A Common Pool Theory of Deficit Bias Correction

Signe Krogstrup   Charles Wyplosz

Graduate Institute of International Studies, Geneva

May 2, 2006

Abstract

This paper examines various policies to contain the budget deficit bias. The deficit bias is modeled as the result of common pool problems on the domestic and the international levels in a two period two country model which allows for productive government spending as well as non-productive government transfers. The resulting framework allows us to analyze and welfare rank alternative policy proposals including Pigouvian taxes, delegation, debt ceilings and golden rules, and to talk about the credibility of fiscal rules.

1   Introduction

Public debts have doubled on the average in the OECD area over the past three decades. This is unprecedented in peace time. One interpretation is the widespread adoption of the Keynesian view that fiscal policy can and should be used to smooth business cycles. This cannot be the whole story, however, for deficits used during the low phase of the cycle could and should be compensated for by surpluses during the high phase. Of course, policy mistakes are possible and some surpluses may not fully make up for all deficits, but genuine mistakes ought to be random and approximately cancel over time. The debt buildup all but rules out this interpretation. In fact, recent work (Fatás and Mihov, 2002, Galí and Perotti, 2003, Wyplosz, 2006) have shown that fiscal policies have not even been countercyclical in Europe. The interpretation must be based on the emergence of a deficit bias in industrial democracies.

Rising public debt levels explain why fiscal rules have been adopted recently in a number of countries, in addition to many US States. Chile and Brazil have adopted formal deficit targets. The UK has put in place a more informal Code for Fiscal Stability and Belgium has established a High Council of Finance. Denmark and the Netherlands have set up wisepersons's committees that inform the general public of their views on debts and deficits. Perhaps the most prominent rule is the adoption in the European Union of the Stability

and Growth Pact, which aims at limiting budget deficits and prescribes budgets that are "near balance or in surplus over the cycle".

There are obvious analogies to the monetary policy debate. Over the 1960s and 1970s, monetary policy, the other Keynesian counter-cyclical tool, also seemed to be generating ever rising inflation and a persistent "inflation bias". This has led to the widespread view that monetary policy should foreswear discretion and be bound by rules. The reason for that prescription was that central banks do not share with the public at large the same preferences over output and inflation views, opening out the door to eventually self-defeating inflation surprises. Wherever such rules have been adopted, low inflation rates have subsequently been achieved. The monetary policy debate has been greatly aided by the powerful analytical framework of Kydland and Prescott (1977) and Barro and Gordon (1980), which has allowed the developments and welfare comparison of policies such as Rogoff's (1985) conservative central banker or optimal inflation contracts as proposed by Walsh (1995).

In contrast with monetary rules, however, the case for budget rules has only started to be articulated. To start with, we need a theory of deficit biases. Two main theories have been developed. Alesina and Tabellini (1990) show that the bias can result from election uncertainty.[1] Finance ministers that have a preference for certain public goods - or whose electors favor certain type of public goods - have an incentive to use their time in power to produce these goods and to build up the public debt so as to constrain successive Finance Ministers that prefer other types of public goods. The other interpretation, advanced by Velasco (1999, 2000), describes deficits as the result of a common pool problem. Interest groups compete for preferred public goods but fail to internalize the common budget constraint; a weak Finance Minister gives in to their demands, which results in a deficit bias.

Political-economic interpretations of the deficit bias among OECD countries have been documented in a large number of papers (see e.g. Alesina and Perroti 1995; Roubini and Sachs, 1989; von Hagen 1992; von Hagen and Harden, 1994). The evidence supports the general view that the deficit bias is, to a large extent, related to political conflicts. Political instability, fragmentation, weak power of the Finance Minister are typically found to play an important role. The presence of a deficit bias calls for corrective policies or institutions. Von Hagen (1992) and Von Hagen and Harden (1994) presents convincing evidence that granting more power to the Finance Minister reduces the bias. Our theory confirms this important observation.

In principle, the deficit bias ought to be addressed where it arises, namely at the national level. Still, there remains the question of whether corrective policies or institutions could be delegated to an external agent. Europe's Stability and Growth Pact is a prime example of such delegation. IMF programmes provide another one. When is such a delegation desirable, and what form it should take, also needs to be examined. One justification is that domestic political institutions are too weak to be adequately adapted. Another justification is

---

[1] An excellent survey is Persson and Tabellini (2000), Chapter 9.

that one country's deficit may harm other countries. In that view, an external agent of restraint is needed to internalize the externality.

It is necessary, therefore, to characterize the international externality as well. The debate around the Stability and Growth Pact, for example, has identified different channels.[2] One channel is the interest rate. The assertion is that one country's deficit raises the interest rate and therefore the cost of debt service throughout the euro area. There is no empirical support for that channel. Or the prospect of a sharply contractionary fiscal policy leads an imperfectly independent central bank to raise the inflation rate[3]. Another channel is the threat of debt default by one member country. It is widely feared that should this threat arise, other countries would face an adverse impact on the union as a whole through a depreciation of the exchange rate or a risk premium that would affect all euro area countries, as the threat of default could be expected to prompt the common central bank to monetize some or all the debt. To eliminate this possibility, the Treaty includes a no-bailout clause. But this clause has not been tested yet and there is widespread concern that somehow, some way would be found to bail out a country in risk of default. In a more general international context, the treat of default could produce an international externality of debt through an IMF intervention, prompted by the fear of international financial instability, with the underlying assumption that the loan will never be fully repaid.

In this paper we adopt the common pool interpretation of deficit biases and we assume the presence of an international externality. We set up a two-period two-country model where each country's budget is partly controlled by interest groups and where each country expects to be able to impose some of the debt service on the other one. As a result, the model creates two common pool problems: the domestic externality arises because interest groups compete on the present value of net transfers received from the Finance Minister; the international externality occurs when each country fails to internalize the fact that part of the cost of holding debt will be assumed by the other country and conversely. While leaving the time inconsistency of preferences argument for the domestic deficit externality out for simplification reasons, the model can easily be extended to include elections and time inconsistency leading to a deficit bias. As shown in Krogstrup (2006), the common pool externality we model below can without modification be interpreted as an externality due to time inconsistency, as long as it is kept in mind that internalization of this externality implies that reelection uncertainty as well as degree of fragmentation are eliminated. With some caution in interpretation, our model and the resulting policy implications hence extend to both types of the deficit bias.

A predecessor of our paper is Von Hagen and Harden (1995) who model the deficit bias as a common pool problem pitting spending ministries against each other. Much as we do, they look at institutional arrangements that reduce the

---

[2] See the papers collected in Brunila, Buti and Franco (2001). See also Giuliodori and Beetsma (2004) for a discussion of the these channels.

[3] Beetsma and Uhlig (1999) model an international externality of debt in a Monetary Union along such lines.

bias and emphasize intra-government arrangements that either give power to the Finance Minister or allow for spending targets. However they do not recognize the intertemporal budget constraints - they treat the debt as a wekfare cost - nor do they allow for an international externality.

A small number of papers have previously dealt with the combination of domestic and international externalities. Beetsma and Uhlig (1999) allow for both a domestic externality in the form of partisan governments with less than 100% probability of reelection and for an international externality, which is brought about by a common currency, as in a federal state or the European monetary union. The international externality arises because the central bank may not be fully independent from governments and therefore driven to balance the need to stabilize inflation against the provision of public goods. As a result, it may accept some inflation when a government, which inherits a high debt level from its predecessor, risks undersupplying public goods. In such a setup, fiscal discipline is not a dominating strategy, which justifies fiscal restraint. Beyond a different formulation of the domestic externality, our paper differs from Beetsma and Uhlig (1999) in several ways. First, we allow for a more general international externality and do not consider monetary policy. Second, they limit their attention to a debt ceiling while we explore many possible solutions; in particular we look at the potential role of domestic and international institutions. Finally, we allow for productive public spending.

Two other closely related papers, Beetsma and Debrun (2004, 2005), also rely on uncertain election prospects to create an inflation bias. They share with our paper the idea that some part of public spending is productive in the sense that it raises future income. As a result, deficit restraints have the indesirable effect of reducing both productive and unproductive spending. They then show how optimal restraints trade-off fiscal discipline against productive spending through a golden-rule type arrangement that displays some tolerance towards productive spending. Blanchard and Giavazzi (2004) reach the same conclusion with the model that assumes that the return from productive public spending is underestimated by standard accounting rules. These papers do not allow for an international externality and limit their analysis to comparing an overall deficit celing to a golden rule that discriminates between productive and unproductive - or less productive - spending. Our paper, instead, not only allows for an international externality but also examines the properties of a golden rule alongside several other policy options, and finds that the golden rule is not the best response to a deficit bias.

Our common pool interpretation of the deficit bias is based on Velasco (2000). One advantage of this two-period model is to focus on deficits, while the previously mentioned papers, also cast in a two period framework, view deficits as the outcome of changes in spending, holding tax revenues constant for no particular reason. Thus we avoid the hidden question of optimal intertemporal tax smoothing. We extend Velasco (2000) in two ways. First we allow for productive public spending in addition to unproductive public good provision. Without productive public spending, the question of what the right deficit ceiling might be is trivially zero. Second we consider two countries and allow for a

general international externality. The resulting framework allows us to conduct a broader analysis of alternative policy proposals, to talk about the credibility of fiscal rules, and to produce a welfare ranking of different policy proposals.

The paper is structured as follows. The next section presents the model and characterizes the socially optimal equilibrium and the Nash solution in the presence of both domestic and international externalities. Section 3 determines the Pigovian taxes that allow for the optimal internalization of both domestic and international externalities. We show that given the two sources of externalities, more than one tax is needed, and the taxes are highly impractical. This leads us to examine the properties of various often-discussed policies. In Section 4 we look at the institutional approach whereby deficits are delegated to a national social planner, which can be either the Finance Minister or an independent fiscal council. In Section 5, we examine the properties of deficit ceilings or budget rules. The properties of such rules heavily depend on their credibility. Golden rules are studied in Section 6. The final section concludes.

2 The Deficit Bias as a Common Pool Problem

2.1 The Model

We view the deficit bias as the result of two externalities, which we model as a common pool problem. The common pool is the income that can be used to pay for transfers to interest groups. The domestic externality arises when domestic interest groups seek to redistribute resources to their advantage through the public tax and spending system. The corresponding public spending items can be seen either as pure transfers or as the provision of public goods that are useful only for the receiving interest group. The interest groups recognize and internalize the intertemporal budget constraint, so there is no issue of debt default here. This description is meant to capture the claims on public resources that interest groups manage to achieve during the debt buildup period, while recognizing that they will eventually have to collectively shoulder the debt burden. One interpretation of the interest groups is that each interest group is a spending ministry represented by a minister. Another is that spending ministries are captured by interest groups and that both conjure up to garner adequate support in parliament. Yes another interpretation is that interest groups are represented by parties, which in turn are members of coalition governments. Here we portray the extreme case where interest groups are in complete control of the net transfer part of the budget. As discussed above, there is no consensus on the source and strength of an international externality of public debt. We therefore postule a general international externality: each country intends to have some of its debt paid for by the other country.

The domestic common pool problem follows Velasco (2000). In each country, there exist $n \geq 1$ interest groups, indexed by i, $i = 1, 2, ..., n$. Each group can decide on the amount of net transfers, $g_t^{h,i}$, that it obtains in period $t = 1, 2$. Net transfers in the home country h, $g_t^{h,i}$, are defined as transfers received less

taxes paid. The same applies to net transfers $g_t^{f,i}$ in the foreign country f.

The Finance Minister does not control the transfers to the interest group, but she can do some spending of her own. This spending is productive in the sense that it raises public revenues in the next period. One interpretation is that the Finance Minister engages in infrastructure or effective reforms that will raise GDP and therefore taxable income. This is the interpretation given by Beetsma and Debrun (2004, 2005). Alternatively, we can think of efficient countercyclical fiscal policy that brings GDP back towards its potential level. This second interpretation matches current debates in Europe over the discretionary use of fiscal policy. Denote productive spending at home in period 1 as X^h. By spending X^h in period 1, the Finance Minister raises tax revenues by $\theta(X^h)$ in period 2. We assume $\theta' > 0$ and $\theta'' < 0$, i.e. these expenditures are subject to decreasing returns, a condition needed for the second order condition to be satisfied.

The Finance Minister can borrow or lend internationally any amount that she wishes at the constant real interest rate r (i.e. the economy is small), but she is bound by the intertemporal budget constraint. Importantly, the budget constraint is understood and accepted by all interest groups. Thus we rule out defaults, an extremely rare occurrence in developed economies. The budget constraint of the home country Finance Minister in period one is:

$$\sum_{i=1}^{n} g_1^{h,i} + X^h = B^h \tag{1}$$

where B^h is the debt acquired in period 1. Without loss of generality, we assume that there is no public debt at the beginning of period 1, so B^h also represents period 1 deficit. The constraint for the second period in the home country is:

$$\sum_{i=1}^{n} g_2^{h,i} + (1+r)\left[(1-\alpha)B^h + \alpha B^f\right] = \theta(X^h) \tag{2}$$

where α represents the international externality. A portion α of domestic debt B^h can be passed on to the other country while the home Finance Minister must serve a portion α of the foreign Finance Minister deficit B^f.

The intertemporal budget constraint thus becomes

$$(1-\alpha)\left[\sum_{i=1}^{n} g_1^{h,i} + X^h\right] + \alpha\left[\sum_{i=1}^{n} g_1^{f,i} + X^f\right] + R\sum_{i=1}^{n} g_2^{h,i} = R\theta(X^h) \tag{3}$$

where $R = (1+r)^{-1}$. The same constraints apply to the foreign country.

We assume that each interest group can implement its chosen level of net transfers in both periods. For simplicity, they all have the same preference over the own transfers that they can receive, represented by the following utility function:

$$U^{h.i} = \log\left(g_1^{h,i} + \overline{g}\right) + \beta\log\left(g_2^{h,i} + \overline{g}\right). \tag{4}$$

where β is the time preference factor. The term $\overline{g}$ represents the maximum amount of net taxes that each interest group is willing and able to pay. More precisely, we assume that there is a lower limit $-\overline{g} < 0$ for the net total transfers received by each interest group.[4] It follows that the maximum net revenues that can be collected by the Finance Minister is $\overline{G} = n\overline{g}$.

The general case where $\beta \neq R$ is presented in the Appendix. When $\beta \neq R$ there exists a rationale for shifting income across periods and therefore for a budget deficit or surplus in period 1. This rationale is well understood and not pursued further here. For simplicity, therefore, from now on, we assume that $\beta = R = 1$. Again, the situation is identical in the foreign country.

Who are the interest groups? In a more complete model, these interest groups could coexist with citizens devoid of political influence. This would greatly complicate the situation. At this stage, we consider that all citizens belong to one interest group. One interpretation is that interest groups bring together citizens with shared interests, and that all citizens are somehow represented by an interest group. We assume that all interest groups are of the same size. Another interpretation is that each citizen is an interest group of its own, in which case n is the size of population. What is important is that the Finance Minister and the social planners maximize the unweighted sum of the interest group utilities. In that sense, the Finance Minister is fully captured, yet democratic.

We first consider the socially optimal allocation of deficits between interest groups, Finance Ministers and countries. Then we consider the free-for-all case when the interest groups effectively control the transfers and the national Finance Ministers decide on productive spending independently of each other.

2.2 The International Social Planner

The international social planner decides on $g_t^{k,i}$ and X^k for $k = h, f$ to maximize $\sum_{i=1}^{n} U^{h,i} + \sum_{i=1}^{n} U^{f,i}$ subject to the budget constraints (3) for both countries. Given the symmetry between all interest groups and countries, it is clear that $g_t^{k,i} = g_t$, $\forall k, i$, and $X^h = X^f = X$. Denoting aggregate transfers $G_t = ng_t$, the first order conditions are:

$$\theta'(X) = 1 \tag{5}$$

$$G_1 = G_2 \tag{6}$$

Condition (5) implies that the social planner chooses the level of productive spending $\overline{X}$ that maximizes the surplus $\theta(X) - X$. Condition (6) means that the social planner equalizes transfers across periods (this is a consequence of the assumption $R = \beta$, see the Appendix for the general case).

---

[4] This formulation, akin to that used in a different model by Velasco (1999), implies that $U^{h,i} \longrightarrow -\infty$ when $g_t^{h,i} \longrightarrow 0$. The formulation differs from Velasco (2000) who assumes instead a bliss level for transfers and uses a quadratic loss function.

Note that symmetry also implies that the intertemporal budget constraint (3) is the same for each country and simplifies to:

$$G_1 + G_2 = \theta(X) - X \qquad (7)$$

The constraint being recognized *ex ante* by the international social planner, the international externality is fully internalized and (6) shows that the same applies to the internal externalities. Using definition (1), the socially optimal deficit is :

$$B^* = \frac{1}{2}\left[\theta(X^*) - X^*\right] + X^* \qquad (8)$$

where asterisks denote socially optimal outcomes. Period 1 and 2 net transfers are $G_1^* = G_2^* = \frac{1}{2}\left[\theta(X^*) - X^*\right]$.

The social optimum implies a deficit to the extent that productive public spending exists. In that case, the interest groups receive positive transfers in both periods, a share of the surplus created by productive spending. If there is no such thing as productive spending, then we have $\theta(X) \equiv 0$ and the socially optimal debt is zero. This establishes the obvious point that not all deficits are bad; some deficit may be justified as optimal intertemporal smoothing of future returns to current productive spending. The presence of powerful interest groups is thus not an argument for imposing a zero deficit and refraining from productive public spending.

2.3 Autonomous Governments

We now investigate the case when there is no social planner. In each country, the interest groups play Nash against each other and against their Finance Minister and each Finance Minister plays Nash vis a vis the other one and the interest groups.

The interest groups choose the transfers that they will receive taking into the account the intertemporal budget constraint, i.e. the fact that they will have to collectively repay in period 2 the debt incurred in period 1. In the absence of productive spending, the optimal net transfer to interest groups is zero, as (8) shows. Yet, each interest group calculates that it will only have to repay one nth of the perceived domestic gross cost of debt. Taking as given what other interest groups do, they each have an incentive to raise their net transfer above the socially optimal level. Moreover, neither interest groups nor Finance Minister take into account the effect of their deficit decisions on the other country's second period budget constraint. Both common pool problems now combine to increase the deficit above the socially optimal level.

Formally, each interest group minimizes its own loss function under the relevant constraints in each period. Each Finance Minister chooses productive spending, taking as given the decision of the other Finance Minister and interest groups, to maximize $\sum_i U^{k,i}$ for $k = h, f$. This is the only decision made by

the Finance Ministers.[5]

Once in period 2, the debt to be repaid is predetermined by the net transfers chosen in period one and by the surplus $\theta(X) - X$ created by productive spending. As a result, there is no choice to be made at that stage. Each group simply recognizes that its net transfers will have to fit within the country's budget constraint (2). For interest group i in the home country, this means:

$$g_2^{h.i} = \theta(X^h) - \sum_{j \neq i} g_2^{h,j} - \left[(1-\alpha)B^h + \alpha B^f\right] \tag{9}$$

In period 1, this interest group maximizes its utility function (4) subject to (9) and to its period 1 budget constraint

$$g_1^{h,i} = B^h - \sum_{j \neq i} g_1^{h,j} - X^h$$

The first-order condition is:

$$g_1^{h,i} = \frac{\alpha + (n-1)}{2(1-\alpha)}\bar{g} + \frac{1}{2(1-\alpha)}\theta(X^h) - \frac{1}{2}\left(X^h + \sum_{j \neq i} g_1^{h,j}\right) - \frac{\alpha}{2(1-\alpha)}\left(X^f + \sum_{i=1}^{n} g_1^{f,i}\right)$$
$$\tag{10}$$

Applying symmetry across interest groups (but not yet across countries) yields the aggregate interest group reaction function in Home:

$$G_1^h = \frac{n}{(2+n)(1-\alpha)}\left(\frac{(\alpha + (n-1))}{n}\bar{G} + \left(\theta\left(X^h\right) - (1-\alpha)X^h\right) - \alpha\left(X^f + G_1^f\right)\right)$$

where $G_1^h = \sum_{i=1}^{n} g_1^{h,i}$. The same conditions apply abroad.

The Finance Ministers each have only one decision to make regarding the level of productive spending X^h and X^f, respectively at home and abroad. Since they do not recognize the implication of their actions on each other, their best choice is:

$$\theta'(X) = 1 - \alpha \tag{11}$$

Since $\theta''(X) < 0$ this means that $X > X^*$ i.e. productive spending exceeds the socially optimal level that maximizes the surplus $\theta(X) - X$ as in (5). This is a consequence of the Nash game between governments as each one expects to pass a share α of the debt to the other government. Importantly, the domestic

---

[5] We assume that the Finance Minister in country k perceives that the partial derivative of G_1^l with respect to the total debt level of country l is zero ($\frac{dG_1^l}{dB^h} = \frac{dG_1^l}{dX^h} = 0$). Under this assumption, the Finance Ministers do not use the level of productive spending strategically to affect the decisions of the other country's interest groups, if they were allowed to move before the interest groups. Since the Finance Ministers' choice of X^k is not affected by the level of transfers either, it hence makes no difference whether the government moves first (pre-commitment) or after the interest groups.

externality does not affect the Finance Minister's choice of X, even though it is captured by the interest groups. In fact, by maximizing the domestically available surplus from productive spending (the last three terms in (10)), which is socially best, captured Finance Ministers also increase the interest groups' welfare. The distortion on X is only related to the international externality. This will matter for policy responses below.

In equilibrium, we have $g_t^{k,i} = g_t \forall t, k, i$, $G_t^h = G_t^f$ and $X^h = X^f = X$, and the solution for each country is :

$$G_1 = \frac{n - (1 - \alpha)}{n + (1 - \alpha)} \overline{G} + \frac{n}{n + (1 - \alpha)} [\theta(X) - X] \tag{12}$$

which implies a deficit:

$$B = \frac{n - (1 - \alpha)}{n + (1 - \alpha)} \overline{G} + \frac{n}{n + (1 - \alpha)} [\theta(X) - X] + X \tag{13}$$

Note first that when $n = 1$ and $\alpha = 0$ we find the results of the international social planner: (11), (12) and (13) reduce to (5), (7) and (8), respectively. The first term in (13) describes how the potential domestic common pool, the maximum taxing possibility $\overline{G}$ is shared among interest groups. In addition to increasing with α, this term increases with n. In the limit case where $n \longrightarrow \infty$, this term is equal to $\overline{G}$, which means that infinitely small interest groups fully exhaust their tax capacity. The role of productive public spending is captured by (11) and by the second and third terms in (13). Much as the compete to capture the common pool of potential tax revenues, interest groups compete for the surplus $\theta(X) - X$ created by productive spending. Again, in the limit case where $n \longrightarrow \infty$, each of the infinitely small interest groups attempts to capture the whole surplus. The third term in (13) is simply productive public spending in period 1, which is larger than socially desirable.

The case of a single country corresponds to assuming $\alpha = 0$. In that case, the Finance Minister chooses the socially optimal productive spending as (16) reduces to (5), but the deficit bias is not eliminated since (13) becomes:

$$B = \frac{n - 1}{n + 1} \overline{G} + \frac{n}{n + 1} [\theta(X) - X] + X$$

The domestic common pool problem creates three deficit bias components. The first term reflects the grab for transfers in the absence of productive spending. The second term shows how the interest groups capture part of the surplus generated by the productive spending. The last term simply corresponds to government borrowing to finance period 1 productive spending, which is greater than socially optimal and hence also add to the bias.

3 Policy Responses: Pigovian Taxes

Whenever externalities create a wedge between the optimal and actual production of some good, correctly devised and imposed Pigovian taxes can correct the

distortions. Assume for the purposes of this section that an international tax authority exists with the sole purpose of imposing Pigouvian taxes to eliminate the distortions due to the domestic and international externalities of transfers. The tax authority has complete information.

3.1 Internalizing the International Externality

Internalizing the international externality with a Pigovian tax is straightforward. The international externality pertains to the aggregate debt level, $X + G$. The international tax authority hence wants to impose a Pigovian tax, τ^I, on the debt in period one such that the total debt level in period two to be repaid is equal to the full amount, $X + G$. Formally, the tax must fulfill:

$$
\begin{aligned}
(X + G) &= (1 + \tau)(1 - \alpha)(X + G) \\
&\Rightarrow \tau^I = \frac{\alpha}{1 - \alpha}
\end{aligned}
$$

The proceeds from this tax are then paid to the other country:

$$
\tau^I (X + G) = \frac{\alpha}{1 - \alpha} (X + G) \tag{14}
$$

which implies that the new second period budget constraint becomes

$$
\sum_{i=1}^{n} g_2^{h,i} + \left((1 - \alpha)(1 + \tau)(X + G) + \alpha(1 + \tau)\left(X^f + G^f\right) - \tau\left(X^f + G^f\right)\right) = \theta\left(X^h\right)
$$

which reduces to the old budget constraint once (14) is inserted. With this tax on the total debt level of each country, the international externality is internalized.

3.2 Internalizing the Domestic Externality

Remains to impose a similar tax on the national source of the common pool problem. We proceed by assuming that the Pigovian tax for the international externality derived above is applied, which reduces the model to the one country case with only domestic externalities of debt.

The source of the national common pool problem is that the interest groups do not fully internalize the effect of their choice of transfers on the overall budget. A Pigovian tax should hence address the cost of transfers in the first period in terms of the associated loss of period two transfers for the individual interest group. There is an added complication here. The revenues from this tax would have to be channeled back to the budget of the country in question, but in such a way that the individual interest group would not be able to affect the amount of tax revenues through his of her transfer choices. In principle, the tax revenue yielded from interest group A's decisions should be channeled back to all other interest groups except interest group A. But the whole common pool problem per definition does not allow to distinguish between the budgets of the individual interest groups in this way, so assuming that such a design for a

Pigovian tax is possible would amount to assuming away the domestic common pool problem. We hence proceed by looking only at Pigovian taxes that apply to the whole budget and do not distinguish between interest groups.

The way we solve the problem here is to assume that the international tax authority makes a lump sum transfers to the Finance Minister at the beginning of period one, which has the effect of increasing the overall common pool by an amount T in the first period, and that this lump sum transfer is equal to the tax revenues from the domestic Pigovian tax ex post. Thus, a Pigovian deficit tax of τ^D is levied on the part of the deficit comprised of transfers to interest groups, G. Since the international externality is neutralized, and taking into account the lump sum transfer from the international tax authority, the intertemporal budget constraint becomes:

$$\left(1 + \tau^D\right) \sum_{i=1}^{n} g_1^i + X + \sum_{i=1}^{n} g_2^i = \theta\left(X\right) + T$$

To ensure revenue neutrality of the tax, the international tax authority commits ex ante to paying T such that ex post, we have:

$$T = \tau^D \sum_{i=1}^{n} \widehat{g}_1^i \tag{15}$$

where $\widehat{g}_1^i$ is the optimally chosen transfer of interest group i given $\widehat{T}$ and τ^D. (Note that for the international tax authority to be able to know $\widehat{T}$ with certainty, we rely on the assumptions of no uncertainty and complete information). Solving backwards yields the interest groups' response to the taxing scheme[6]:

$$\widehat{G}_1\left(T, \tau^D\right) = \frac{n\left(T + \theta\left(X\right) - X\right)}{\left(1+n\right)\left(1+\tau^D\right)} + \frac{n - \left(1+\tau^D\right)}{\left(1+n\right)\left(1+\tau^D\right)} \overline{G}$$

Since the international tax authority chooses T such that (15) is satisfied ex post, we have

$$\widehat{G}_1\left(\tau^D\right) = \frac{n\left(\theta\left(X\right) - X\right)}{\left(1+n\right)\left(1+\tau^D\right) - n\tau^D} + \frac{n - \left(1+\tau^D\right)}{\left(1+n\right)\left(1+\tau^D\right) - n\tau^D} \overline{G}$$

The international tax authority now selects the domestic Pigovian tax, τ^D, that induces the socially optimal transfers to the interest groups, which yields

$$\tau^D = n - 1$$

---

[6] Using that

$$\theta'\left(X\right) = 1$$

and the budget constraint to derive the second period deficits as a function of first period deficits:

$$g_2^i = \frac{1}{n}\left(\theta\left(X^h\right) - X^h\right) + \frac{1}{n}\left(T - \left(1+\tau^D\right) \sum_{i=1}^{n} g_1^{h,i}\right)$$

This in turn implies that the initial transfer from the international tax authority to the two countries becomes:

$$\widehat{T} = \frac{n-1}{2} \left(\theta\left(X\right) - X\right)$$

where X is given by the socially optimal level.

In conclusion, if a tax on the overall deficit of τ^I and a tax on only the transfers part of the deficit of τ^D are levied on the two countries, and moreover, $\widehat{T}$ is transferred to each of the two countries from the international tax authority prior to the game (or in period one as the game has started, provided the international tax authority can commit credibly to transferring $\widehat{T}$), the Nash solution to the game is socially optimal[7].

4   Delegation to National Social Planners

Given our assumption that national governments are fragmented, a natural policy response is to delegate fiscal policy to a benevolent national social planner. This can take the form of formal delegation to a fiscal council, as advocated by Wyplosz (2005), or - since there is no issue of time inconsistency of preferences of government in this model - a Finance Minister who is given broad powers, as recommended by von Hagen and Harden (1994)[8]. The social planner can make decisions on X^k and $g_t^{k,i}$ for all i's in each country, but does not coordinate with the social planner in the other country. In effect, we consider a Nash game where both social planners act simultaneously, taking the other social planner's decision as given. The symmetry of the situation implies that $g_t^{h,i} = g_t^{h,i} = g_t^i$ and $X^h = X^f = X$.

The home social planner chooses $g_t^{h,i}$ and X^h to maximize (4) subject to (3). The first-order conditions are:

$$\theta'(X) = 1 - \alpha \tag{16}$$

$$G_1 = \frac{\alpha}{2-\alpha}\overline{G} + \frac{1}{2-\alpha}\left[\theta(X) - X\right] \tag{17}$$

with the corresponding deficit $B = G_1 + X$:

$$B = \frac{\alpha}{2-\alpha}\overline{G} + \frac{1}{2-\alpha}\left[\theta(X) - X\right] + X \tag{18}$$

The national social planners eliminate the domestic externality but the international common pool problem remains because each national planner expects

---

[7]Note that the transfers of tax revenues from the international pigouvian tax τ^I between the two countries in the second period do not actually have to take place, as the same is symmetric and the bilateral transfers hence cancel each other out.

[8]The underlying mechanism behind the domestic externality - common pool or time inconsistency of preferences - becomes important in the interpretation of the national social planner. If we assume time inconsistency of preferences of government, the delegation to the a Finance Minister will not internalize the domestic source of the deficit bias as the Finance Minister is still subject to elections.

to pass a portion α of its debt to the other planner. Indeed, (17) and (18) correspond to (12) and (13) in the Nash case with $n = 1$. Exactly as in the Nash case (11), productive spending is set higher than X^*, the level that maximizes the national surplus $\theta(X) - X$, compare (5) and (16). Although $\theta(X) - X$, the surplus available to each country, is reduced, the deficit in (18) is higher than in (8) since $\dfrac{\partial B}{\partial X} > 0$: the international externality creates a deficit bias in both countries. Note that the first term in (17) shows that the international externality is also an incentive for the social planner to raise transfers to its own interest groups.

If the international externality is small and $\alpha \simeq 0$, (16) reduces to (5) and (17) reduces to (7). Trivially, a national social planner achieves the social optimum in a one-country model.

5   Deficit (or Debt) Ceilings

An alternative policy response is a mandatory cap on the deficit or on the debt. Deficit ceilings have been adopted in the case of sub-federal level Finance Ministers as well as at the national level in Chile or Brazil. The Stability and Growth Pact rests on both a deficit and a debt ceiling, although the latter has been set aside *de facto*.[9] In our model, there is no distinction between deficit and debt, so we leave this important distinction out.[10] We assume that the deficit ceiling is optimally set by an outside authority that we call the international social planner.

A key question is which category of spending is affected by the deficit ceiling. Recall that we assume that the Finance Ministers are politically captured so that they do not control the transfers to their interest groups. If they move last, i.e. is they cannot precommit, the ceiling only constrains productive spending X.[11] While it is obviously better to constrain unproductive transfers than productive spending, restraining only the latter may still be welfare-improving. Indeed, we know from (11) that, in the absence of any corrective measure, productive spending is excessive ($X > X^*$). Yet, the risk is that the constraint be so tight that it leads to insufficient productive spending ($X < X^*$). Conversely, if the Finance Ministers can precommit and move first, it is the transfers to interest groups that are constrained, assuming that the interest groups recognize the

---

[9] The Stability and Growth Pact includes a preventive arm and a corrective arm. The preventive arm applies in normal times; it prescribes that the deficit be then "close to balance or in surplus". During economic slowdowns, the pact allows for some counter-cyclical fiscal policy, but sets a limit to the deficit. Under the interpretation that X represents a keynesian expansion, it is only "productive" during periods of slowdown. In normal times, fiscal policy is not needed and could be counter productive (e.g. $\theta(X) \leq X$) and indeed the optimum solution is $X = 0$. During periods of slowdown, on the other hand, it is desirable to choose $X = \overline{X} > 0$.

[10] Wyplosz (2005) emphasizes the distinction and argues that the public debt is the correct variable to be targeted.

[11] In Section 6 below we look at golden rules that separate out the two budget components.

ceiling. Thus we need to consider the two cases of precommitment and no-precommitment.

In addition, it matters whether the deficit ceiling chosen by the social planner is credible or not. If the social planner cannot precommit and can change the chosen ceiling once action by either interest groups or Finance Ministers has been taken, the deficit ceiling is not credible; knowing this, the interest groups and the Finance Minister will make different decisions than if the ceilings are seen as carved in stone. We therefore analyse the properties of a deficit ceiling in the cases where the social planner is credible and non-credible, respectively.

5.1 Deficit ceiling with a credible social planner

We first consider the case where the deficit ceiling credible, that is taken as given by both Finance Ministers and interest groups. We analyze succesively the situation when the government cannot and can precommit.

5.1.1 The Finance Minister cannot precommit

When the deficit ceiling is binding and the interest groups choose the transfers first, the Finance Ministers have no further decision to make, they simply carry productive spending up to the ceiling. As they move first, the interest groups recognize that the surplus $\theta(X) - X$ from productive spending will be constrained. In this situation their budget constraints (1) and (2) become:

$$\sum_{i=1}^{n} g_1^{h,i} + X^h = \hat{B} \tag{19}$$

$$\sum_{i=1}^{n} g_2^{h,i} + \left[(1-\alpha)\hat{B} + \alpha\hat{B}\right] = \sum_{i=1}^{n} g_2^{h,i} + \hat{B} = \theta(X^h) \tag{20}$$

where $\hat{B}$ is the ceiling. The fact that the same constraint binds both countries' deficits eliminates the international externality, but the domestic externality remains. In addition, the interest groups understand that, when they decide on the transfers, they effectively set the level of productive spending $X^h = \hat{B} - \sum_{i=1}^{n} g_1^{h,i}$. As usual, the symmetry of the situation implies that the optimal choice of the interest groups is:

$$G_1 = \left[\frac{n - \theta'(X)}{\theta'(X)}\right] \bar{G} + \frac{n}{\theta'(X)} \left[\theta(X) - \hat{B}\right] \tag{21}$$

$$G_2 = \theta(X) - \hat{B} \tag{22}$$

Then the Finance Minister spends whatever is left under the ceiling:

$$X = \hat{B} - G_1 \tag{23}$$

The international social planner optimally chooses $\hat{B}$. to maximizes welfare. Given G_1, by setting $\hat{B}$ the social planner in effect sets X. Its first order condition implies:

$$\theta'(X) = \frac{n}{1 + (n-1)\dfrac{dX}{d\hat{B}}} \tag{24}$$

where:

$$\frac{dX}{d\hat{B}} = \frac{n + \theta'(X)}{(1+n)\theta'(X) - (G_1 + \bar{G})\theta''(X)} \tag{25}$$

Note that substituting (23) into (21) gives the level of transfers:

$$G_1 = \frac{n}{\theta'(X) + n}[\theta(X) - X] - \left[\frac{\theta'(X) - n}{\theta'(X) + n}\right]\bar{G} \tag{26}$$

Since $\theta''(X) < 0$, (24) and (25) imply $\theta' > 1$ i.e. $X < X^*$. Productive spending is now less than optimal. This, in turn, reduces the available surplus $\theta(X) - X$ and thus indirectly constrains transfers G_1. Note that $\theta' > 1$ implies $\dfrac{dX}{d\hat{B}} < 1$: when $\hat{B}$ is reduced, X falls by less, which means that G_1 is indirectly constrained as well since the surplus $\theta(X) - X$ shrinks. As a consequence, $\dfrac{\partial \theta'(X)}{\partial n} > 0$:[12] when the domestic externality rises, the social planner reduces $\hat{B}$, which increasingly constrains X and G_1. For n large enough, productive spending is driven to zero. When this happens, the social planner does not face any more a trade-off between squeezing the deficit and reducing the surplus $\theta(X) - X$ and it sets $\hat{B} = 0$.

The upshot is that an optimally set and credible deficit limit cannot deliver the social optimum when national governments cannot precommit. This is un-related to the international externality, which is removed, but to the domestic externality. Indeed, in the absence of the domestic externality, i.e. when $n = 1$, (24) implies that public spending is at the socially optimal level. Then (26) implies that the social planner uses its choice of $\hat{B}$ in such a way that G_1 is also socially optimal, see (8). It is no even clear that the deficit ceiling improves upon the Nash equilibrium since with the former productive spending is too high while it is too low with the latter.[13]

5.1.2 The Finance Minister can precommit

If the Finance Ministers can precommit to a level of productive spending, it is the transfers to interest groups that become the residual item under the budget ceiling. Formally, the Finance Ministers can choose $X \le \hat{B}$ and the interest

---

[12] $\dfrac{\partial \theta'(X)}{dn} = \dfrac{1}{\left[1 + (n-1)\dfrac{dX}{d\hat{B}}\right]^2}(1 - \dfrac{dX}{d\hat{B}}) > 0.$

[13] We would need to make assumptions about $\theta''(X)$ to compare welfare.

groups have no decision to make, they receive $G_1 = \hat{B} - X$. As in Section 5.1.1, the international externality is fully internalized. The social planner credibly controls $\hat{B}$, not its breakdown between G_1 and $\hat{B}$, but it knows that the Finance Ministers move first. By setting the ceiling as $\hat{B} = X^* + \dfrac{\theta(X^*) - X^*}{2}$, the international social planner leads the Finance Minister to choose $X = X^*$ and, therefore, $G_1 = \dfrac{\theta(X^*) - X^*}{2}$, which delivers the social optimum.

The combination of government precommitment and a credible debt ceiling is therefore one solution to the deficit bias. The reason is clear: government precommitment eliminates the domestic externality while and the debt ceiling eliminates the international externality.

When there is no international externality, the deficit bias can be dealt with at the national level if the debt ceiling can be credibly set and enforced. In practice, this may be difficult to achieve, especially if we consider that the productivity of X is time-varying. In that case a fixed ceiling is inadequate and a brainy social planner must accordingly decide on the ceiling according to circumstances.

5.2   Deficit ceiling with a non-credible social planner

We now consider the case where the deficit ceiling $\hat{B}$ can be changed by the social planner after the interest groups set their transfers G_1 when they move first, or after the Finance Ministers set their productive spending levels X when they can precommit. Importantly, though, the existence of an *ex post* ceiling that is identical for both countries implies that the international externality is internalized. The situation would be different if the ceiling would be different from one country to another or if the ceiling were not binding in at least one country. This kind of asymmetry is not examined in the present paper. If neither the Finance Ministers nor the interest groups internalize the ceiling (i.e. the game in which social planner moves last) we are back to the unconstrained outcomes previously studied. Accordingly we investigate the two cases where either Finance Minister or interest groups move first and do not internalize the budget constraint, then the social planner sets the deficit ceiling, which binds the last mover.

Before proceeding, note first that we can restrict the analysis to strictly positive deficit ceilings, as a zero deficit rule never can be a subgame perfect equilibrium outcome, irrespective of whether the Finance Ministers or the interest groups move first. To see this, note that the deficit cieling can never bind the actors (either interest groups or Finance Ministers) who move in the first stage of the game, since this would be a non-credible threat. That means that the ceiling has to allow for the unconstrained deficit decisions of the actors who move first. And these first movers always select strictly positive deficits: interest groups will always choose strictly positive transfers when unconstrained, due to the deficit bias, and the Finance Ministers will always choose the socially optimal - strictly positive - level of productive spending when the overall deficit

is capped because international externality is internalized.

5.2.1 The interest groups move first

We first assume that the Finance Ministers cannot precommit, and hence that interest groups move first. They select transfers before the deficit ceiling is set and before the Finance Ministers decides on productive spending. The Finance Ministers implement $X = \hat{B} - G_1$ in the third stage. In the second stage, the social planner selects $\hat{B}$ such that $\theta'(X) = 1$ i.e. the optimal level of productive spending $X = X^*$. In the first stage of the game, the interest groups choose G_1, taking into account X^* and $\hat{B}$:

$$G_1 = \frac{n}{n+1} \left[\theta(X^*) - X^* \right] + \frac{n-1}{n+1} \overline{G} \tag{27}$$

which are higher than in the case of a credible social planner when interest groups move first[14]. The deficit ceiling becomes:

$$\hat{B} = \frac{n\theta(X^*) + X^*}{n+1} + \frac{n-1}{n+1} \overline{G} \tag{28}$$

Since both transfers and productive spending are higher than in the case where the social planner is considered credible, the deficit ceiling is also higher here. The deficit bias remains because the domestic externality still applies and affects the transfers to interest groups.

The situation is improved relative to the unconstrained Nash case since the outcome corresponds to the Nash outcome in the case of a zero international externality. The deficit is correspondingly smaller and welfare is correspondingly higher. But the situation is worse than when social planner is credible as in Section (5.1.1). If this were not the case, the social planner would have chosen the debt ceiling given by (28) when acting as a Stackelberg leader in section (5.1.1). Since she chooses a tighter ceiling under commitment, it must be the case that this tighter ceiling leads to higher welfare.

5.2.2 The Finance Ministers move first

When the Finance Minister can precommit, the deficit constraint binds the interest groups who move last and take whatever is left below the ceiling after the Finance Minister's decision on X. Moving first, the Finance Ministers each set X at the level $\hat{X}$ that maximizes national welfare $\sum_{i=1}^{n} U^{k,i}$ for $k = h, f$ given the expected reaction of the social planner in selecting the deficit ceiling in the second stage of the game, and given the reaction of the interest groups in the third stage of the game. The interest groups have no choice but to accept $G_1(X) = \hat{B} - X$. Given Finance Ministers' choice of X, the social planner indirectly controls the transfers, which she will set at the socially optimal level given

---

[14]To see this, note that: $\frac{n}{n+1} \left(\theta(X) - X \right) + \frac{n-1}{n+1} \overline{G} > \frac{n}{n+\theta'(X)} \left(\theta(X) - X \right) + \frac{n - \theta'(X)}{n + \theta'(X)} \bar{G}.$

productive spending: she will choose $\hat{B}$ such that $G_1 = G_2 = \frac{\theta(X)-X}{2}$, see (8). Since the deficit ceiling is symmetric across the two countries, the international externality is eliminated and the Finance Ministers select the socially optimal level of productive spending, i.e. $X = X^*$.

As in the case of a credible fiscal rule (5.1.2), we find that when the national Finance Ministers move first, a mandatory deficit ceiling delivers the social optimum. The reason is that forcing the interest groups to act as residual claimants eliminates the domestic externality while the international externality disappears because the same deficit ceiling applies to both countries.

5.3 Conclusions on ceilings

Three conclusions emerge from the treatment of debt ceilings. First, the combination of precommitment on productive spending on the part of the Finance Minister and of a mandatory deficit ceiling delivers the social optimum. This conclusion does not depend on whether the Finance Minister considers the deficit ceiling credible or not. The reason for this is that the presence of a fiscal rule, which limit the overall level of the deficit to the same level on both countries, eliminates the international externality. In the absense of an international externality, the precommitted Finance Ministers always select the socially optimal level of productive spending. The deficit ceiling is then set by the social planner to constrain the transfers to the interest groups to their socially optimal level.

The second point is that when Finance Ministers cannot precommit, a credit ceiling never delivers the social optimum, irrespective of whether the ceiling is seen by the interest groups as credible or not. The reason is that when the overall deficit ceiling is positive, the domestic common pool externality leads the interest groups to always select a level of transfers that exceeds the optimal ceiling. When the deficit ceiling is zero, the level of transfers is optimal conditional on a zero deficit, but the productive expenditures are too low to reach social optimum.

The third conclusion concerns the debate on rules versus discretion in economic policy. Irrespective of whether the Finance Minister can precommit on the level of productive spending or not, a credible fiscal rule yields a higher level of welfare compared to the case in which the rule is set after the interest groups have selected their transfers. This result is just one more instance of the general result that it is desirable to build credible institutions.

6 Golden Rules

So far we considered the case of a ceiling that applies to the overall deficit. It has been proposed to leave productive spending out of the ceiling.[15] In the

---

[15] This is the traditional German "Goden Rule", adopted in the British Rule for Fiscal Conduct. See Blanchard and Giavazzi (2004) and Beetsma and Debrun (2004, 2005) for an analytical justification.

present model, a golden rule would set a limit on G_1 while leaving the Finance Minister free to choose X. Let $\hat{G}$ be the limit.

If the ceiling is credible, the interest groups have no decision left and $G_1 = \hat{G}$. and the domestic externality is eliminated. Irrespective of whether they can precommit or not, the Finance Ministers choose X to maximize the available surplus. As they fail to internalize the international externality, they set X according to (11) so $X > X^*$. The social planner chooses $\hat{G}$ to maximize $\sum_{i=1}^{n} U^{h,i} + \sum_{i=1}^{n} U^{f,i}$ subject to the budget constraints $\hat{G}^h + G_2^h = \hat{G}^f + G_2^f = \theta(X) - X$. Not surprisingly, the social planner sets $\hat{G}$ so that the transfers are socially optimal, given the surplus $\theta(X) - X$:

$$G_1 = \hat{G} = \frac{\theta(X) - X}{2} \tag{29}$$

The debt level is now higher than socially optimal due to the suboptimally high levels of productive spending, but lower than the deficit in the Nash outcome since the national externalities are rained in. In short, even if it were possible to distinguish between productive spending and transfers to interest groups, a golden rule is not enough to eliminate the deficit bias in the presence of an international externality. Obviously, if $\alpha = 0$, the golden rule delivers the social optimum.

If the ceiling is not credible and if the Finance Ministers cannot precommit, the interest groups move first and we are back to the Nash case. If they can precommit, the Finance Ministers move first and still choose X according to (11) because they do not internalize the international externality. Then the social planner sets $\hat{G}$ according to (29). Thus, the effect of a golden rule crucially depends on whether it is credible, but does not depend on whether the Finance Ministers can precommit or not.

7   Conclusions

When both the international and the domestic sources of the deficit bias are active, the welfare ranking of the analyzed policy proposals becomes:

$$U^* = \hat{U}^{C,PC} = \hat{U}^{NC,PC} > \left(\begin{array}{c} U^{GR} > U^{NSP} \\ \hat{U}^{C,NPC} > \hat{U}^{NC,NPC} \end{array} \right) > U^N > U^{PC}$$

where U^* is the social optimum, and subscripts C and NC to a credible and a not credible deficit ceiling, respectively, NSP to national social planners, PC to precommiment by the Finance Minister and NPC to the opposite situation of no precommitment, GR to a golden rule, N to Nash and a hat represents a credit ceiling. We cannot generally rank all solutions. The relative welfare ranking of U^{GR}, U^{NSP}, $\hat{U}^{C,NPC}$ and $\hat{U}^{NC,NPC}$ depends on the relative strenghts of the domestic and international externality (i.e. on the relative sizes of α and n.

Except for an improbable international social planner, the social optimum can reached when a credit ceiling is combined with a Finance Minister able to

precommit to a level of productive spending. None of the other policy proposals considered here can deliver the social optimum. The question is what, in practice, are the arrangements that can mimic these solutions?

Before looking into that issue, note that we look at net spending. Our model explicitly ignores the level of public spending and the taxation burden. These are important issues, not wholly unrelated to the deficit bias. However, the common pool interpretation of the deficit bias assumes that all parties involved recognize that spending must be tax financed, either immediately or later on. Separating spending and taxation decision, in effect allowing for two separate games linked by the budget constraint, would greatly complicate matters without, we believe, delivering much additional intuition.

Pigovian taxes can internalize externalities but their implementation is doubtful in the absence of an international authority who can tax sovereign Finance Ministers. The international social planner is a convenient analytical construct but it does not have a real-life existence. Pigovian taxes could be raised nationally but this presumes that the interest groups that are powerful enough to capture the Finance Minister will let their influence vanish; this amounts to assuming the problem away.

Precommitment means that the government can isolate in the budget law some spending items that are of general interest, in contrast with spending that favor interest groups, and that it can decide on these items irrespective on what is decided about the rest of the budget. What is crucial is that the interest groups - or the spending ministries - know *ex ante* that spending on general-purpose public goods and taxation will not be affected by spending on special-purpose public goods.[16] In practice, however, it is not always possible to draw a line between "productive" and "unproductive" public goods. The implication is that some value judgment is required. Finance Ministers are usually those who are best placed to pass such judgment, even if they too are likely to be partially captured. Under this view, precommitment means that the Finance Minister - or the Prime Minister - is given a dominating role in the budget process. Von Hagen and Harden (1994) provide a detailed discussion and evaluation of existing arrangements. They also show that the performance of these arrangements are intimately linked to the structure of government, i.e. whether it is constituted by a single party or involves a coalition.

More delicate is the question of who is the social planner who sets the deficit (or debt) ceilings. A simple solution is a mandatory ceiling fixed by law, for example a zero-budget rule or the Stability and Growth Pact's 3% ceiling. In our model, the ceiling is optimally set, and this is a crucial condition for achieving the social optimum. In real life, the optimal ceiling is likely to vary over time in response to various disturbances, so that any permanently set number is not, possibly never, optimal. Underlying this issue is the familiar question of rules vs. discretion, which shows that rules can be counter-productive but superior to unconstrained discretion, depending on the nature of disturbances. This

---

[16]This must affect the complete budget process, from the preparation and adoption of the budget law by the government to its passage by the parliament.

question cannot be dealt with here as we do not allow for uncertainty about the economic condition.

If we allow for recurring disturbances, the social planner must then fix a new ceiling for each annual budget, and she must do so in a time-consistent way. Once again, judgment must be exercized by a non-partisan agent. This can be the Finance Minister, if her independence from interest groups can be relied upon. If not, the social planner must be outside of the political arena. This is what lies behind the proposal of fiscal councils composed of independent wisepersons. Note that the social optimum is achieved whether the ceiling is *ex ante* credible or not in the eyes of the governments. This conclusion rests on the assumption that the government can pre-commit. Giving the power to set the ceiling to an already powerful Finance Minister is a solution, but giving it to a fiscal council that does not dominate the Finance Minister also works.[17]

Credit ceilings work when the Finance Minister is powerful to precommit because the optimally-set ceilings bind the interest groups. This arrangement in effect separates out productive and unproductive spending. Such a separation is the motivation for golden rules. In our model, golden rules deliver a lower welfare because they do not deal with the international externality. If this source of deficit bias is negligible, the golden rules too achieve the social optimum.

Are the two externalities equally important? We tend to regard the domestic externality as a very plausible cause of the deficit bias, while we see the second externality as less likely to play an important role. We have treated it completely because it underpins Europe's Stability and Growth Pact. When this international externality is excluded, we have in effect a one-country model. In that case, with $\alpha = 0$ and $n > 1$, the welfare ranking becomes:

$$U^* = \hat{U}^{C,PC} = \hat{U}^{NC,PC} = U^{GR} = U^{NSP} > \hat{U}^{C,NPC} > \hat{U}^{NC,NPC} > U^N > U^{PC}$$

In the absence of an international externality, there is no clear justification for involving an outside agent to act as social planner unless the country requests it, as is the case it applies for IMF support. The solution must found internally. From the ranking of welfares, the menu of options that deliver the social optimum is wider, but this is largely illusory. The national social planner solution calls for fully delegating the budget deficit authority to an independent agent. As before, the likely candidates are a powerful Finance Minister or an independent fiscal council. The only difference, then, is whether this agent explicitly dictates the various decisions or whether she uses an opitmally-set ceiling to reach the exact same outcome. The difference may be politically sensitive but, at this level of generality, little can be added. The only new optimal solution is the golden rule. This solution raises many practical questions, however. Someone must decide which budget items are productive, which is likely to be a politically delicate step. The alternative is to draw up a list of productive

---

[17]In the European Monetary Union, the Commission intervenes to pass judgement on the reasons why a country might not abide by the deficit ceiling. This can be interpreted as implicitly changing the ceiling in response to particular circumstances. In this interpretation, the Commission acts as social planner.

items, but the likely outcome is creative accounting.[18]

Ignoring instead the domestic externality, with $\alpha > 0$ and $n = 1$, the welfare ranking is:

$$U^* = \hat{U}^{C,PC} = \hat{U}^{NC,PC} = \hat{U}^{C,NPC} = \hat{U}^{NC,NPC} > U^{GR} > U^{NSP} > U^N > U^{PC}$$

The need for precommitment by the Finance Minister disappears. The social optimum is achieved by setting a deficit ceiling. The reason is that we assume that the deficit ceiling is the same for both countries and that it is binding. Once the deficit is the same, there is no possibility to shift the debt burden and the international common pool problem disappears.

The assumption of an identical and binding the deficit ceiling is unrealistic, though. It comes naturally in a model with identical countries. If they are not, the ceiling is unlikely to be binding both. In that case, the international externality is not eliminated. Adopting different ceilings that bind both countries would not work either since the country with the larger deficit could still expect to take advantage of the common pool. Country symmetry is clearly an unreasonable assumption, but introducing asymmetries greatly complicates the model and is left for further research.

---

[18] On the issue of creative accounting, see Milesi-Ferretti (2003), Canova and Pappa (2004), and Buti et al. (2006).

Appendix

We present here the general case when the interest rate r and the rate of time preference δ, which appear in (3) and (4) as $R = (1 + r)^{-1}$ and $\beta = (1 + \delta)^{-1}$ are not nil.

Social optimum

The first-order conditions are:

$$\theta'(X^*) = \frac{1}{R}$$

$$G_2 + \overline{G} = \frac{\beta}{R}(G_1 + \overline{G}) \qquad (30)$$

The solution is:

$$G_1 = \frac{R - \beta}{1 + \beta}\overline{G} + \frac{(R\theta(X^*) - X^*)}{1 + \beta}$$

Note that when $R \neq \beta$ there is a rationale for shifting income intertemporally, hence the first term in the budget deficit equation. The corresponding welfare is:

$$U^* = (1 + \beta)\log(G_1 + \overline{G}) + \beta\log(\frac{\beta}{R})$$

National social planners

The first-order conditions are:

$$\theta'(X) = \frac{1 - \alpha}{R} \qquad (31)$$

$$G_2 + \overline{G} = (1 - \alpha)\frac{\beta}{R}(G_1 + \overline{G}) \qquad (32)$$

The solution is:

$$G_1 = \frac{R - (1 - \alpha)\beta}{1 + (1 - \alpha)\beta}\overline{G} + \frac{1}{1 + (1 - \alpha)\beta}(R\theta(X) - X)$$

and welfare:

$$U^{NSP} = (1 + \beta)\log(G_1 + \overline{G}) + \beta\log\left((1 - \alpha)\frac{\beta}{R}\right)$$

Nash

The first-order conditions are:

$$\theta'(X) = \frac{1-\alpha}{R}$$

$$G_2 + \overline{G} = \frac{1-\alpha}{n}\frac{\beta}{R}(G_1 + \overline{G})$$

So:

$$G_1 = \frac{nR - (1-\alpha)\beta}{n + (1-\alpha)\beta}\overline{G} + \frac{n}{n + (1-\alpha)\beta}\left[R\theta(X) - X\right]$$

The corresponding welfare is:

$$
\begin{aligned}
U^N &= (1+\beta)\log\left(\frac{n}{n + (1-\alpha)\beta}\right) - \beta\log n \\
&\quad + (1+\beta)\log\left((1+R)\overline{G} + R\theta(X) - X\right) + \beta\log\left[\frac{(1-\alpha)\beta}{R}\right]
\end{aligned}
$$

Note that, as required:

$$\frac{dU}{dn} = -\frac{\beta}{n}\frac{n - (1-\alpha)}{n + (1-\alpha)\beta} < 0$$

Policy responses

Pigovian taxes

The taxes on period 1 debt $\tau^I = \frac{\alpha}{1-\alpha}$ and on transfers to interest groups $\tau^D = n - 1$ remain unchanged. The international tax becomes:

$$\widehat{T} = \frac{n-1}{\beta+1}\left[R\theta(X) - X + (R-\beta)\overline{G}\right]$$

Deficit tax

To be filled in.

Deficit ceilings

Fill in.

Credible deficit ceiling

Finance Minister cannot precommit   The first-order conditions are:

$$R\theta'(X) = \frac{n}{1 + (n-1)\dfrac{dX}{d\hat{B}}}$$

$$\frac{dX}{d\hat{B}} = \frac{n + R\theta'(X)}{(1+n)R\theta'(X) - \beta(G_1 + \bar{G})\theta''(X)}$$

$$\beta\theta'(X) = Rn\frac{G_2 + \bar{G}}{G_1 + \bar{G}}$$

Note that $R\theta'(X) > 1$ if $\dfrac{dX}{d\hat{B}} < 1$. Then observe that $\theta''(X) < 0$ implies $\dfrac{dX}{d\hat{B}} < \dfrac{n + R\theta'(X)}{(1+n)R\theta'(X)} < 1$ when $R\theta'(X) > 1$.

The outcome is:

$$G_1 = \frac{n - \beta\theta'(X)}{\beta\theta'(X)}\bar{G} + \frac{n}{\beta\theta'(X)}[\theta(X) - X]$$

Non-credible deficit ceiling

Finance Minister cannot precommit

$$\theta'(\hat{X}) = \frac{1}{R}$$

$$G_1 = \frac{n\left(R\theta\left(\hat{X}\right) - \hat{X}\right)}{(\beta + n)} + \frac{Rn - \beta}{\beta + n}\overline{G}$$

Zero deficit ceiling   When $X = G_1 = -RG_2 = \hat{B} = 0$ we have:

$$\hat{U}' = (1 + \beta)\log(\bar{G})$$

When $R = \beta = 1$

$$\hat{U}' = 2\log(\bar{G})$$

$$U^N - \hat{U}' = 2\log\left(\frac{n}{n + (1-\alpha)}\right) - \log n + 2\log\left(2\overline{G} + \theta(X) - X\right) + \log(1-\alpha) - 2\log(\bar{G})$$

When $n = 1$, we cannot sign $U^N - \hat{U}'$. When $n \to \infty$ or when $\alpha \to 1$ $U^N - \hat{U}' \to -\infty$.

.0.1 Golden Rule

The first-order conditions are given by (31) for the choice of X and (30) for the interest groups. The cap on the net transfers to interest groups in period one is:

$$\hat{G} = \frac{R - \beta}{1 + \beta}\overline{G} + \frac{R\theta\left(X\right) - X}{1 + \beta}$$

With $G_1 = \hat{G}$ The resulting welfare is:

$$U^{GR} = (1 + \beta)\log(\hat{G} + \overline{G}) + \beta\log\left(\frac{\beta}{R}\right)$$

A References

Alesina, Alberto and Roberto Perotti (1995): "Fiscal Expansions and Fiscal Adjustments in OECD Countries", *Economic Policy* 21: 205-48.

Alesina, Alberto and Guido Tabellini (1990) "A Positive Theory of Fiscal Deficits and Government Debt", *Review of Economic Studies* 57: 403-14.

Barro, Robert J., and David B. Gordon (1983) "Rules, Discretion and Reputation in a Model. of Monetary Policy", *Journal of Monetary Economics* 12: 101-121.

Beetsma, Roel and Xavier Debrun (2004) "Reconciling Stability and Growth: Smart Pacts and Structural Reforms", *IMF Staff Papers* 51(3): 431-456.

Beetsma, Roel and Xavier Debrun (2005) "Implementing the Stability and Growth Pact: Enforcement and Procedural Flexibility", IMF Working Paper WP/05/59.

Beetsma, Roel and Harald Uhlig (1999) "An Analysis of the Stability and Growth Pact", *Economic Journal* 109: 546-571.

Blanchard, Olivier Jean and Francesco Giavazzi (2004) "Improving the SGP Through a Proper Accounting of Public Investment", CEPR Discussion Paper No. 4220.

Brunila, Anne, Marco Buti and Daniele Franco, eds. (2001) *The Stability and Growth Pact*, Basingstoke: Palgrave

Buti, Marco, João Nogueira Martins and Alessandro Turrini (2006) "From Deficits to Debt and Back: Political Incentives under Numerical Fiscal Rules", European Commission.

Calmfors, Lars (2005) "What Remains of the Stability Pact and What Next?", *Swedish Institute for Economic Policy Studies* 8.

Canova, Fabio and Evi Pappa (2004) "Does It Cost to be Virtuous? The macroeconomic Effects of Fiscal Constraints", CEPR Discussion Paper No. 4747.

Eichengreen and Wyplosz (1997) "The Stability Pact: Minor Nuisance, Major Diversion?", *Economic Policy* 26: 65-114.

Eichengreen, Barry, Ricardo Hausmann and Jürgen von Hagen (1999) "Reforming Budgetary Institutions in Latin America: The Case for a National Fiscal Council", *Open Economies Review* 10(4): 415-42.

Fatás, Antonio, Jürgen von Hagen, Andrew Hughes Hallet, Rolf R. Strauch and Anne Sibert (2003) "Stability and Growth in Europe: Towards a Better Pact", *Monitoring European Integration* 13, Centre for Economic Policy Research.

Gali, Jordí and Roberto Perotti (2003) "Fiscal Policy and Monetary Integration in Europe", Economic Policy 37: 533-572.

Giuliodori, Massimo and Roel Beetsma (2004) "What are the Spill-overs from Fiscal Shocks in Europe? An Empirical Aanalysis", ECB Working Paper No. 325.

Kotlikoff, Laurence (2003) *Generational Policy*, Cambridge, MA: The MIT Press.

Krogstrup, Signe (2006) 'A note on the formal equivalence of the time inconsistency model and the common pool model for budget deficits', Mimeo, The Graduate Institute of International Studies, Geneva

Kydland, F. E. and Prescott E. (1977), 'Rules Rather than Discretion: The Inconsistency of Optimal Plans', *Journal of Political Economy* 85 (3): 473-491.

Milesi-Ferretti, Gianmaria (2003) "Good, Bad, or Ugly? On the Effects of Fiscal Rules with Creative Acconting", *Journal of Public Economics* 88: 377-394.

Persson, Torsten and Lars Svensson (1989) "Why a Stubborn Conservative Would Run a Deficit:Policy with Time-Inconsistent Preferences", *Quarterly Journal of Economics* 54: 225-245.

Persson, Torsten and Guido Tabellini (2000) *Political Economics, Explaining Economic Policy*, MIT Press.

Rogoff, Kenneth, (1985) "The Optimal Degree of Commitment to an Intermediate Monetary Target," *Quarterly Journal of Economics* 100: 1169–1190..

Roubini, Nouriel and Jeffrey Sachs (1989) "Government Spending and Budget Deficits in the Industrial Countries", Economic Policy 8: 100-132.

Velasco, Andres (1999) "A Model of Endogenous Fiscal Deficits and Delayed Fiscal Reforms" in Poterba and von Hagen (eds.), 1999, Fiscal Institutions and Fiscal Performance, University of Chicago Press

Velasco, Andres (2000) "Debts And Deficits With Fragmented Fiscal Policymaking" *Journal of Public Economics* 76(1): 105-125.

Von Hagen, Jürgen (1992), "Budgeting Procedures and Fiscal Performance in the European Communities", Economic Papers 96, European Commission, Brussels.

Von Hagen, Jürgen and Ian Harden (1994) "National Budget Processes and Fiscal Performance", *European Economy Reports and Studies* 3, 311-418.

Von Hagen, Jürgen, and Ian Harden (1995) "Budget Processes and Commitment to Fiscal Discipline", *European Economic Review* 39(3): 771-779.

Walsh, Carl (1995), "Optimal Contracts for Central Bankers", *American Economic Review* 85(1): 150-167.

Wyplosz, Charles (2005). "Fiscal Policy: Institutions Versus Rules", National Institute Economic Review 191: 70-84.

Wyplosz, Charles (2006) "The European Monetary Union: The Dark Sides of a Major Success", *Economic Policy*, forthcoming.