Germany's New Debt Brake:
A Blueprint for Europe?

Eckhard Janeba*

September 2012

Abstract

Many policy reforms are introduced with a significant lag between the time of legislative passing and its actual implementation. This is also the case for a new constitutional rule in Germany, the socalled debt brake (*Schuldenbremse*), which requires the federal and state governments to run (almost, cyclically adjusted) balanced budgets from 2016 and 2020 onwards respectively. In this context I analyze within a simple political economy model, where politicians are less patient than citizens, the costs and benefits of a credibly announced but lagged deficit or debt ceiling rule. I show that a balanced budget rule is at best as effective as not having such a rule in terms of implementing the first best. In an important benchmark case the first best cannot be reached at all. By contrast, a constitutional limit on the future debt level is more effective, even though the first best cannot be always reached when politicians are too inpatient.

JEL-Classifications: D72, D78, H11, H62

Keywords: *balanced budget rule, political economy, debt brake, Schuldenbremse*

1   Introduction

The recent European debt crisis and debt increases in many other countries like the U.S. have fostered the debate about the sustainability of fiscal policy and the search for mechanisms to constrain excessive debts. This has led to a reconsideration of constitutional constraints such as balanced budget amendments, which are already used in various forms in many US states and in Switzerland. In Germany a new so-called *debt brake* ("Schuldenbremse") has become part of the constitution in 2009. Constitutional budget rules are also emphasized in the context of the European debt crisis. The Heads of State of the Euro Area agreed on their summit in December 2011, and followed up by the agreement of all EU member countries except for the U.K. and the Czech Republic in March 2012, to establish a set of new fiscal rules called the Fiscal Compact. This will call for annual structural deficits of no more than 0.5% of nominal GDP if the debt-to-GDP ratio exceeds 60% (European Council, 2011). Despite the current popularity of constitutional constraints on fiscal policy our understanding of the welfare consequences of such rules is still limited when considered in second best situations in which excessive debts are accumulated in the first place.[1]

The purpose of this paper is to understand in a theoretical model the effectiveness of a German type debt brake under two realistic conditions: One, I take a political economy perspective: Fiscal policy is carried out by elected politicians whose interests are not aligned with those of voters. In particular I assume that politicians are less patient than voters, which creates a tendency for overspending and excessive debt in the short run. This incentive is mitigated but not eliminated by reelection concerns. Second, there is a delay between the legislative passing and the date when the new fiscal policy regime becomes effective. For example, in Germany the federal government is allowed to run a (cyclically adjusted) budget deficit of no more than 0.35% of GDP *starting in 2016*. For German states (Länder) the new rule is tougher and requires them to run a zero (cyclically adjusted) budget deficit *starting in 2020*. New rules for Euro countries are also likely to be introduced only in the medium distant future because in the short run coping with recession may still be an important priority.[2]

---

[1]Feld (2010) provides an assessment of the new German rule and gives a good literature overview. An interesting exception is Azzimonti, Battaglini and Coate (2008), which is discussed further below.

[2]The possibility of delay seems to be built in the Fiscal Compact Treaty, Art. 3(1): "The contracting

Besides the goal of stabilizing the economy in the short term, political opportunism is likely to be one important reason for the delay between the legislative act and the effective implementation of fiscal rules. The costs of adjustment are passed on to future policymakers, who may differ from today's ones, and possibly to future generations or individuals who are not politically active today. The lag is sometimes considered an important part of the reform itself, making it viable in the first place.[3] [4] Lagged implementation bears a cost to society, as the reform benefits materializes only in the (distant) future. The costs may be considered small from a welfare perspective if one takes a very long run perspective. This view, however, ignores the decisions and actions prior to the implementation of the reform, which themselves may affect the long run benefits and the credibility of the reform, a point well known from the classic literature on time-inconsistency as in Kydland and Prescott (1977).

In this paper I study the economic effects of two constitutional constraints on fiscal policy, whose introduction is lagged. In order to focus on the role of delay in implementation I assume that the constitutional constraint is credible. Particular attention is devoted to the incentives of voters and politicians prior to the time of the new rule becoming effective. In doing so I am interested in answering the following question: Assuming that politicians are inpatient, is it possible to reach the first best outcome under a lagged debt brake which prohibits budget deficits in the future? The short answer is that in a relevant benchmark case this is not possible. I therefore consider also an alternative rule, which imposes a debt-to-GDP ceiling, and which in this model performs better even though not perfect. This result should not be seen as a general endorsement of debt level over balanced budget rules, as the model abstracts from other important considerations such as the pro-cyclicality of debt rules. Rather, the main point of the paper is to discuss one critical feature of fiscal rules, namely

---

parties shall ensure rapid convergence towards their respective medium-term objective. The time frame will be proposed by the European Commission taking into account country-specific sustainability risks." Furthermore, it is stated that „the contracting parties may temporarily deviate from their medium-term objective or the adjustment path towards it only in exceptional circumstances."

[3]Heinemann (2010) has made this point for Germany's debt brake. Buchanan (1991) goes further and argues that "lagged implementation is an important element in any strategy for constitutional change, and for reasons that are over and beyond the familiar facilitation of agreement among individuals and groups whose identified interests may conflict" (p. 11), as individuals are in a better situation to evaluate alternative constitutional choices when the introduction is lagged.

[4]The case of the introduction of a debt brake in Switzerland is interesting, see EFV 2004 for an overview as well as Feld and Kirchgässner (2008). The new rule was approved in a referendum in 2001 and became effective in 2003. Due to a too optimistic revenue forcasts the maximum expenditure level was adjusted in 2003 to avoid procyclical behavior (see Sachverständigenrat 2007). In this paper cyclical aspects are not considered.

the delay in implementation, that has not been considered in a formal political economy framework yet. For the same reason, the paper does not invalidate empirical research that has shown some effectiveness of fiscal rules, including balanced budget rules, to reduce debt levels and/or expenditures, see Kirchgässner (2002) and Voigt and Blume (2011) for surveys of the literature, because in most cases delays in implementation do not play an important role and rules may be beneficial for other reasons than those considered here.[5]

While the message of the theoretical analysis calls into doubt recent efforts to achieve fiscal sustainability through (near) balanced budget rules, it is interesting to note that in some of the above cases the fiscal rules are accompanied by secondary efforts to make the target realistic. For example, Germany's debt brake for the federal government is accompanied with a specific requirement detailing how the structural deficit shall be reduced between 2011 and 2015 so that the new rule becomes "feasible" in 2016 (Bundesministerium der Finanzen, 2009). A similar plan is suggested for the German Länder but not as firmly required in Germany's national constitution. The longer time horizon and subjective expectations about a bailout make it less likely that all German states will be successful in reaching this target. Interestingly, some states currently consider additional constitutional provisions at the state level. At the European level, the EU Commission and Council will monitor the annual deficit plans and an automatic correction mechanism is called for (European Council, 2011). The present paper points to the importance of these accompanying measures, as without these a balanced budget rule will not lead to a first best outcome under "realistic" parameter values.

The theoretical analysis in this paper introduces a simple political economy model of government debt, in which homogenous voters are governed by politicians who are inpatient from the viewpoint of citizens. The political agency model builds on the retrospective voting framework by Persson and Tabellini (2000). Politicians discount future benefits more than voters, perhaps because there is an exogenous probability of not being in office in the future (other than the explicit reelection calculus considered by voters), leading to excessive debts in absence of any constitutional constraint. This incentive is mitigated but not eliminated

---

[5]A key assumption of the model is that voters are fully rational and information on budget deficits is readily available when voters make their decisions. In reality, voters may be subject to a certain degree of fiscal illusion, as pointed out by an anonymous referee. Whether this changes the result of this paper is unclear a priori, as fiscal illusion would matter both in the situation with and without constitutional constraints. To the extent that fiscal illusion is the result of intransparency, Alt and Lassen (2006) show theoretically and empirically that fiscal transparency reduces debt accumulation.

through reelection concerns.

The main results highlight the importance of only four model parameters: per period tax revenues R, the exogenous non-budget related benefit of holding political office r, the politician's discount factor $\delta \leq 1$, and the historical debt level D_0. It is first shown that in the absence of constitutional constraints fiscal policy is typically inefficient where efficiency is measured by the range of the politician's discount factor under which the first best is implemented.[6] As an important benchmark I consider the situation where tax revenues R are very large relative to the politician's benefits of holding office r (and historical debt). In this benchmark case, the first best can never be reached in the absence of constitutional constraints.

I then consider two constitutional constraints, which are known in period 1 to become effective in period 2. The first type captures a core element of the new German debt brake and prohibits budget deficits in the future (which means new debt cannot exceed repayment of existing debt). In equilibrium, however, this leads at best to the same outcome as under no constitutional constraint, as far as first best implementation is considered. Loosely speaking, politicians in period 1 can threaten to not run for reelection and spend the revenue of all future periods without violating the new debt rule, similar to the situation when no restriction is in place. The second constitutional rule imposes a restriction on the maximum debt level in the future. When the debt target is set appropriately the range of discount factors consistent with the first best is larger than in the absence of a constitutional constraint or a constraint on budget deficits. In the benchmark case the first best is implemented for the politician's discount factor above approximately 0.62. Under the debt constraint the most a politician can achieve in period 1 when not seeking reelection is to extract the revenue from the period in which the constitutional constraint is becoming effective, but not all future tax revenues. The paper thus finds more support for an appropriately set debt ceiling rather than a budget deficit rule (at least when not accompanied by supporting measures as discussed above).

The paper is related to the now classic literature on the political economy of the budget deficit (for an overview see Persson and Tabellini, 2000, chapter 13). Alesina and Tabellini (1990) explain why a balanced budget is desirable ex ante from the voters' perspective, but

---

[6]This idea follows Acemoglu, Golosov, and Tsyvinski (2011), albeit in the context of tax policy.

is not a political equilibrium outcome due to diverging interests among voters. Persson and Svensson (1989) show why a conservative politician, who tends to like little spending, runs a large budget deficit when his successor may come from a different party than when he continues to be in office, thereby focusing on the conflict of interest among governments of different points in time. By contrast, I focus here on the political agency conflict between voters on the one hand and the incumbent politician on the other hand. More recently, Azzimonti, Battaglini and Coate (2008) analyze a balanced budget amendment in a political economy framework building on Battaglini and Coate (2008). Their focus is on the role of supermajorities that may or may not be overridden. They show that a strict balanced budget rule lowers debt in the long at the expense of greater short run volatility in taxes and public goods provision. Unlike this paper, there is no consideration of lagged implementation.

The plan of the paper is as follows. In section 2 I introduce the general model setup and characterize the equilibrium when no constitutional constraint is in place. Section 3 is devoted to the analysis of a two types of fiscal rules. In section 4 check the robustness of the results. Section 5 concludes.

2   The Model

Consider a small open economy which is populated by a representative voter/citizen (also referred to voters) and politicians. There are three periods, $t = 1, 2, 3$. Voter lifetime utility is

$$u(g_1, g_2, g_3) = \ln g_1 + \ln g_2 + \ln g_3, \tag{1}$$

where g_t is public good spending in period t. While the utility function is quite specific in order to make the analysis more tractable, the qualitative forces at work require strict concavity in per period spending, so that smoothing of public good spending is desirable. For simplicity income and tax revenue are held constant throughout, so that the focus is on the timing of government spending. Each period tax revenue is exogenously given at level R. Debt can be taken on in periods 1 and 2 and must be repaid in the next period. The

interest rate is normalized to zero. Hence per period government budget constraints are

$$g_1 = R + D_1 - D_0$$
$$g_2 = R - D_1 + D_2, \tag{2}$$
$$g_3 = R - D_2.$$

Historical debt is given by $D_0 \geq 0$ and is assumed to be not too large relative to R. Borrowing and government saving is done in the international credit market.

It is useful to characterize the first best from the voters' perspective, which is found by maximizing (1) subject to (2) and leads to

$$D_1 = \frac{2D_0}{3}, D_2 = \frac{D_0}{3}, \tag{3}$$

because per period voter utility is strictly concave in government spending and symmetric across periods, and there is no discounting. The first best debt path induces a reduction in debt over time and leads to an allocation with equal public good spending across time

$$g_1 = g_2 = g_3 = R - \frac{D_0}{3}. \tag{4}$$

The voters' first best utility level is $3\ln(R - D_0/3)$.

In contrast to the first best, I assume from now on that decisions on debt and public goods are made by politicians. A politician's utility in any period t when in office, v_t, is equal to government spending in that period plus any fixed benefit r. This simple approach follows the tradition of modelling politicians as budget maximizer, although here in an intertemporal context. A different objective function is considered in section 4, which gives qualitatively similar results. A politician has zero utility when not in office. Politicians are assumed to have a preference for spending today rather than tomorrow, and discount future utility at rate $\delta \in (0, 1]$. While in the analysis below the reelection process is explicitly considered, there might be other (exogenous) reasons why politicians are less patient than voters. For example, the discount factor could be interpreted as the probability that the politician's party stays in power and the politician is not removed by its party or forced to leave office after a scandal involving the candidate himself after reelection. For tractability reasons I assume that a politician's per period utility is linear in the sum of g and r, which implies

that one unit of spending today is more valuable to a politician than spending it tomorrow.[7]

A politician who is in office for all three periods has lifetime utility

$$v = \sum_{t=1}^{3} \delta^{t-1}(g_t + r). \tag{5}$$

The politician in period 1 is the incumbent and hence I ignore in the following the first period office rent. When a politician is not reelected, another otherwise identical politician is randomly selected from the set of politicians. A politician who is not in office has a utility of zero in that period. The difference in objective functions between voters (1) and politicians (5) gives rise to a principal agent problem. In the remainder of this paper I analyze a game between voters and politicians, both with and without constitutional constraints. The game's timing of event is as follows. There are three periods. Within periods actions are taken by politicians and voters in three steps:

1. In period 1, i) voters first set their reservation utility $\bar{u}_1$, which is the maximum (!) utility for period 1 that voters are willing to tolerate in order to reelect the incumbent politician; ii) then the incumbent politician chooses D_1, and iii) voters decide on re-election of the incumbent politician after observing D_1 and given the reelection rule i), that is, a politician who meets or undercuts the reservation utility is reelected with probability one.

2. At the beginning of period 2, the constitutional constraint kicks in (if in place, see below). Then the steps i) to iii) from period 1 are repeated, with D_2 replacing D_1.

3. In period 3 no further action is taken, as only the public good is provided based on the debt decision in period 2.

Notice that there is a monotonic relationship between per period voter utility in period t, $u_t = \ln(R - D_{t-1} + D_t), t = 1, 2$, and debt choice, D_t in that period, which will be exploited frequently below. Once D_t is determined, the corresponding reservation utility follows immediately.

---

[7]This means that preferences of politicians differ from that of voters both in the discount rate and the trade-off between spending across periods. The latter assumption simplifies the analysis as the optimal spending when not running for reelection biases the politician's desired spending entirely to the present.

I consider two types of constitutional limits on fiscal policy. A balanced budget or debt brake restricts the *budget surplus* in period t to be nonnegative

$$R - g_t = D_{t-1} - D_t \geq 0. \tag{6}$$

This is the core feature of Germany's new debt brake, and is consistent with taking on new debt in period 2, D_t, as long as it is not more than repayment of old debt D_{t-1}.

An alternative constitutional constraint restricts the *debt* level in period t to be less than some threshold level

$$D_t \leq \overline{D}_t. \tag{7}$$

For example, $\overline{D}_2 = D_0/3$ is the first best debt level for period 2. Even under such a rule, however, the first best allocation might not be implementable because politicians are less patient than voters and the fiscal rule starts only in period 2.

2.1 Solving the Model: No Constitutional Constraints

In this section I consider the situation of no fiscal policy constraints. The main question is whether the first best allocation (see (3) or (4), respectively) can be implemented. The game is solved by backward induction.

Period 2

A politician has two options: seeking reelection by delivering at least the reservation utility to voters, or maximizing current period payoff and thereby forgoing reelection. Consider an incumbent politician forgoing reelection in period 2. The optimization problem for a politician in that period is:

$$\max_{D_2} R - D_1 + D_2 \text{ s.t. } g_2 = R - D_1 + D_2 \geq 0 \text{ and } g_3 = R - D_2 \geq 0. \tag{8}$$

Note that the optimization problem is independent of historical debt D_0. The optimal decision for the politician is to choose the highest possible debt level $D_2 = R$, as the second inequality constraint regarding g_3 is binding. Doing so gives the politician utility for periods 2 and 3 of

$$\widetilde{v}^{NR} = 2R - D_1,$$

where NR refers to no reelection and the tilde sign indicates interim utility in period 2. It is easy to see that this allocation produces the worst possible outcome for voters who would obtain an utility level equal to minus infinity (because $g_3 = 0$). In order to avoid this outcome, the politician must be given under reelection at least as much as under no reelection. With reelection (R) the politician gets utility equal to spending in period 2, g_2, plus the discounted sum of spending in period 3, g_3, and rent of holding office, r, that is

$$\widetilde{v}^R = g_2 + \delta(g_3 + r) = (1 + \delta)R - D_1 + (1 - \delta)D_2 + \delta r. \tag{9}$$

Debt in period 2 must therefore be at least equal to the value coming from the utility indifference between reelection and no reelection

$$D_2 \geq D_2^{pol} = R - \frac{\delta r}{(1 - \delta)}, \tag{10}$$

where *pol* refers to politician. Condition (10) is the *reelection incentive constraint.* D_2^{pol} is independent of D_1 and positive if and only if $\delta < R/(R + r)$. The latter inequality holds if the rent of holding office (r) is sufficiently small relative to tax revenue (R). When the constraint is binding, the public good levels following from (10) and are

$$g_2^{pol} = 2R - D_1 - \frac{\delta r}{1 - \delta}$$
$$g_3^{pol} = \frac{\delta r}{1 - \delta} > 0. \tag{11}$$

Condition (10) shows how much debt politicians must be allowed to take on. Voters may want more debt, however, depending on how much debt was accumulated in period 1, thus affecting the overall size of spending for periods 2 and 3. Intuitively, if in the first period a high level of debt was taken on, voters want to shift spending away from period 3 towards period 2 by allowing for (more) borrowing in period 2 .

Given D_1, the unconstrained (that is ignoring the reelection constraint (10)) optimal debt for period 2 from the voters' perspective is the solution to the problem

$$max_{D_2} \ln(R - D_1 + D_2) + \ln(R - D_2), \tag{12}$$

subject to nonnegative public good levels in periods 2 and 3. This leads to

$$D_2^{vot}(D_1) = \frac{D_1}{2}, \tag{13}$$

where *vot* refers to voters. The right hand side of (13) is rising in D_1, that is, the higher is first period debt, the higher is the voters' desired second period debt level. If second period debt is chosen according to (13), public good provision equals

$$g_2^{vot} = g_3^{vot} = \frac{2R - D_1}{2}. \tag{14}$$

I can now determine the reservation utility set by voters in period 2, taking the two candidates for second period debt into account: the level necessary for a politician to seek reelection, D_2^{pol}, and the one preferred by voters, D_2^{vot}. Since voter utility is strictly concave in second period debt, voters set the reservation utility $\overline{u}_2 = \ln(R - D_1 + D_2)$, where

$$D_2 = \max\{D_2^{vot}, D_2^{pol}\} = \max\left\{\frac{D_1}{2}, R - \frac{\delta r}{1 - \delta}\right\}. \tag{15}$$

The *reelection constraint is said to be binding* if $D_2^{vot} < D_2^{pol}$: Voters must accept a higher debt level than they prefer otherwise in order to give the politician the proper incentive to seek reelection.

Let $\widehat{D}_1$ be the level of first period debt such that the two second period debt levels are the same, i.e., $D_2^{pol} = D_2^{vot}(\widehat{D}_1)$:

$$\widehat{D}_1 = 2\left(R - \frac{\delta r}{1 - \delta}\right). \tag{16}$$

Compared to no reelection the politician is better off by going for reelection and choosing D_2 according to the maximum of $\{D_2^{vot}, D_2^{pol}\}$, given the reservation utility. The politician's and voters' utilities can be found by inserting (15) in (9) and (12) respectively. From the debt choice follows the corresponding reservation utility by inserting D_2 into $\overline{u}_2 = \ln(R - D_1 + D_2)$.

Lemma 1. Assume that first period debt D_1 is given and no constitutional restriction is in place at the beginning of period 2.

a) When $D_1 < \widehat{D}_1$, the reelection constraint in period 2 is binding ($D_2^{vot} < D_2^{pol} = D_2$) and public good levels are given by (11).

b) When $D_1 \geq \widehat{D}_1$, the reelection constraint in period 2 is not binding ($D_2 = D_2^{vot} \geq D_2^{pol}$) and public good levels are shown in (14).

Lemma 1 is illustrated in *Figure 1*. It shows the levels of first and second period debt on the axes. Period 2 debt equals the upper portion of the two functions, and is given by the bold line.

Period 1

I now move on to the analysis of *period 1*. When the politician does not seek reelection in the first period, the politician goes for maximum debt in that period. D_1 is constrained by $2R$, however, which is the sum of all future tax revenue (no lender would accept more debt than available tax revenues from now on). At this binding maximum, (15) implies $D_2 = R$. The no reelection strategy gives the politician a payoff of $v^{NR} = 3R - D_0$. Intuitively, the incumbent politician extracts the entire tax revenues from all three periods and is constrained only by paying back historical debt D_0. This utility level will be critical for the comparison to the case with constitutional constraints in section 3.

No reelection in period 1, however, is harmful to voters as no public goods are provided in periods 2 and 3. Thus providing incentives for reelection in period 1 is in the interest of voters. When seeking reelection in period 1 the politician obtains

$$
\begin{aligned}
v^R &= g_1 + \delta(g_2 + r) + \delta^2(g_3 + r) \\
&= (1 + \delta + \delta^2)R - D_0 + (1 - \delta)(D_1 + \delta D_2) + \delta r(1 + \delta),
\end{aligned}
\tag{17}
$$

given that the politician is reelected also in period 2.

The politician's utility under reelection depends on the rationally expected level of second period debt. The following result is helpful in solving the model.

Lemma 2. In equilibrium, second period debt fulfills $D_2 = D_2^{vot} = D_1/2$.

Proof: The proof is done in two steps. I first show that $D_2 = D_2^{pol}$ is not compatible with $D_1 = D_1^{pol}$. Then I prove that $D_2 = D_2^{pol}$ cannot hold when first period debt satisfies $D_1 = D_1^{vot}$. Assume to the contrary that $D_2 = D_2^{pol}$, and for the moment that the reelection constraint is also binding in period 1 so that

$$
D_1 = D_1^{pol} = 2R - \frac{\delta r}{1 - \delta},
$$

where the latter is found by equating v^{NR} and v^R. From Lemma 1 above, $D_2 = D_2^{pol}$ requires $D_1 \leq \widehat{D}_1 = 2\left(R - \frac{\delta r}{1-\delta}\right)$. Taken together the restrictions on D_1 imply $2R - \frac{\delta r}{1-\delta} \leq$

11

$2\left(R - \frac{\delta r}{1-\delta}\right)$, which is not feasible for $\delta \in (0,1]$. Hence the second period reelection constraint cannot be binding if it is binding in the first period.

Now assume instead that the reelection constraint in period 1 is not binding (i.e., $D_1 = D_1^{vot} \geq D_1^{pol}$), but $D_2 = D_2^{pol}$. The voters' preferred first period debt level is found by maximizing (1) with respect to D_1 subject to the budget constraints (2) and now using $D_2 = D_2^{pol} = R - \delta r/(1-\delta)$, which is independent of D_1. Maximization leads to $D_1^{vot} = (R + D_0 - \delta r/(1-\delta))/2$, and this first period debt level must be higher than $D_1^{pol} = 2R - \delta r/(1-\delta)$ by construction. At the same time, $D_2^{pol} = R - \delta r/(1-\delta) > D_2^{vot} = D_1^{vot}/2$ must hold, which turns out to be infeasible because $R - \delta r/(1-\delta) > D_1^{vot}/2 > (2R - \delta r/(1-\delta))/2$. Thus if the the first period reelection constraint is not binding, it cannot be binding in period 2. This completes the proof.

The intuition for the result is as follow. When the politician's discount factor is high, and thus the future is highly valued, voters do not have to tolerate much debt because politicians themselves are eager to obtain the benefit of holding office in the future. $\widehat{D}_1$ is low and thus the reelection constraint in period 2 is not binding. By contrast, when politicians discount future benefits a lot, voters need to accept a lot of debt for politicians to seek reelection ($\widehat{D}_1$ is large). Yet, the same logic applies in period 1 as well, leading to high levels of D_1^{pol}, which means that voters in period 2 want even more debt than what it takes for politicians to seek reelection.

I am now in a position to analyze the equilibrium level of debt in the first period. Using Lemma 2 and setting the reelection utility in period 1 equal to the no reelection utility, $3R - D_0$, the incentive constraint for reelection in period 1 reads

$$D_1 \geq D_1^{pol} = 2\left(R - \frac{\delta r(1+\delta)}{2 - \delta - \delta^2}\right). \tag{18}$$

Voters may want more or less debt compared to (18). To find out, differentiate voter utility (1) subject to (2) with respect to D_1, and take into account Lemma 2. The derivative is

$$\frac{du}{dD_1} = \frac{1}{R + D_1 - D_0} - \frac{2}{2R - D_1}, \tag{19}$$

which is nonnegative at $D_1 = D_1^{pol}$, and thus $D_1^{vot} \geq D_1^{pol}$, if

$$\frac{\delta r(1+\delta)}{2 - \delta - \delta^2} \geq R - \frac{D_0}{3}. \tag{20}$$

12

Assuming for the moment that condition (20) holds, the optimal debt level is found from setting (19) equal to zero and solving for D_1. The solution is $D_1^{vot} = 2D_0/3$, which subsequently leads to $D_2 = D_0/3$, and together match the first best values as given in (4). So the first best allocation would be attained if (20) were satisfied. Based on this, the first main result is summarized in

Proposition 1. When no constitutional constraint on fiscal policy is in place, the first best is implemented if and only if the politician's discount factor satisfies

$$\delta \geq \delta^* := -0.5 + \sqrt{0.25 + \frac{2(3R - D_0)}{3(R + r) - D_0}} \geq 0. \tag{21}$$

Proof: Solving (20) as equality for the smallest level of δ gives (21).

Proposition 1 provides the parameter range under which the efficient allocation is implemented despite the fact that politicians are inpatient. It may look surprising that this is possible at all. Yet, it may not be particularly likely. To assess the stringency of condition (21), consider the following special case: For $R >> r$ (and small value of D_0) the quotient under the root in (21) is converging to 2, which in turn implies that δ^* goes to 1. In words, when the per period tax revenue becomes very large relative to the exogenous benefit of holding office (and historical debt), Proposition 1 says that the first best is not implementable with even only slightly inpatient politicians. The result suggest that it is worth looking for constitutional constraints that limit deficits or debts in period 2.

3 Constitutional Constraints

In this section I consider credible constitutional rules which kick in at the beginning of period 2. I consider two types of rules, both roughly in line with elements of existing constitutional provisions like the debt brake in Germany or a debt-ceiling rule as in the European Stability and Growth Pact.

3.1 Restricting the Budget Deficit in Period 2

I now analyze a constitutional constraint on the budget deficit in period 2, which captures a core element of the new German debt brake. In the context of the present model the constraint requires according to (6): $D_2 \leq D_1$. I start with the analysis of period 2. A politician who does not seek reelection solves problem (8) subject to the new constraint. Rather than solving the entire game, I focus on the conditions under which the first best can be implemented, in order to compare to the outcome reported in Proposition 1.

For nonnegative historical debt D_0 I restrict attention to first period debt levels to be in the interval $D_1 \in [0, 2R]$, so that public good levels are nonnegative in periods 2 and 3.[8] The solution to the politician's optimization problem in period 2 when not seeking reelection is $D_2 = \min\{R, D_1\}$, because her utility is increasing in D_2. This level is lower or equal to the debt level under no reelection without constitutional constraints (where $D_2 = R$). In this sense the constitutional constraint has bite. The politician's utility in period 2 under no reelection is thus

$$\tilde{v}^{NR} = \begin{cases} R & \text{if } 0 \leq D_1 < R. \\ 2R - D_1 & \text{if } R \leq D_1 \end{cases} \tag{22}$$

The alternative strategy for a politician is to seek reelection, which must be in the interest of voters.[9] Reelection utility is given by (9). Depending on D_1 second period debt must satisfy

$$D_2 \geq D_2^{pol} = \begin{cases} D_1 - R & \text{if } 2R - \frac{\delta r}{1-\delta} \leq D_1 \leq 2R \\ R - \frac{\delta r}{1-\delta} & \text{if } R \leq D_1 < 2R - \frac{\delta r}{1-\delta} \\ \frac{D_1 - \delta(R+r)}{1-\delta} & \text{if } R > D_1 \geq 0. \end{cases} \tag{23}$$

In (23), the level of second period debt at very high levels of first period debt, $D_1 - R$, is driven by the constraint of nonnegative public good supply in period 2. *Figure 2* illustrates the shape of the political incentive constraint under the assumption that δ is not too low. In this case D_2^{pol} lies under the debt level preferred by voters and coincides with D_2^{vot} at $D_1 = 2R$ and happens to coincide at $D_1 = R$ (due to a specific value of δ).

I can now state directly the main result of this section.

---

[8] This assumption is innocuous in so far as lenders would not be willing to lend more than $2R$ in period 1, as the amount cannot be paid back.

[9] From the voters' perspective reelection is better than no reelection for $D_1 \geq 0$ when $D_2 \in [0, D_1]$, which is implied by the balanced budget rule.

Proposition 2. Under a credible balanced budget rule (as shown in (6)) in period 2 the range of the politician's discount factor compatible with the first best is the same as under no constitutional constraint.

Proof: Recall that the first best requires $D_1 = 2D_0/3$ and $D_2 = D_0/3$. Assume for the moment that first period debt is at its first best level. Voters in period 2 prefer then the first best level of second period debt $D_2^{vot} = D_0/3 = D_1/2$, because the unconstrained solution to the program (12) is consistent with the balanced budget rule. *Figure 2* shows that $D_2 = D_2^{vot} \geq D_2^{pol}$ holds if δ is not too low (which I now assume for a moment). In the first period voters prefer the first best debt level in period 1 when anticipating that second period debt is optimal as well because this implements the overall efficient solution. Hence, the politician's reelection constraint in period 1 shall not be binding. The necessary condition for this is $D_1^{vot} = 2D_0/3 \geq D_1^{pol}$, which is the same condition leading to (21) as in Proposition 1.

If δ is sufficiently low, so that $D_2^{vot} < D_2^{pol}$, the first best cannot be implemented because second period debt would be excessive even if first period debt were at its first best level because $D_2^{pol} > D_2^{vot} = D_1/2 = D_0/3$. This completes the proof.

Proposition 2 shows that a balanced budget rule in period 2 alone does not improve the outcome over the case without constitutional constraints. The constitutional constraint makes it not easier to get to the first best debt level in period 2, and this limits its usefulness. The balanced budget rule in period 2 makes sure that the reelection constraint in period 2 is not binding for sufficiently high levels of δ, but this is also the case *in equilibrium* without a constitutional constraint. It is important to recall, however, that I consider only the case of the first best. A constraint on budget deficits may have beneficial effects in a second best case. In other words, in a situation when the first best cannot be reached, voter utility with such a constraint may be higher than without any constraint.

It is also interesting to point out that the delay of introducing (6) is crucial for the rather pessimistic outcome of Proposition 2. To make this more explicit, let me make the assumption that a balanced budget constraint is in place in periods 1 *and* 2, so that $D_2 \leq D_1 \leq D_0$ must hold. This limits in period 1 the politician's utility under no reelection:

The best choice from the politician's viewpoint, assuming D_0 is smaller than R, is then $D_1 = D_0$, and the corresponding utility of the politician is $v^{NR} = g_1 = R + D_0 - D_0 = R$. By contrast, when the politician seeks reelection the utility is given by (17). As the focus is on first best implementation, let me assume for a moment that second period debt follows the voters' rule $D_2 = D_1/2$. i.e., the reelection constraint is not binding in period 2. In that case the politician finds reelection in period 1 advantageous when

$$D_1 \geq D_1^{pol} = \frac{D_0 - \delta(1 + \delta)(R + r)}{(1 - \delta)(1 + \delta/2)}.$$

Efficiency of first period debt then requires $D_1^{vot} = 2D_0/3 \geq D_1^{pol}$, which holds when

$$D_0 \leq \frac{3\delta(1 + \delta)(R + r)}{(1 + \delta + \delta^2)}.$$

This condition is satisfied for large enough δ relative to D_0. In the special case of no historical debt $(D_0 = 0)$ the condition always holds, and the first best is implemented under a balanced budget rule in *both* periods. This makes clear that the delay in implementation is responsible for the difficulty in reaching the first best.

3.2 Restricting the Debt Level in Period 2

I consider next a different constitutional constraint, becoming effective in period 2, and which requires the government to meet a maximum debt level, as shown in (7). As before I compare the utility of a politician under the no reelection and the reelection strategies. Under the former, the politician faces in period 2 the same problem as in (8) subject to the constitutional constraint (7). Now the best option for the incumbent is to choose $D_2 = \min\{\overline{D}_2, R\}$.[10] This gives a no reelection utility for the politician equal to $\widetilde{v}^{NR} = R - D_1 + \min\{\overline{D}_2, R\}$.

With reelection the politician gets $\widetilde{v}^R = g_2 + \delta(g_3 + r)$, as in (9), which is preferred over no reelection if

$$D_2 \geq D_2^{pol} = \frac{\min\{\overline{D}_2, R\} - \delta(R + r)}{1 - \delta}. \tag{24}$$

Note that (24) is independent of D_1.

By contrast, the voters' optimum debt level in period 2 is $D_1/2$, as shown in (13), if this debt level is consistent with the balanced budget rule. Thus $D_2^{vot} = \min\{D_1/2, \overline{D}_2\}$. The

---

[10]I implicitly assume that D_1 was not too large so that $g_2 \geq 0$.

constitutional constraint limiting D_2 affects therefore both the voters' desired debt level and the level necessary to keep the politician interested in reelection.

Combining the above insights the following second period debt is chosen by voters when determining their reservation utility in period 2

$$D_2 = \max\{D_2^{pol}, D_2^{vot}\} = \max\left\{\frac{\min\{\overline{D}_2, R\} - \delta(R + r)}{1 - \delta}, \min\left\{\frac{D_1}{2}, \overline{D}_2\right\}\right\}. \tag{25}$$

The constraint is shown in *Figure 3*. D_2^{pol} is independent of D_1 and thus a flat line. It lies below $\overline{D}_2$ and is the lower the higher is δ. Hence the political incentive constraint is less likely to bind, the higher the politician's discount factor. D_2^{vot} is equal to $D_1/2$, as before, until the constitutional constraint becomes binding at $D_1 = 2\overline{D}_2$.

Next, I move to the analysis of *period 1*. When the politician does not aim for reelection in period 1, the politician's utility is $v^{NR} = R - D_0 + D_1$, which is increasing in D_1. Various constraints must be taken into account, however. All public good levels must be nonnegative and the debt level constraint (7) in period 2 must hold, which requires $D_2 \leq \min\{\overline{D}_2, R\}$. Together with the condition $g_2 = R - D_1 + D_2 \geq 0$ first period debt must therefore satisfy

$$D_1 \leq R + \min\{\overline{D}_2, R\}.$$

Under no reelection this constraint is binding because the politician's utility is increasing in D_1 and therefore the corresponding utility level for the incumbent is

$$v^{NR} = 2R - D_0 + \min\{\overline{D}_2, R\}. \tag{26}$$

With reelection, utility is given by (17). To keep the politician interested in reelection, utility from reelection (17) and no reelection (26) are equated. First period public debt must therefore satisfy

$$D_1 \geq D_1^{pol} = \frac{R(1 - \delta - \delta^2) - \delta r(1 + \delta) + \min\{\overline{D}_2, R\}}{1 - \delta} - \delta D_2. \tag{27}$$

Again I focus on the implementation of the first best. Assume for a moment that first period debt D_1 is at the efficient level $D_1 = 2D_0/3$. As before, the condition $D_2 = D_0/3$ then holds and implements the first best if $\overline{D}_2 \geq D_1/2 = D_2^{vot} \geq D_2^{pol}$. Upon substitution from (25) and imposing $\overline{D}_2 \leq R$ this condition is equivalent to

$$\frac{D_0}{3} \leq \overline{D}_2 \leq \frac{(1 - \delta)D_0}{3} + \delta(R + r). \tag{28}$$

17

The condition requires the debt target to be set appropriately. Condition (28) is not empty and holds, for example, when $\overline{D}_2 = D_0/3$, that is at the first best level for that period. The following result now follows.

Proposition 3. The first best is implemented under a credible maximum debt level $\overline{D}_2 \in [D_0/3, R]$, consistent with (28), when the politician's discount factor satisfies

$$\delta \geq \delta^{**} := -0.5 + \sqrt{0.25 + \frac{3(R + \overline{D}_2) - 2D_0}{3(R + r) - D_0}} \geq 0. \tag{29}$$

Proof: When (28) holds, the remaining question is when first period debt is efficient, which requires $D_1 = D_1^{vot} = 2D_0/3 \geq D_1^{pol}$? Substituting (27) for D_1^{pol} and solving the inequality for δ gives (29).

Note the difference between δ^* and δ^{**}, which arises in the second term under the square root of (21) and (29). It can be easily shown that the numerator of the the second term under the bracket for δ^{**} is smaller than for δ^*. Assuming that the debt ceiling is properly set, this means that the constitutional constraint on debt is more effective than the previous constraint restricting budget deficits. The difference to the first constitutional constraint arises due to the better outside option when foregoing reelection under no constitutional constraint, which allows the politician to set $D_1 = 2R$, compared to the second constitutional constraint, when $D_1 = R + \min\{\overline{D}_2, R\}$ under no reelection.

Condition (28) puts a constraint on the range of feasible debt ceilings. Recall that the condition is fulfilled when the debt target for period 2 is set at the first best level. It is important to note that a constitutional constraint that forces the government to take on at most the first best debt level in the second period does not automatically lead to the overall first best allocation. The delay in introducing the constraint combined with inpatient politicians imposes additional constraints.

As in section 2 it is interesting to look into special cases. For example, setting the debt ceiling at its upper bound, $\overline{D}_2 = R$, leads to the same outcome as in Propositions 1 and 2 and therefore the debt ceiling has no bite. At the lower bound of the range, when the debt ceiling is at its first best level, $\overline{D}_2 = D_0/3$, the critical discount factor falls because

18

the second term under the root of (29) reduces to $(3R - D_0)(3(R + r) - D_0)^{-1}$. Assuming now, like in the benchmark previously considered, that the tax revenue R is large relative to the rent of holding office r and historical debt D_0, the term converges toward 1. For this situation δ^{**} in (29) equals approximately 0.62. Even for values of the discount factor clearly below 1, the first best can be obtained. However, the debt ceiling rule introduced in period 2 reduces efficiency substantially when politicians are too impatient.

4   Comparison and Extensions

I now compare the results of Propositions 1,2 and 3 by comparing δ^* and δ^{**} to arrive at the main result of this paper.

Proposition 4. An appropriately set constitutional constraint on the debt level in period 2, $\overline{D}_2 \in [D_0/3, R)$, implements the first best for a larger range of politician's discount factors than if no constitutional rule is imposed or a balanced budget rule prohibiting budget deficits in period 2 is in place.

The difference between the two situations comes from out of equilibrium behavior. With an appropriately chosen constitutional constraint on D_2 in place, the option of foregoing reelection in period 1 is less attractive for a politician than when a bigger deficit could be run under no such rule or when constraints are placed only on net debt. It is important to emphasize that the result does not make any statement about the effectiveness of a debt brake in second best situations, that is outside the range of discount factors for which the first best can be reached.

In the remainder of this section I discuss two important assumptions. A key assumption for the existence of excessive debt was that politicians are less patient than voters. While there are good reasons to make such an assumption, it is instructive to reverse it. In a modified scenario voters are assumed to be inpatient, thus having a discount factor of less than 1, and politicians are assumed to value present and future alike. Specifically, assume that voter utility is

$$u = g_1 + \delta g_2 + \delta^2 g_3,$$

19

where $\delta \leq 1$, and politician utility is given by

$$v = \ln g_1 + \ln(g_2 + r) + \ln(g_3 + r),$$

when in office for all three periods. A politician who accumulates debt may simply respond to the interests of voters. It is easy to see that in this framework the agency problem disappears. Take, for example, the case of no constitutional constraint as in section 2. In period 2 voters prefer second period debt D_2 to be equal to R, as one Euro spent in period 2 gives higher utility than spending it in period 3. The voters' optimal debt level, however, is exactly what the politician would choose if not seeking reelection. Hence there is no conflict of interest. Voters can choose not to reelect the politician whenever he deviates from the voter's optimal choice, thus eliminating the incentive for a politician to behave against voter interests.

Another important assumption in the previous two sections was that an incumbent politician's utility is proportional to government spending on public goods. While a drastic simplification, it was meant to capture the aspect that more spending gives more control. In contrast, let me assume here that politicians benefit from money diverted away from government public good spending, called government waste (as in Persson and Tabellini, 2000). In line with the main analysis of this paper I assume that politicians are less patient than voters. The government budget constraints now become

$$\begin{aligned} g_1 + s_1 &= R + D_1 \\ g_2 + s_2 &= R - D_1 + D_2, \\ g_3 &= R - D_2, \end{aligned} \qquad (30)$$

where $s_t, = 1, 2$, is the amount of money that a politician is able to extract for himself and is not beneficial to voters (and $D_0 = 0$ for simplification). The politician's per period utility when in office in period t is the sum of $s_t + r$.

The modification changes how the reelection constraint is constructed. Consider again the case of no constitutional constraint in period 2 to illustrate the mechanism: With no reelection the incumbent politician maximizes s_2, which leads to no public good provision in that period, $g_2 = 0$, and maximal debt, $D_2 = R$, so that utility from that strategy is $2R - D_1$. Reelection utility, by contrast, is $s_2 + \delta r = R - D_1 + D_2 - g_2 + \delta r$. Indifference between the two options gives a relationship between debt and public good level in the second period

according to

$$D_2 = g_2 - \delta r + R, \tag{31}$$

which is now the reelection constraint. In setting the reservation utility voters then maximize $\ln g_2 + \ln g_3$ over D_2 subject to (31), which results in second period variables as function of the exogenous parameter and D_1.

The key insight of section 2, however, remain in tact. To see this, consider the situation in period 1. With no balanced budget rule a politician who forgoes reelection sets $D_1 = 2R, g_1 = 0$, and thus $s_1 = 3R$. This is also the case under a constitutional constraint prohibiting budget deficits. By contrast, when the debt level in period 2 is restricted to be nonnegative (given $D_0 = 0$), the maximum amount that a politician can extract is $D_1 = R, g_1 = 0$ and thus $s_1 = 2R$ only. This pattern for the no reelection strategy parallels the one in sections 2. What differs is how in equilibrium the politician's utility emerges when voters formulate their reelection strategy, something that is not analyzed in detail here. The first best seems to be even more difficult to reach, as now there is not only an inefficiency of spending across periods, but also diversion of government funds for purposes that have no value to voters at all.

5   Concluding Remarks

In this paper I have analyzed the economic effects of constitutional constraints on future fiscal policy when voters and politicians disagree on the timing of government spending. The focus on a political agency problem does not imply that political conflicts among citizens, like in Tabellini and Alesina (1990), or among present and future governments, like in Persson and Svensson (1989), are irrelevant for understanding budget deficits and excessive debt. Rather the emphasis is on the shortsightedness of politicians, similar to Acemoglu et al. (2011) in the context of capital taxation, and thus complements those other analyses of excessive budget deficits and debts. The present approach is similar in spirit to Azzimonti, Battaglini and Coate (2008) who analyze the desirability of a balanced budget rule in a complex dynamic political economy model. Unlike their paper, the contribution of the present paper is to consider lagged constraints, which means a delay in the introduction of a previously passed

new budget or debt rule. It is the combination of the political agency problem with the delay that leads typically away from the first best and gives rise to interesting dynamics, as decisions prior to the new rule become important.

I first show that without any constitutional constraint the delay of implementation is crucial, that is, the first best is typically not implementable when politicians are not patient enough. In the benchmark case the first best cannot be reached at all. A debt brake that restricts only future budget deficits cannot improve upon this when it comes to implementing the first best, as a politician's outside option is still consistent with extracting all future tax revenue through borrowing before the new rule kicks in. This tendency for excessive debt can be reduced by imposing an appropriately chosen restriction on the future debt level. In this case politicians are constrained in how much they can extract from future tax revenue through debt issue prior to the time when the constitutional rule becomes effective. Nevertheless, this rule does not guarantee an overall first best allocation. The delay in introducing the rule has bite. At the same time, it should be pointed out that lack of bite of the balanced budget rule may be less severe in a model with a longer time horizon than the three periods considered here. Extending the model beyond three periods is non-trivial because the equilibrium policy is non-stationary due to the lack of introducing the constitutional rule right at the start. Future research may address this point.

The first constitutional rule captures a core element of the new German constitutional provisions regarding deficit policies at the federal and state level, which will kick in 2016 and 2020 respectively. Given the high levels of debt in Germany and the time until the new rule becomes effective the credibility of the new rules will be challenged. The long period until implementation suggests that the transition effects are not negligible. As many other countries also struggle with large amounts of debt and non-sustanainable budget deficits new constitutional constraints on debt are likely to be considered there as well. As emphasized in the introduction, political opportunism might lead those countries to delay the introduction of tighter constraints, which may also be called for by current stabilization objectives, but a debt brake rule may be less effective than desired.

References

[1] **Acemoglu, D., Golosov, M. and A. Tsyvinski.** "Political Economy of Ramsey Taxation," *Journal of Public Economics* 95, 2011, 467-475.

[2] **Alt, J.E. and D.D. Lassen.** "Fiscal transparency, political parties, and debt in OECD countries," *European Economic Review*, 50(6), 2006, 1403-1439.

[3] **Azzimonti, M., Battaglini, M. and S. Coate.** "Analyzing the Case for a Balanced Budget Amendment to the U.S. Constitution," mimeo, October 2008.

[4] **Battaglini, M. and S. Coate.** "A Dynamic Theory of Public Spending, Taxation, and Debt," *American Economic Review* 98, 2008, 201-236.

[5] **Buchanan, J.M.** "Lagged implementation as an element in constitutional strategy," *European Journal of Political Economy* 10, 1994, 11-26.

[6] **Bundesministerium der Finanzen**, Reform der verfassungsrechtlichen Verschuldungsregeln von Bund und Ländern, Die Empfehlungen der Föderalismusreform II, Monthly Report March 2009, 36-44.

[7] **Eidgenössische Finanzverwaltung (EFV)**, Eine Neubewertung der Schuldenbremse, Working Paper No. 2, Bern, January 2004.

[8] **European Council.** "Statement by the Euro Area Heads of State or Government, Brussels, December 9, 2011.

[9] **Feld, L.P.** "Sinnhaftigkeit und Effektivität der deutschen Schuldenbremse," *Perspektiven der Wirtschaftspolitik* 11(3), 2010, 226-245.

[10] **Feld, L.P. and G. Kirchgässner.** "On the Effectiveness of Debt Brakes: The Swiss Experience," in R. Neck and J.-E. Sturm (eds.), Sustainability of Public Debt, Cambridge, USA, MIT Press, 223-255.

[11] **Heinemann, F.** "Eine Gabe an St, Nimmerlein? - Zur zeitlichen Dimension der Schuldenbremse," *Perspektiven der Wirtschaftspolitik* 11, 2010, 246-259.

[12] Kirchgässner, G. "The Effects of Fiscal Institutions on Public Finance: A Survey of the Empirical Evidence", in: S.L. Winer and H. Shibata (eds.), *Political Economy and Public Finance: The Role of Political Economy in the Theory and Practice of Public Economics*, Edgar Elgar, Cheltenham 2002, S. 145-177.

[13] **Kydland, F.E. and E.E. Prescott.** "Rules rather than discretion: The inconsistency of optimal plans," *Journal of Political Economy* 85, 1977, 473-492.

[14] **Persson, T. and L.E.O. Svensson**. "Why a stubborn conservative would run a deficit: Policy with time-inconsistent preferences," *Quarterly Journal of Economics* 104, 1989, 325-345.

[15] **Persson, T. and G. Tabellini.** *Political Economics: Explaining Economic Policy.* Cambridge: MIT Press, 2000.

[16] **Sachverständigenrat**, *Staatsverschuldung wirksam begrenzen*, Wiesbaden, März 2007.

[17] **Tabellini, G. and A. Alesina**. "Voting on the Budget Deficit", *American Economic Review* 80, 1990, 37-49.

[18] **Voigt, S. and L. Blume.** "The Economic Effects of Constitutional Budget Institutions", mimeo. 2011.
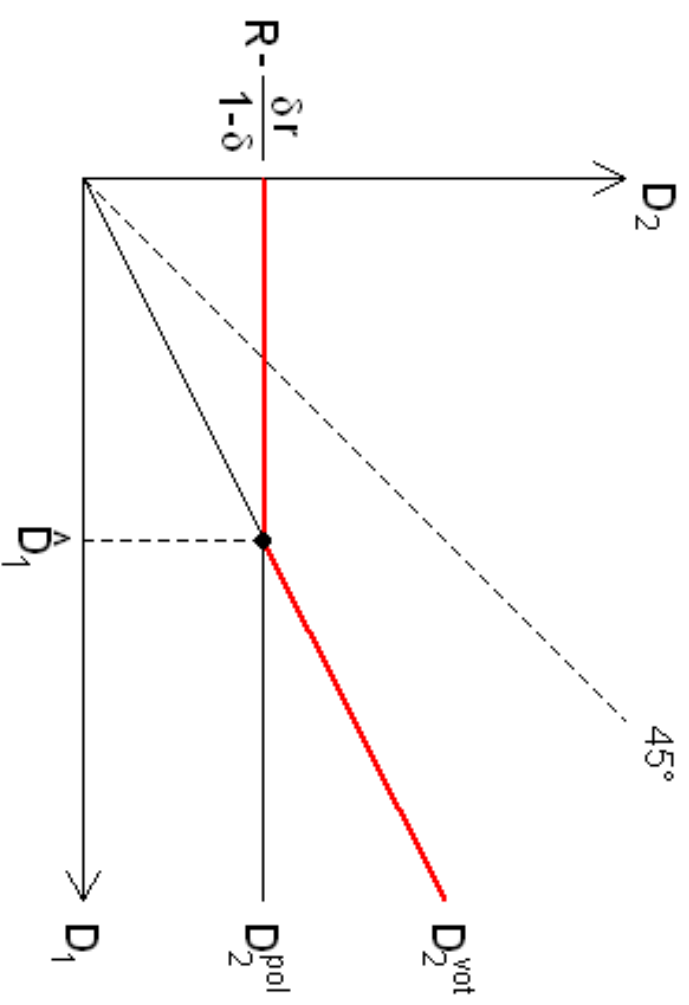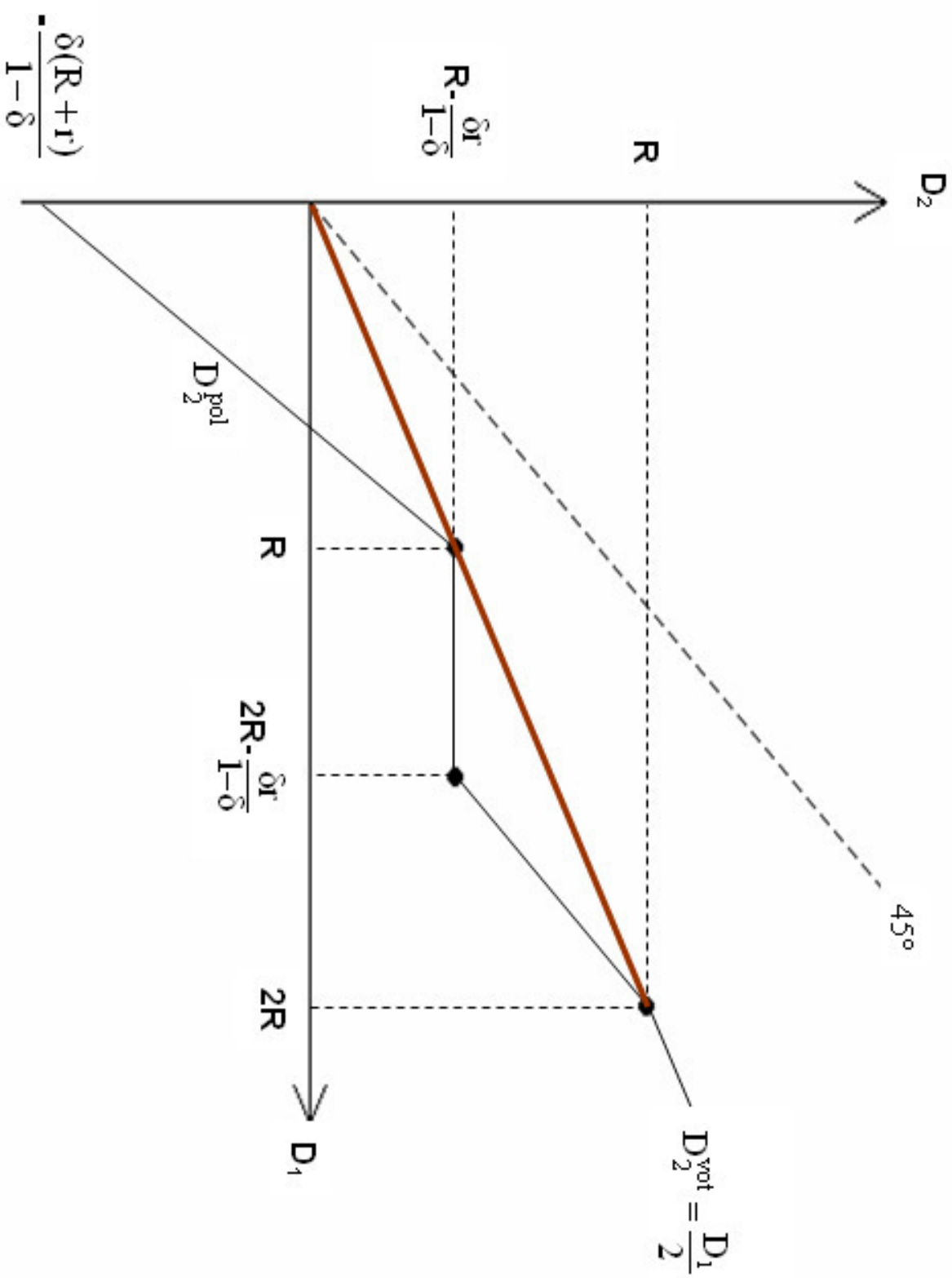
Figure 1

Figure 2

Figure 3