of the public output depends on the level of the output $\bar{G}$, the macroeconomic shock X and the politician's competence ϵ to produce the output: $C = C(\bar{G}, X, \epsilon)$.

For example, the public output could be a transfer payment to the unemployed. The value of an individual payment is fixed by law. Therefore, the government would have to spend fixed aggregated payments $\bar{G}$. But government costs depend on the competence value ϵ of politicians to produce the public output. For example, a competent government with $\epsilon > 0$ organizes an employment agency to place workers quickly and therefore is able to cut total costs to $(1 - \epsilon)\bar{G}$.

A party's competence depends on the abilities of politicians to react on economic problems. The environment changes permanently, and each party has special abilities to react to different economic problems. Furthermore, political participants can change within the party, and these participants may have different abilities to solve economic and political problems. But economic challenges change slowly and only few offices within the party are reoccupied over time. Therefore, the competence ϵ depends on the change of competence of the previous period and a random term. It follows a moving average process of first order:

$$e_t^j = \mu_t^j + \mu_{t-1}^j. \tag{3}$$

Let μ_t be a random variable of a Bernoulli distribution:

$$\mu_0 = 0 \quad \text{and} \quad \mu_t = \begin{cases} \bar{\mu} > 0 & \text{with} \quad P(\mu_t = \bar{\mu}) = \lambda \\ \underline{\mu} < 0 & \text{with} \quad P(\mu_t = \underline{\mu}) = (1 - \lambda). \end{cases} \tag{4}$$

The expected change of competence is zero:

$$E_{t-1}(\mu_t) = \lambda\bar{\mu} + (1 - \lambda)\underline{\mu} = 0; \tag{5}$$

and competence is too small to convert costs into benefits, i.e. $\epsilon_t < 1$. A party shall be described as competent if $\epsilon_t > 0$ and as incompetent if $\epsilon_t < 0$. The actual competence is private information of the politician. Voters cannot directly observe a party's competence, but are aware of the parameters given by the moving average process. Consequently, voters can estimate a party's postelection competence

if a party signals its actual competence and by estimating the change in competence. Because the expected change in competence is zero, the expected second period competence of a competent government is higher than of an incompetent government.

Furthermore, the aggregated payments C depend on a macroeconomic shock X. Picking up the example, a negative shock, defined as $X > 0$, increases the number of unemployed people. Because the shock occurs at the end of period 2, the government has no opportunity to cut these additional costs. Consequently, government expenditures increase by X. The macroeconomic shock X follows a Simpson distribution, with mean zero, $EX = 0$, and a support $[-a, a]$.[4] The symmetric Simpson distribution assures, that shocks of larger sizes occur less frequently than shocks of smaller sizes, and that positive and negative shocks of the same size occur with the same probability. In these two points the Simpson distribution does not differ from a normal distribution. However, the Simpson distribution is used because in comparison to a normal distribution it simplifies the calculation without effecting the outcomes of the signaling game. To sum it up, the government offers the public output at a cost of $C = (1 - \epsilon_t^A)\bar{G} + X$.

The government inherits an exogenous amount of debt which is normalized to 1 and which has to be refinanced. Furthermore, the government is able to incur new debt by issuing government bonds. The total of interest payments is labeled with I. Therefore, the government's budget constraint can be represented as

$$D + T = C + I = (1 - \epsilon_t^A)\bar{G} + X + I, \tag{6}$$

where D notes the deficit.

The government chooses between nominal and inflation-indexed bonds. Both types of bonds mature after two periods. In such a case, considering single-period nominal bonds as an additional type would not change the results of the model. Choosing a single-period bond in the first period and refinancing it through a single-period bond in the second period necessitates the same interest payments as an inflation-indexed bond.

Investors are generally assumed as risk-neutral. They do not demand a risk premium for insecure bonds and have rational expectations. The constant real interest rate r of both periods is common knowledge. There is no inflation in the

[4] If the macroeconomic shock follows a uniform distribution, the maturity of debt is irrelevant and the model yields no feasible results. But a uniform distribution is not an adequate distribution to model the macroeconomic shock, because extreme shocks would occur with the same probability as small shocks.

first period. Because bonds do not differ in the interest payments of the preelection period, the real interest rate of the first period is set equal to zero. In the second period, interest payments on the different debt instruments have to be paid as follows: At the time of issuance, neither the government nor the investors are aware of the ensuing inflation. The interest payments on nominal bonds are derived from the expected nominal interest rate for period 2, Ei_2. In addition to the real interest payments r, investors who hold inflation-indexed bonds obtain a compensation for inflation which equals the prevailing inflation π_2.

The timing of events is divided into two periods. The government is in office for one period. Subsequently, an election takes place. At the beginning of the preelection period, the government inherits an exogenous amount of public debt that has to be rolled over. Therefore, the government has to determine the relative amounts of different debt instruments. Then it issues the bonds and clears the inherited debt. In period 2, transfer and interest payments have to be paid. After taxes are raised, the macroeconomic shock X occurs and the deficit is realized. This is consistent with the problem that the concrete costs of an economic shock and also the concrete amount of tax revenues cannot be rated instantly, but are normally determined in the following year. A government is not able to adjust tax levels precisely to economic shocks. Furthermore, changes in legislation are accompanied with political discussions and agreements through political institutions, which takes time. The sequence of events is as follows:

Preelection period $(t = 1)$

stage 1: Private investors form their expectations on the period-2 interest rate, Ei_2.

stage 2: The government decides the composition of debt and then issues the bonds and clears the inherited debt.

stage 3: The election takes place.

Postelection period $(t = 2)$

stage 1: The government levies taxes T^*, settles transfer payments $(1 - \epsilon_t^A)\bar{G}$ and pays the interests I.

stage 2: The random macroeconomic shock X occurs, and the budget deficit is realized.

stage 3: If the deficit exceeds the specified deficit limit, a penalty K has to be paid.

3 Complete information

Informational asymmetries lead to welfare losses. To calculate these losses, it is helpful to first analyze the case of complete information. In this case, voters are informed about the competence of both parties. As voters prefer the competent party and voters are aware of the current government's competency, they reelect the government with reelection probability $\rho = 1$ if and only if the government is competent. A government cannot manipulate voting decisions. Therefore, it aims to minimize its expected loss by choosing taxes T and the composition of public debt, but does not consider the reelection probability or ego rents. The decisions of the model come about sequentially; thus, the optimization problem can be solved backwards in two stages. First, the taxes are determined. Then, the amounts of the different types of bonds that minimize the expected loss are chosen.

Whether a government exceeds the deficit limit or not obviously depends on the value of its spending, more precisely, on the macroeconomic shock X. For the purpose of simplification, the exogenous deficit limit is assumed as zero.[5] The probability p that the public deficit exceeds the specified deficit limit corresponds to $p = P(D > 0)$ or

$$p = P(X > T - (1 - \epsilon_t^A)\bar{G} - I). \tag{7}$$

The government misses its target of deficit stabilization exclusively in case of a negative macroeconomic shock. Therefore, only the right-hand side of the Simpson distribution of X will be considered here to derive the probability p.

In accordance with the Fisher Equation, the actual period-2 interest rate equals the sum of the real interest rate and actual inflation, $i_2 = r + \pi_2$. We assume that there exists an independent central bank that aims to maintain the inflation to a specified level, the target inflation rate $\bar{\pi}$, over time. This assumption is adequate to model the policy of an independent central bank that only aims to reach price stability like the European Central Bank.[6] It is assumed that the central bank doesn't reach the inflation target every period, but makes a stochastic error ψ with $E\psi = 0$. In case of an independent central bank, it is impossible to predict whether the inflation target will be overshoot or undershoot and how much the deviation will be, even if the altitude and sign of the macroeconomic shock are known. The

[5] Introducing a positive deficit limit would not change the results of the model.

[6] In a model including a central bank like the Fed that has in addition the target of high employment, the inflation target should depend on the macroeconomic shock, $\bar{\pi} = \bar{\pi}(X)$.

second period inflation equals:

$$\pi_2 = \pi_2(u) = \bar{\pi} + \psi, \quad \text{with} \quad E\psi = 0, \quad E\psi^2 = \sigma^2. \tag{8}$$

Because inflation is exogenous, the central bank is not a player in this model. Let m be the share of inflation-indexed bonds in public debt. Because the issuance volume is standardized to one, the second-period interest payments, I, are obtained by

$$I = m(r + \pi_2) + (1 - m)(r + E\pi_2). \tag{9}$$

Substituting the interest payments and the probability of missing the deficit threshold into the government's loss, the government minimizes

$$EL^A = \frac{K}{2a^2} E(a + (1 - \epsilon_t^A)\bar{G} + m(r + \pi_2) + (1 - m)(r + E\pi_2) - T)^2 + \frac{1}{2}T^2 - \gamma R. \tag{10}$$

Voters seek to minimize their loss. The level of taxes and the debt composition are chosen by the government; hence, voters can merely vote for the party that incurs the lowest loss in the second period.

Proposition 1. *In the case of complete information the strategies*

$$m^* = 0, \quad T^* = \frac{K}{a^2 + K}(a + (1 - \epsilon_t^A)\bar{G} + r + \bar{\pi}) \tag{11}$$

of the government and

$$\rho = \begin{cases} 1 & \text{if } \epsilon_1^A > \epsilon_1^O \\ 0 < \rho < 1 & \text{if } \epsilon_1^A = \epsilon_1^O \\ 0 & \text{if } \epsilon_1^A < \epsilon_1^O. \end{cases} \tag{12}$$

of the voters are a perfect equilibrium.

Proof. See Appendix A. □

The government solely issues nominal bonds, whether it is competent or incompetent. This can be explained as follows: A positive stochastic inflation error, $\psi > 0$, increases the expected loss by a higher amount than an equivalent negative error would lower it. The risk of an excessive deficit limit is minimized by eliminating any inflation uncertainty in relation to the budget, because interest payments on nominal bonds are based on the expected interest rate and are thus independent from stochastic errors.

The government's equilibrium strategies also minimize the voters' loss. There is no *ex ante* inefficiency in the equilibrium with complete information. However, the

results may be *ex post* inefficient, because competences change in the second period. It is possible that the incumbent is less competent than the opposition. In such a case, it produces the public good at a higher cost and therefore has to levy higher taxes, with the result that the losses of both the government and voters are higher in comparison to the incumbency of the opposition.

4 Asymmetric information

In reality, however, voters do not have perfect information about the competence of the government. Therefore, governments use policy to signal competence. In the present model, two policies may act as a signal: taxes and/or the debt structure. However, even if a government fixes the taxes in the preelection period, these taxes are not binding. A new or even the reelected government is able to change them.

If the government is not opportunistic, i.e., if ego rents are sufficiently low, then an incompetent government prefers to be voted out of office.[7] The incompetent government reveals its incompetence by not campaigning for reelection. Thus, only competent governments are reelected. Because most governments are opportunistically motivated, this case is not realistic.

However, when politicians are opportunistic, taxes are not an option to signal competence. It involves a time-inconsistent policy, because both types of governments announce low taxes, but after the election the government chooses a tax level independently from the announced tax level. Because tax laws are not binding, tax announcements are, in effect, cheap talk.

Therefore, opportunistic politicians use the composition of public debt as a strategic variable. The long-term debt can not be substituted in the second period and therefore serves as an irreversible signal. A competent government can signal its competence by deviating from the optimal debt structure, thus showing that it can absorb higher budgetary risks. However, from an incompetent government's point of view it is also beneficial to become reelected, because the subject of high ego rents is considered. The incompetent government will try to imitate a competent party by similarly deviating from the optimal debt structure, i.e., by issuing inflation-indexed bonds. This signal is costly, because the expected loss rises with the amount of indexed debt. There is a share of indexed bonds of the emission volume, $\tilde{m}$, that an incompetent government refrains from issuing because of its increased public spending. Ego rents from holding office cannot compensate the in-

[7] See appendix B for a formal treatment of this case and the following paragraph.

creased expected loss of higher taxes and the increased probability of exceeding the deficit limit. The incompetent government prefers to be voted out of office. Voters are informed about the level of $\tilde{m}$. They observe an emission of $m \geq \tilde{m}$ inflation-indexed bonds and conclude that the governing party is competent. In theory, it is well-established and logical that a receiver is aware of the separating level of a signal. In practice, the provision of information is costly. However, these costs are diminishing. Especially media institutions fulfill the task of delivering relevant informations to voters. It is thus sufficient that only one institution like a research institute knows the separating level of inflation indexed bonds, if it transmits its knowledge to information delivery services like TV channels or newspapers.

If indexed bonds are issued, voters will recognize that a competent party holds office. From the voters' point of view, the deviation from the optimal debt structure equals sunk costs, because the opposition is also bound to the issuance of indexed debt. There is no binding tax rule. Hence, the elected government holds the possibility of adjusting the tax level to the effective interest payments. Therefore, if the government sends a signal $\tilde{m}$, voters will reelect the government, because it levies the lower expected taxes due to lower expected government expenditures than those of the first-period oppositional party.

Proposition 2. *If ego rents are high, there exists a share of indexed bonds $\tilde{m}$ so that there is a perfect Bayesian Separating Equilibrium with*

$$m = \begin{cases} \tilde{m} = \sqrt{\frac{\frac{2(a^2+K)}{K}R + 2\underline{\mu}\bar{G}(a+\bar{G}+\bar{\pi}+r) - \underline{\mu}^2\bar{G}^2}{\sigma^2}} & \text{if} \quad \epsilon_1^A = \bar{\mu} \\ 0 \quad \text{if} \quad \epsilon_1^A = \underline{\mu} \end{cases}, \tag{13}$$

$$T^* = \frac{K}{a^2+K}((1-\epsilon_t^A)\bar{G} + \tilde{m}(r+\pi_2) + (1-\tilde{m})(r+E\pi_2)) \tag{14}$$

and

$$\rho = \begin{cases} 1 \quad \text{if} \quad \epsilon_1^A = \bar{\mu} \\ 0 \quad \text{if} \quad \epsilon_1^A = \underline{\mu}. \end{cases} \tag{15}$$

Proof. See Appendix C. □

In this separating equilibrium, the incompetent government is always voted out of office, and a competent government is always reelected. But in comparison to the case of complete information, there are *ex ante* inefficiencies, because sending the debt signal entails costs attributable to a higher expected loss. Because $\partial\tilde{m}/\partial R > 0$, inefficiencies increase with an increasing value of government power. The more

attractive a reelection becomes for an incompetent government, the more intensely the competent government has to deviate from the optimal debt structure to signal a high competence.

The signal strength decreases in the exogenous budget components public output, real interest rate and target inflation. Higher costs of borrowing or higher costs of providing the public output result in higher taxes. However, the tax level increases only to some extent of the additional budget burden, because taxes are distortionary and induce a disproportionally high expected loss. Therefore, a part of the increased budget is deficit-financed. In this case, the government is confronted with a higher risk of missing the deficit threshold. If an incompetent government campaigns for reelection, ego rents must therefore compensate a higher expected loss. The share of indexed debt, which signals competence, decreases.

A decrease in the variance of the stochastic inflation error would lead to a stronger competence signal. In fact, the expected inflation and therefore the expected interest payments, do not change. However, taxes are distortional. Therefore, a positive deviation from the inflation target $\psi > 0$ would increase the expected loss by a larger value than a negative deviation $\psi < 0$ would lower it. The deviation from the optimal debt structure becomes less costly. Hence, the signal has to be stronger if an incompetent government shall not imitate a competent one.

If the expected competence of the incompetent government increases, the signal strength has to increase. A higher competence lowers the costs of the public output. The incompetent government meets lower expected taxes and a lower probability to miss the deficit threshold. Therefore, ego rents must compensate a lower loss by distortionary taxation and the expected fine when missing the deficit threshold. The competent government has to increase its efforts to become reelected, because the incompetent government tends to accept higher inefficiencies caused by the nonoptimal debt structure to become reelected.

The effect of the range of the macroeconomic shock on the signal strength is ambiguous. A decreased support of the shock X restricts, for example, the change in the number of unemployed. In this context, the individual transfer payment to the unemployed remains unaffected. But the potential maximum number of unemployed and, therefore, the aggregated potential maximum transfer payments decrease. This would lead to a lower probability of missing the deficit threshold. However, a contrary effect would increase the probability: the government will lower the tax level to reduce the expected loss of distortionary taxation. Therefore, the effect of a lower support of the shock on the expected loss and thus on the signal

strength is undetermined.

5 Conclusions

This model shows that a government is able to signal its high competence by issuing inflation-indexed debt. Inflation-indexed bonds are not issued by a government that minimizes budgetary risks. Using indexed debt, a competent government signals that it is able to absorb higher budgetary risks than an incompetent government without inducing a higher loss in welfare.

In the model, a government is punished if it misses the deficit threshold. Over the past years, the directives of the Stability and Growth Pact had been softened by the EU Council (see Beetsma and Debrun (2005) for a theoretical analysis of the reform of the Stability and Growth Pact). In some exceptional cases like a natural disaster or a great economic crisis, the Excessive Deficit Procedure is not instituted. In this model, a lenient punishment for an excessive deficit limit encourages the government to finance the budget by deficit. The loss of distortionary taxation decreases strongly relative to the expected costs of exceeding the deficit threshold. Hence, the share of indexed debt to signal a high competence has to increase. If there is no punishment for an excessive deficit at all, an incompetent government prefers to stay in office, even if the politicians are little opportunistic. This is because the competence of the government has no effect on the expected loss. The budget is financed by borrowing. In this case, there is no possibility for a competent government to signal its competence by debt management. However, a pure financing by borrowing without any taxation is herein excluded. In many member states, deficit is already determined by national law. Furthermore, EU member states intent to set up severe and automatic sanctions that will restrict public budgets in the future.

The choice of a debt structure is an appropriate competence signal for various reasons. First, every EU government is authorized to choose the currency, maturity, and basis of indexation of government bonds independently. New bonds can be issued flexibly and close to elections. Second, a government is bound to the debt structure during the bond maturity. Because the government is not able to reoptimize the debt structure immediately after the election, it can credibly commit its competence to the voters. Furthermore, especially inflation-indexed bonds are a convenient instrument to signal competence. In EU member states, such as Germany, inflation-indexed bonds constitute a relatively new class of government bonds and, therefore, are increasingly noticed by the media or the constituency.

Appendix

A Proof of proposition 1

The optimal tax level that minimizes (10) equals

$$T^* = \frac{K}{a^2 + K}(a + (1 - \epsilon_t^A)\bar{G} + m(r + \pi_2) + (1 - m)(r + E\pi_2)). \tag{16}$$

Then, the government's expected loss can be rewritten as

$$EL^A_{T^*}(m, \epsilon, \gamma) = E\frac{K}{2(a^2 + K)}\left[a + (1 - \epsilon_t^A)\bar{G} + m(r + \pi_2) + (1 - m)(r + E\pi_2)\right]^2 - \gamma R. \tag{17}$$

The derivative of the expected loss with reference to the maturity m leads to $m^* = 0$. The optimal tax level in period 2 will therefore be

$$T^* = \frac{K}{a^2 + K}(a + (1 - \epsilon_t^A)\bar{G} + r + \bar{\pi}). \tag{18}$$

The government's optimal tax level and the optimal debt structure are independent of ego rents. Hence, the optimal policies T^* and m^* coincide with the voters' optimal tax level and debt structure. The voters' expected loss increases with decreasing competence, $\partial EL_{T^*}/\partial\epsilon < 0$. The expected change in competence is zero; hence, the reelection probability equals

$$\rho = \begin{cases} 1 & \text{if } \epsilon_1^A > \epsilon_1^O \\ 0 < \rho < 1 & \text{if } \epsilon_1^A = \epsilon_1^O \\ 0 & \text{if } \epsilon_1^A < \epsilon_1^O. \end{cases} \tag{19}$$

B Nonopportunistic politicians

At the beginning of the second period, the government optimally levies taxes $T^* = \frac{K}{a^2+K}(a + (1-\epsilon_t^A)\bar{G} + m(r+\pi_2) + (1-m)(r+E_1\pi_2))$. Defining

$$T^l = \frac{K}{a^2+K}(a + (1-\bar{\mu})\bar{G} + r + \bar{\pi}), \tag{20}$$

$$T^h = \frac{K}{a^2+K}(a + (1-\underline{\mu})\bar{G} + r + \bar{\pi}) \tag{21}$$

and

$$\bar{R} = \frac{K}{2(a^2+K)}\underline{\mu}\bar{G}\left[\underline{\mu}\bar{G} - 2(a + \bar{G} + r + \bar{\pi})\right]. \tag{22}$$

It is assumed that a government does not campaign for reelection if it is indifferent between reelection and deselection. If $R \leq \bar{R}$, an incompetent government prefers to be voted out of office, because

$$EL^A_{T^*}(E\epsilon_2^A = \underline{\mu}, \gamma = 1) \geq EL^A_{T^*}(E\epsilon_2^O = 0, \gamma = 0) \forall m. \tag{23}$$

A competent government prefers to become reelected, because

$$EL^A_{T^*}(E\epsilon_2^A = \bar{\mu}, \gamma = 1) < EL^A_{T^*}(E\epsilon_2^O = 0, \gamma = 0) \forall m. \tag{24}$$

Because $\partial EL_{T^*}/\partial\epsilon < 0$, voters would reelect a competent government and vote an incompetent government out of office. Subsequently, an incompetent government announces T^h, a competent government announces T^l. The reelection probability equals

$$\rho = \begin{cases} 1 & \text{if} \quad \epsilon_1^A = \bar{\mu} \\ 0 & \text{if} \quad \epsilon_1^A = \underline{\mu}. \end{cases} \tag{25}$$

If $R > \bar{R}$, both types of government aspire to become reelected, because

$$EL^A_{T^*}(E\epsilon_2^A \in \left\{\bar{\mu}, \underline{\mu}\right\}, \gamma = 1) < EL^A_{T^*}(E\epsilon_2^O = 0, \gamma = 0) \forall m. \tag{26}$$

Voters prefer competence to incompetence. Therefore, both government types pose as competent and announce low taxes T^l. The voters are not able to distinguish between a competent and an incompetent government. Thus, the reelection probability ρ is indefinite.

In both cases, a government reoptimizes the tax level in the second period and will therefore choose taxes that minimize its loss,

$$T^* = \frac{K}{a^2+K}(a + (1-\epsilon_2^A)\bar{G} + I). \tag{27}$$

Substituting the tax level into the expected loss recursively leads to the optimal debt structure $m^* = 0$.

C Proof of proposition 2

If $R \leq \bar{R}$ holds and if nonoptimal debt serves as a competence signal, an incompetent government is not willing to issue the share of $\tilde{m}$ indexed bonds and prefers to be voted out of office if

$$EL^A_{T^*}(m \geq \tilde{m}, E\epsilon^A_2 = \underline{\mu}, \gamma = 1) \geq EL^A_{T^*}(m = 0, E\epsilon^O_2 = 0, \gamma = 0). \tag{28}$$

Therefore, a competent government party must issue indexed bonds for the amount of

$$m \geq \tilde{m} = \sqrt{\frac{\frac{2(a^2+K)}{K}R + 2\underline{\mu}\bar{G}(a + \bar{G} + \bar{\pi} + r) - \underline{\mu}^2\bar{G}^2}{\sigma^2}} \tag{29}$$

to signal its competence. A competent government will exactly issue the share $\tilde{m}$ of indexed bonds to signal its type, because the expected loss increases with m.

Voters will reelect a competent government party, because

$$EL_{T^*}(m = \tilde{m}, E\epsilon^A_2 = \bar{\mu}) < EL_{T^*}(m = \tilde{m}, E\epsilon^O_2 = 0). \tag{30}$$

Voters will vote an incompetent government out of office, because

$$EL_{T^*}(m = 0, E\epsilon^A_2 = \underline{\mu}) > EL_{T^*}(m = 0, E\epsilon^O_2 = 0). \tag{31}$$

The reelection probability equals

$$\rho = \begin{cases} 1 & \text{if} \quad m = \tilde{m} \\ 0 & \text{if} \quad m = 0. \end{cases} \tag{32}$$

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