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Deficit Limits and Fiscal Rules for Dummies

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The paper shows that common fiscal rules, such as a limit to the deficit-output ratio, induce an "escape clause"–type fiscal policy, similar to that studied for monetary policy by Flood and Isard (1988 and 1989) and Lohmann (1992): The government resorts to an active stabilization (for example, countercyclical) policy only during "exceptional times" by running deficits in recession phases and surpluses during economic booms. In contrast, it optimally chooses a procyclical policy in intermediate states of the economy, for example, by raising the budget deficit when output improves. Because the optimal fiscal reaction function in the presence of fiscal rules is not monotonous in output, the standard estimates that assume linearity are prone to a serious bias, and the conclusions on the pro- or countercyclical properties of fiscal policy found in the literature are likely to be unreliable. [JEL E61, E62, E63]
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This paper presents a very simple framework for discussing the effects of budget limits and fiscal rules on the conduct of fiscal policy. The literature on "fiscal frameworks" has expanded very rapidly in the past few years, possibly owing to the introduction of the Stability and Growth Pact (SGP) in Europe, the adoption of the "golden rule" in the United Kingdom, and the implementation of various fiscal rules and fiscal responsibility laws in many countries.

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In a nutshell, all these frameworks aim to get rid of the ''bathwater'' of (politically motivated) excessive fiscal deficits without throwing away the ''baby'' of fiscal stabilization. But how should one achieve this objective? This paper attempts to clarify this issue by providing a simple framework for analyzing the effects of budget limits on the government's incentive for fiscal discipline and their implication for stabilization policy.

The paper shows that common fiscal rules, such as a limit to deficit-output ratio, induce an ''escape clause''–type fiscal policy similar to that studied for monetary policy by Flood and Isard (1988 and 1989) and Lohmann (1992): The government resorts to an active stabilization (for example, countercyclical) policy only during ''exceptional times'' by running deficits in recession phases and surpluses during economic booms. In contrast, it optimally chooses a procyclical policy in intermediate states of the economy, for example, by raising the budget deficit when output improves.

The analysis allows for a comparison between different budget rules and the characterization of the ''optimal'' fiscal rule. This optimal rule requires a mechanism by which the government accumulates ''credits'' when running surpluses (in good times), to be used to run deficits when needed (in bad times). A fiscal ''stabilization fund'' provides an example.

Finally, I find that deficit limits become less effective for providing fiscal discipline when the economy is subject to high output volatility.

An interesting implication of these results concerns the empirical estimation of ''fiscal policy reaction functions'' in the presence of fiscal rules. Most empirical specifications assume linearity. However, because the optimal fiscal reaction function in the presence of fiscal rules is not monotonous in output, the estimates are prone to a serious bias, and the conclusions on the pro- or countercyclical properties of fiscal policy are likely to be unreliable (for a nonlinear empirical approach, see Manasse, 2006).

More specifically, the paper focuses on two main issues. The first is the *discipline* effects of budget limits. The questions I ask are the following: Under what conditions are deficit limits effective in providing fiscal discipline (that is, balance close to balance over the business cycle)? Are they preferable to simple (state-independent) balanced budget rules? The second issue is *stabilization* policy.[1] Here the relevant questions are the following: What are the effects of budget rules for the policymakers' incentive to run a countercyclical policy? How should fiscal rules be optimally designed?

The analysis is set in a static framework where the focus is on budget deficits and surpluses. Issues relating to debt accumulation and sustainability are not addressed here. This is not because they are deemed less important—quite the contrary. There are three main reasons for not addressing these issues. The first is that the dynamic consequences of ''mechanical'' budget

[1]Clearly, the issues of discipline and stabilization are not independent; lack of fiscal discipline today will compromise the possibility of implementing stabilization policies tomorrow.

rules on debt dynamics are already well understood. If, say, tax rates react appropriately whenever the debt-to-GDP ratio increases, debt will be stabilized.[2] Secondly, many of the existing budgetary frameworks have been set in terms of (different concepts of) deficits; for example, the SGP, the golden rule, and so on. This setup probably reflects the view that the level of the public debt reflects past deficits, so that governments cannot be made fully responsible for decisions made by their predecessors. Moreover, if deficit ceilings are effective in achieving balanced budgets in the medium term, they will also likely obtain a constant level of public debt. The third reason is analytical simplicity.[3] Notice that this paper does *not* attempt to provide a justification for the existence of such rules in terms of, say, underlying political economy factors or optimal contracts in principal-agent models. Here, I take the rule as given and simply work out the implications.

I. A Brief Review of the Literature

There are at least three strands of literature relevant to the issue at hand: the empirical literature on the cyclical properties of fiscal policy, the theoretical literature on possible explanations of procyclical behavior, and the ''rules vs. discretion'' debate for monetary policy.

As to the first one, the idea that fiscal rules may induce procyclicality goes back to the debate on the SGP (see Buiter and others, 1993). This presumption, however, has not found much empirical support (see Galì and Perotti, 2003; IMF, 2003; and Balassone and Francese, 2004). Gavin and Perotti (1997) observed that budget deficits in Latin America from 1970 to 1995 largely failed to respond to economic growth, suggesting that discretionary policy was used in a procyclical fashion to offset automatic stabilizers (for example, raising expenditures that offset revenue windfalls in good times). They suggested that the explanation might relate to the fact that capital flows are strongly associated with the business cycle: they tend to be high in good times and low (or negative) in bad times. The idea that developing countries may face borrowing constraints in bad times but not in good times is also supported by the evidence presented in Kaminsky, Reinhart, and Végh (2004). In particular, they show that credit ratings for Latin American sovereign issuers tend to be good during periods of high growth and bad during recessions. Other studies that present evidence of procyclical fiscal policy for developed countries, albeit to a lesser extent, include van den Noord (2000); Bouthevillain and others (2001); and IMF (2004).

The theoretical literature has proposed several explanations of the procyclicality ''puzzle,'' mostly related to weak political institutions. Tornell

[2]For a dynamic general equilibrium approach, see Schmitt-Grohe and Uribe (2004).

[3]I have tried to keep technicalities to a minimum, or to relegate them to Appendix, to appeal to as broad an audience as possible. For a dynamic stochastic model of optimal taxation in the presence of spending barriers, see Manasse (1996).

and Lane (1999) discuss a ''voracity'' effect, a sort of dynamic ''common pool'' problem. This effect, according to the authors, is due to weak legal and political institutions. Talvi and Végh (2005) present an optimizing model where the government is subject to a political distortion, which implies a high cost of running surpluses in good times. As a result, the government chooses to cut tax rates in good times to fend off spending pressures in bad times. Alesina and Tabellini (2005) suggest an explanation for procyclical fiscal policy based on electors' mistrust of corrupt politicians and on asymmetric information; in good times, voters require the government to redistribute windfall revenues because they anticipate that these resources would otherwise be dissipated by rents. Guerson (2003) proposes a model where procyclical policy can be socially optimal when the government cannot commit to not default on its debt. Because the temptation to default—and the default premium—is higher in bad times, the government partially reduces government spending during a recession to mitigate the rise in the interest bill.

The current debate on fiscal rules has largely abstracted from the ''rules vs. discretion'' literature on monetary policy that originated with Kydland and Prescott's (1977) seminal paper. A host of solutions have been proposed to the trade-off between credibility and stabilization, the most popular including reputation (Backus and Driffill, 1985), a conservative central baker (Rogoff, 1985), and incentive contracts (Walsh, 1995). In this respect, this paper shows that common fiscal rules, such as limits to deficit-output ratios, *induce* an ''escape clause''–type policy reaction similar to that studied by Flood and Isard (1988 and 1989) and Lohmann (1992), and applied to a collapsing exchange rate regime by Obstfeld (1994). These last papers assume a (fixed) cost of violating commitment (for example, moving from fixed to floating rates) and show that ''escape clause'' behaviors dominate simple noncontingent rules (fixed exchange rates) and discretionary policy (pure floating). In contrast, this paper assumes a fiscal framework that penalizes ''excessive'' deficit-output ratios, with given probability, and shows that as a result the government will optimally follow an ''escape-rule'' stabilization policy.

II. A Simple Model

The simple model presented here describes an economy where it is socially optimal to keep the budget in balance over the business cycle, and to run transitory deficits and surpluses for stabilization purposes. Policymakers pursue average excessive deficits because of the presence of a political (for example, electoral) distortion. The remedy of ceilings on deficit-output ratios confronts the policymakers with the following trade-off: they either forgo the economic benefits of stabilization and the political benefits of excessive deficits by abiding by the constraint, or violate the limit and face possible sanctions. Thus, what is crucial is the idea that the government can always choose to not abide by the ''law'' when it is optimal to do so. The point is

that this trade-off between the benefits and costs of violating the law depends on the size of the output shock.

I start with the benchmark case where a government chooses a fiscal balance in the absence of a fiscal rule; this choice sets the stage for the discussion of alternative regimes. For simplicity, the policymaker has one instrument: the level of the budget deficit. I assume that there is a (measure one) continuum of identical consumers, whose indirect utility function depends on the (log) ratio of fiscal deficit to potential output, d, and on the (log) deviation of output from its potential, e, the "output gap," $W(d, e)$.[4] Output and its potential level are given exogenously. The welfare function displays some intuitive properties:

1. $W_d(0, 0) = 0$;
2. $W_d(0, e) > 0$ for $e < 0$, $W_d(0, e) < 0$ for $e > 0$;
3. $W_{de}(d, e) < 0$;
4. $W_{dd}(d, e) < 0$.

The first property expresses the idea that when output is at potential, $e = 0$, a balanced budget, $d = 0$, is optimal. The second property requires that in recession, $e < 0$ (or expansion, $e > 0$), a small deficit (or surplus) yields a positive marginal utility. The third states that the marginal utility of a budget deficit falls when the economy improves. As we will see, this condition implies the optimality of countercyclical policy. The last condition states that welfare is concave in d.

The optimality of countercyclical deficit spending can be rationalized in several ways. In Bordignon, Manasse, and Tabellini (2001), households derive utility from leisure and from the consumption of a private and a public good. In bad times, the tax base shrinks, and this has two implications. On one hand, tax distortions rise; on the other hand, tax revenues and the supply of public goods fall, so that the marginal utility of the public goods rises. As a result, it is optimal to cut tax rates and spend more (that is, to run a larger deficit) in bad times. The opposite occurs in good times. Other justifications for stabilization policy range from tax smoothing considerations when shocks are transitory (Barro, 1979) to imperfect capital markets and borrowing constraints. The present framework is similar to that employed by Bottazzi and Manasse (2005) for monetary policy.

To economize on partial derivatives, I take a simple functional form that satisfies the requirements above, as described in the following equation:

$$W(d, e) = -d^2/2 - ed + c(e). \tag{1}$$

The term $c(e)$ captures the consumption effects of good and bad states. In what follows, I assume that $c(e) \equiv e - e^2$, so that consumption and welfare depend positively on the output gap e, and negatively on the (squared)

[4] I follow the convention of indicating a partial derivative with a subscript; for example, W_x is the partial derivative of W with respect to x.

deviation of output from trend.[5] The policymaker's objective function does not exactly coincide with consumers', because of the presence of a political distortion. It reads:

$$W^p(d,e) = W(d,e) + \omega d. \tag{2}$$

The new term[6] represents a *deficit bias*, $\omega > 0$; even when output is at potential ($e = 0$), the policymaker benefits from running a deficit for political (for example, electoral) reasons. One simple interpretation is that the policymakers maximize a weighted average of consumer's welfare and of political contributions (see Grossman and Helpman, 1994) or "electoral support." Here, electoral support is assumed to be proportional to (deficit) spending on selected groups (or lobbies). Note that this political distortion applies independently of the cycle e. Finally, I assume that the "output gap" e is uniformly distributed between $[-a, a]$, $a > 0$, with probability density function $f(e) = 1/2a$, so the mean is zero and the variance is $\sigma^2 = a^2/3$. In this simple formulation, it is useful to think of a as a mean-preserving spread. Next, I assume that the output gap is observable; its realizations occur before fiscal decisions are made.

First- and Second-Best Policies

Here I briefly characterize the model's first-best outcome, and discuss the second-best outcomes obtained when political distortions are present. I then review the consequences of balanced budget (noncontingent) rules, and discuss the features of an optimal rule that implements the first best.

First-best rule

Equation (1) immediately shows that the optimal state-contingent deficit rule that maximizes *consumers*' welfare is

$$d = D^F(e) = -e \quad \text{with} \quad E_e(d^F) = 0; Var(d^F) = \sigma^2. \tag{3}$$

From equation (3), the optimal fiscal reaction function raises the deficit in recessions and lowers it in booms, with its size depending on the output gap, e. Note that the budget is in balance over the cycle. Substituting equation (3) into equation (1) gives the following first-best level of welfare:

$$W(D^F(e), e) = -\sigma^2/2. \tag{4}$$

Thus, the stabilization policy rule alleviates the negative welfare costs of output volatility by lowering (halving) the negative effects of uncertainty.

[5]This term can be justified if liquidity constraints prevent consumption smoothing and insurance. The terms in the function $c(e)$are exogenous and enter separately from the choice variable, d, so they only affect the welfare calculations. The term e^2 introduces (in expected terms) "risk aversion."

[6]Empirically, the parameter ω can be estimated as the average deficit/trend output that prevails when the output gap is zero.

Second-best (political distortions) rule

Policymakers' objectives do not exactly match those of consumers, because policymakers have a higher marginal utility for deficit spending. When policymakers maximize equation (2) instead of equation (1), the optimal rule becomes

$$d = D^P(e;\omega) = \omega - e \quad \text{with} \quad E_e(D^P(e;\omega)) = \omega;$$

$$Var(D^P(e;\omega)) = \sigma^2. \tag{5}$$

As before, the policymaker optimally raises or cuts the deficit whenever output falls below or rises above potential. However, as a result of the political distortion ω, the budget is on average in deficit over the business cycle. Substituting equation (5) into equation (1) and taking expectations gives the expected welfare:

$$E_e W(D^P(e;\omega), e) = -(\omega^2 + \sigma^2)/2. \tag{6}$$

Welfare is lower than the first best because of the incentive to run an excessive deficit over the cycle.

Balanced budget rule

Assume that the country's constitution mandates a balanced budget rule, $d = 0$, in all states of the economy. From equation (1), the expected welfare for this case is simply

$$E_e W(0, e) = -\sigma^2. \tag{7}$$

Comparing this with equation (6), we see that the balanced budget rule removes the costs of the political bias, ω, but forgoes the benefits of stabilization (the standard trade-off in Barro and Gordon (1983) type of models). Thus this rule is preferable to the discretionary (countercyclical) policy only when output uncertainty is low compared with to the political bias ($\sigma < \omega$).

Empirically, one should observe balanced budget rules in countries with low output volatility and/or high political distortions.

The optimal rule

By comparing consumers' and policymakers' utility functions, we can immediately see that a Walsh (1995)-type rule—one that rewards or penalizes policymakers depending on whether they choose a surplus or a deficit—can implement the first best. When policymakers are subject to a reward schedule (or sanction) that is proportional to the surplus, $w(d) = -\omega d$, their utility becomes identical to that of the representative consumer:

$$W^p(d, e) = W(d, e) + \omega d + w(d) = W. \tag{8}$$

Clearly, the policymaker will then choose the first-best policy. The rationale here is as follows: because the marginal incentive of the politician to

run a deficit (ω) is independent of the state of the economy, the optimal fiscal rule should *not* be state contingent and should apply *symmetrically* over the business cycle, rewarding surpluses and penalizing deficits. In practice, this can be done by letting the fiscal authorities accumulate ''credits'' when running surpluses (in good times) to be spent to run deficits (in bad times). Because bad and good times average out, this scheme is viable.

In summary, the first-best policy is to use the deficit countercyclically, while keeping the budget in balance over the business cycle. When political distortions are introduced, the countercyclical nature of policy is preserved, but the policymaker now runs an average deficit. Strict balanced budget (noncontingent) rules alleviate the political distortion but forgo stabilization; they are preferable to the politically distorted outcome only insofar as the output volatility is low relatively to the deficit bias. Finally, a simple rule that implements the first best is symmetric and not state-contingent.

III. Deficit Limits

My interest here is to describe the policy incentives of some commonly observed ''fiscal frameworks,'' such as the ceilings on the deficit-output ratio. This section makes two simple but important points. First, deficit-output limits typically induce an ''escape clause''–type of fiscal policy. This policy implies a procyclical policy in intermediate states and an active stabilization (for example, countercyclical) policy in very good and very bad states. Limits are optimally violated in a recession, even if they continue to exert discipline on deficit spending. Second, the discipline effects of such limits tend to be lower for more volatile economies.

Consider the following fiscal framework: a constraint on the deficit $\Phi(d, e) \leq 0$ is imposed such that whenever the constraint is violated, a penalty $\underline{\varphi}(d, e) > 0$ is levied on the policymaker, with a known probability, p. By assumption, the constraint and the penalty rule depend on d and (possibly) on the state of the economy e. For example, the constraint that the budget deficit should not exceed a limit of X percent of GDP can be written as $\Phi(d, e) = d - e - x$, where $x = \ln(X)$.[7]

The penalty is enforced by an external regulator and ultimately paid by consumers. I assume that a sanction is commuted only with a given probability, $0 < p < 1$. This probability can be considered in two ways. Under the first interpretation, p is determined by the monitoring technology available to the external regulator. In other words, the policymaker may fudge the balance sheets, show a deficit lower than real, and get away with it with probability $1-p$. Alternatively, p can be taken to represent, literally, the probability that the rule will be enforced by the regulator. In this respect, p can be interpreted as a (inverse) measure of the policymaker's clout and

[7]Recall that d is the logarithm of the ratio of the deficit to potential output, and e is the (log) deviation of actual output from potential, so that $d-e$ represents the (log) deficit-actual output ratio.

bargaining power with respect to the regulator, or as a direct measure of the political independence of the regulator. One simple and interesting rule is the following:

Definition of deficit-limit rule: A penalty $\underline{\varphi}(d, e)$ is imposed (with probability p) when the deficit ratio exceeds the threshold x, $\Phi(d, e) = d - e - x > 0$; the penalty is itself proportional to the excessive deficit—that is, to the difference between the actual deficit-output ratio and the ceiling, $\underline{\varphi}(d, e) = \varphi(d - e - x)$, with $\varphi > 0$ denoting the constant of the proportionality—no penalty applies when the fiscal constraint is not binding, $\Phi(d, e) \leq 0$.

This type of sanction is very common; think, for example, of speed limits for cars where fines are proportional to the excess of the actual speed over the maximum limit. This penalty closely resembles the SGP. A simple way to summarize this framework is to note that the *ex ante* value of the penalty can be written as the *max* $[p\varphi\ (d - e - x), 0]$.

Stabilization and Discipline Incentives

Stabilization

I now study the implications of this rule for the conduct of fiscal policy. A similar setup can be applied to a variety of different rules. When subject to the budget limit, the government maximizes a constrained welfare function, given by

$$W^c = -d^2/2 - ed + c(e) + \omega d - \max[p\varphi(d - x - e), 0]. \tag{9}$$

It is relatively easy to show that:

Proposition: When the government is subject to the budget limit described in the previous definition, the optimal fiscal rule is:

$$\begin{aligned} d = D^c(e; \omega) &= \omega - e && \text{if } e > \bar{e} \equiv (\omega - x)/2 \\ d = D^c(e; \omega) &= x + e && \text{if } \bar{e} \geq e \geq \underline{e} \equiv \bar{e} - p\varphi/2 \\ d = D^c(e; \omega) &= \omega - e - p\varphi && \text{if } e < \underline{e} \end{aligned} \tag{10}$$

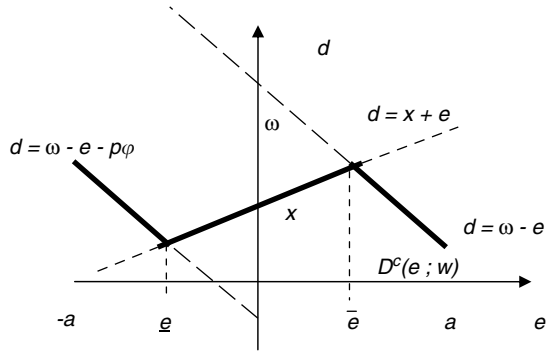
Proof: A simple and instructive geometrical proof is provided in the Appendix. ■

The optimal fiscal (constrained) rule is depicted in Figure 1.[8]

The positively sloped line $d = x + e$ represents the fiscal limit on the deficit-output ratio. Below this line the limit does not bind, whereas above the line it does bind and the penalty is imposed (with probability p). The higher

[8]In the figure we assume that $\omega < x$, $-a > \underline{e}$, $\bar{e} < a$.

Figure 1. Optimal Fiscal Reaction Function with a Deficit Limit



Source: Author's calculations.

downward sloping line represents the fiscal reaction function for the unconstrained policymaker (equation (5)). The bold S-shaped broken line is the constrained policy function described in equation (10). When the economy is in a boom, in states where $e > \bar{e}$, the deficit associated with the (unconstrained) rule, $d = \omega - e$, is below the ceiling, so that the limit does not bind and the government *does not* have to abide by the ceiling; it freely pursues its strategy of countercyclical policy–cum–deficit bias. However, when the economy worsens and the output gap falls below $\bar{e}$, the fiscal limit becomes binding and the government chooses the highest possible deficit that avoids the sanction. In the range $[\underline{e}, \bar{e}]$, it is optimal to keep the deficit *just below* the limit, $d = e + x$.

The reason for this situation is that here the expected cost of the penalty exceeds the stabilization and electoral benefits of deficit spending, and therefore the authorities choose to be restrained by the ceiling. Note that when the output gap rises in this range, marginally relaxing the constraint, the government raises the deficit proportionally and the optimal (constrained) policy rule becomes procyclical. Finally, when the economy falls into recession,[9] $e < \underline{e}$, the government *chooses not to* abide by the deficit limit, because the cost of forgoing stabilization (plus the electoral benefits of the deficits) exceeds the expected penalty. Here the deficit moves up along the negatively sloped (constrained) fiscal rule line $d = \omega - e - p\varphi$. In this range, policy is again countercyclical. Interestingly, even if the deficit limit is being violated, it still provides fiscal discipline equal to $-p\varphi$, because the government reduces the deficit to cut the expected sanction (in the absence of the constraint, the government would be moving on the higher parallel reaction function). Thus the deficit-limit ratio induces an "escape clause"–type of fiscal policy.

[9]We assume here that the penalty is not excessive, that is, point $\underline{e} = \bar{e} - p\varphi/2$ is above the lower support of the distribution of shocks, $-a$.

A crucial empirical implication of this behavior is that the optimal reaction function under the fiscal rule is not monotonous in the output gap; the government's choice of a pro- or countercyclical policy depends on the state of the economy. Thus the empirical results that assume linearity may be seriously affected by the distribution of the shocks in the sample period. If, say, the country mostly experiences intermediate states in the estimation period, based on a linear model the researcher will conclude that the government has acted procyclically, whereas if bad (or good) shocks predominate, the researcher will conclude in favor of a countercyclical stabilization policy.

Discipline

It is natural to ask how effective the rule is in reducing the policymaker's deficit bias. To calculate the average discipline effect of the limit, we must find the average deficit implied by equation (10). After a little algebra, this average deficit turns out to be

$$\begin{aligned} E_e D^c(e;\omega) &= E_e D^c(\cdot \mid -a \le e < \underline{e}) + E_e D^c(\cdot \mid \underline{e} < e \le \bar{e}) \\ &\quad + E_e D^c(\cdot \mid \bar{e} < e \le a) \\ &= \omega - [(\omega - x)(\bar{e} - \underline{e}) + p\varphi(\underline{e} + a)]/2a. \end{aligned} \tag{11}$$

The interpretation of equation (11) is straightforward. The term in parentheses in the last line measures the discipline effect of the limit. From Figure 1, we see that the limit effectively constraints fiscal choices in two ranges. The first is the range of size $\bar{e}-\underline{e}$, where the policymaker sticks closely to the limit. The political bias is mitigated only insofar as the limit is sufficiently tight, $x<\omega$. The contribution to discipline is measured by the first term in the bracket. Second, discipline is exerted in bad states, in the range measuring $\underline{e}-(-a)=\underline{e}+a$, where the deficit is cut down by $p\varphi$ (see equation (11)). This effect is given by the second term in the parentheses. Clearly, when the policymaker expects no sanction ($p\varphi=0$), both terms in the parentheses vanish and the government fiscal rule and average deficit reverts to the politically distorted outcome (see equation (5)).[10]

A few comparative statics exercises can be useful at this point. Countries that have political clout and bargaining power with the regulator—presumably larger countries—face a low probability p of being sanctioned, and so they are less affected by deficit limits. Similarly, if the monitoring technology available to the regulator is ineffective, the discipline effect also will be low.

Interestingly, the discipline effect falls with the volatility of the economy, a. Because the discipline effect applies only in relatively "bad" states, $e<\bar{e}$,

[10]Note that there is no guarantee that the deficit rule will actually restraint the average deficit below ω. If the political bias ω is sufficiently low and the limit x sufficiently high, the rule may well raise deficit spending, that is, the terms in parenthesis may become negative.

Table 1. Baseline Calculation ($\varphi=1$, $p=1/2$, $\omega=4$, $x=3$, $a=5$)

	Deficit Ceiling	Political Distortion	Balanced Budget	First Best
Expected loss	39.70	12.17	8.33	4.17
Average deficit	3.69	4.00	0.00	0.00

Source: Author's calculations.

having more "bad and good" states (with a larger mean-preserving spread a) actually reduces the expected sanction and the discipline effect. Finally, equation (11) highlights a familiar feature of policymaking: the existence of a trade-off between discipline and stabilization. Suppose that to reduce the induced procyclicality, the penalty φ is reduced, or exemptions to the enforcement of the rule are introduced (p is reduced),[11] or the deficit limit x is raised. The first two measures effectively improve stabilization by downsizing the range where a procyclical policy is chosen, $(\bar{e}-\underline{e})=p\varphi/2$, but as equation (11) shows these measures also reduce the discipline effect of the framework. Conversely, an increase in the deficit limit, x, improves stabilization only in "good" states, effectively shifting the procyclical range to the left (recall that $\bar{e}=(\omega-x)/2$), but raising the average deficit.

A Numerical Example

How effective are budget limits for providing discipline, and how serious are the consequences of the induced procyclicality? It is instructive to compare the average deficits and expected losses (the negatives of expected welfare) that apply under different fiscal frameworks. Table 1 does that, for reasonable parameter values.

The deficit ceiling X is taken at 3 percent, the deficit-trend output owing to political bias ω is 4 percent, the probability of a sanction p is 1/2, the sanction coefficient $\varphi=1$, the output gap volatility parameter $a=5$, corresponding to a standard error of 2.89. By construction, the first best and the balanced budget rule (see equations (3), (4), and (7)) achieve a zero deficit on average; see the last two columns in the table. The latter, however is associated with lower expected welfare (higher expected loss) because it forgoes stabilization. The deficit-output rule implies a higher loss than the unconstrained equilibrium with political distortions; a small discipline effect (a reduction of the average deficit ratio from 4 to 3.69 percent) is achieved at the price of a highly procyclical policy.

Table 2 shows the effects of changing the sanction. To obtain more discipline, the penalty should be raised to unreasonably high levels (to reduce the average deficit by 1.20 points, the sanction should be 4.5 points per percentage deviation from the limit).

[11] In policy circles, these caveats are called "flexibility."

Table 2. Change in Penalty

	Deficit Limit	
Penalty (φ)	Expected loss	Average deficit
0.00	37.96	4.00
0.50	38.89	3.84
1.00	**39.70**	**3.69**
1.50	40.41	3.54
2.00	41.02	3.40
2.50	41.54	3.27
3.00	41.97	3.14
3.50	42.31	3.02
4.00	42.58	2.90
4.50	42.78	2.79

Source: Author's calculations.
Note: The bold entries represent the baseline.

Table 3. Change in Ceiling

	Deficit Limit	
Ceiling (x)	Expected loss	Average deficit
2.00	35.77	3.61
2.50	37.72	3.65
3.00	**39.70**	**3.69**
3.50	41.70	3.73
4.00	43.70	3.76
4.50	45.68	3.80
5.00	47.63	3.84

Source: Author's calculations.
Note: The bold entries represent the baseline.

Stricter deficit-output limits, x, do not seem more effective (see Table 3).

Reducing the limit to 2 percent brings about a fall of only 5 basis points in the average deficit ratio. Budget limits seem to perform particularly poorly when large political distortions are present. Table 4 compares the unconstrained outcome (Political Distortion) to the Deficit Limit case, for different values of the parameter ω.

On average, the larger the political bias, the more often the limit is violated. A looser constraint restrains the actual deficit only marginally, and this restraint comes at the price of increasing procyclicality and welfare losses. Finally, Table 5 compares the performance of the various frameworks for different values of the output gap volatility parameter a (mean-preserving spread, and the associated standard error).

Table 4. Change in Political Bias

	Deficit Limit		Political Distortion	
Political Bias (ω)	Expected loss	Average deficit	Expected loss	Average deficit
3.00	**16.90**	**2.76**	**8.67**	**3.00**
3.50	27.51	3.23	10.29	3.50
4.00	39.70	3.69	12.17	4.00
4.50	53.47	4.15	14.29	4.50
5.00	68.81	4.61	16.67	5.00
5.50	85.73	5.08	19.29	5.50
6.00	104.23	5.54	22.17	6.00
6.50	124.31	6.00	25.29	6.50
7.00	145.97	6.46	28.67	7.00
7.50	169.20	6.93	32.29	7.50

Source: Author's calculations.
Note: The bold entries represent the baseline.

Table 5. Change in Volatility

		Deficit Limit		Political Distortion		Balanced Budget		First Best	
Volatility (a)	SE	Expected loss	Average deficit	Expected loss	Average deficit	Expected loss	Average deficit	Expected loss	Average deficit
5.00	**2.89**	**39.70**	**3.69**	**12.17**	**4.00**	**8.33**	**0.00**	**4.17**	**0.00**
5.50	3.18	38.55	3.69	13.04	4.00	10.08	0.00	5.04	0.00
6.00	3.46	36.20	3.70	14.00	4.00	12.00	0.00	6.00	0.00
6.50	3.75	32.51	3.70	15.04	4.00	14.08	0.00	7.04	0.00
7.00	4.04	27.37	3.71	16.17	4.00	16.33	0.00	8.17	0.00
7.50	4.33	20.64	3.71	17.38	4.00	18.75	0.00	9.38	0.00
8.00	4.62	12.20	3.71	18.67	4.00	21.33	0.00	10.67	0.00

Source: Author calculations.
Note: The bold entries represent the baseline. SE is the standard error of the output gap associated to the corresponding value of a.

The good news is that deficit limits tend to outperform the other second-best rules when volatility is high. The bad news is that these limits do so precisely because they are less effective in constraining the deficit. As volatility rises, the authorities implement procyclical policies less frequently.

IV. Conclusions

This paper has presented a very simple framework for discussing the incentive effects of budget limits. The main result is that limits on deficit-output ratio

provide incentives to implement *pro*cyclical policies in intermediate states, and *counter*cyclical policies only in very "good" and "bad" times. Such rules induce an "escape clause"–type fiscal policy, similar to that studied by Flood and Isard (1988 and 1989) and Lohmann (1992) for monetary policy. In intermediate states, fiscal policy is procyclical because the government keeps the deficit just below the limit in order to avoid the sanction. However, the government resorts to an active stabilization policy during "exceptional times," running deficits in recessions and surpluses in expansions. The analysis provides a simple explanation of the recent apparent lack of fiscal discipline of many large European countries during the latest recession years. This does not imply that such rules are ineffective; as it turns out, governments would have implemented an even larger fiscal deficit in their absence.

The "optimal" fiscal rule implies a mechanism by which the government accumulates "credits" when running surpluses (in good times), to be used to run deficits when needed (in bad times). The lack of incentives for fiscal consolidation in good times is precisely why many observers have criticized the SGP. I also find that deficit limits become less effective for providing fiscal discipline when the economy is subject to high output volatility. This result casts some doubt about the desirability of applying this framework to very volatile economies, such as those in Latin America. Empirically, these results also cast some doubt on the reliability of the conclusions concerning the cyclical properties of fiscal policy, which are based on the assumption that the authorities' reaction function is monotonous in the output gap. Finally, a numerical example suggests that deficit limits often forgo the "baby" of stabilization with only limited success in disposing of the "bathwater" of political distortions, and therefore these limits can have potentially large negative effects on welfare.

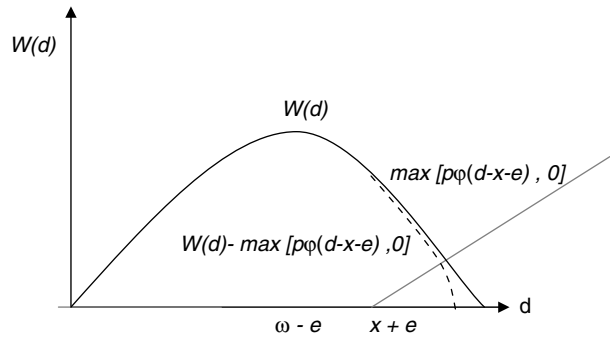
The European Commission has recently advanced a series of amendments to the SGP, based on the following "three pillars": (1) modification of the rules and interpretation of the SGP, with increased focus on country-specific economic developments (for example, debt sustainability, growth); (2) enhancement of fiscal governance (that is, more coordination in budget programs, more transparency, national fiscal rules); and (3) reinforcement of statistical governance (see Deroose and Langedijk, 2005). Although a discussion of this and other proposals goes beyond the scope of the paper, the analysis suggests a note of skepticism toward the ultimate relevance of these amendments. Marginal tinkering within the deficit limit framework is likely to be ineffective.

APPENDIX

Proof of Proposition

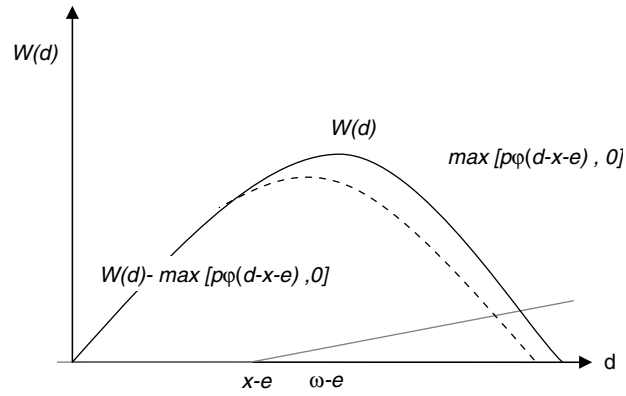
The simplest way to prove the Proposition is by geometry. Appendix Figure A.1 plots the unconstrained welfare function $W(d, e)$, for a given shock e, the constraint function, $max(\cdot)$, and the constrained welfare function $W^c(.)$, a dotted curve, which is simply the difference between the two functions.

Figure A.1. Case $x+e>\omega-e$, and $p\varphi<(\omega-e)-(x+e)$



Source: Author's calculations.

Figure A.2. Case $x+e<\omega-e$, and $p\varphi<(\omega-e)-(x+e)$



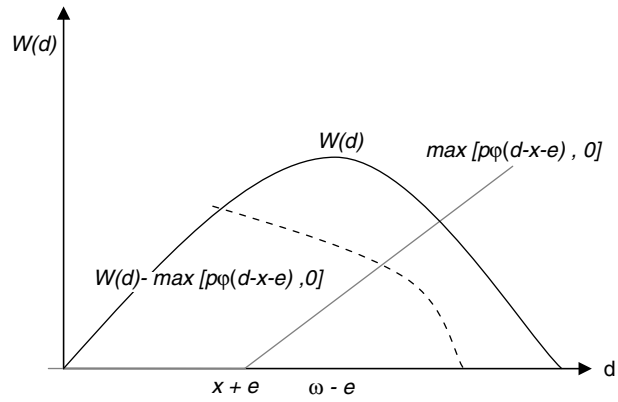
Source: Author's calculations.

Appendix Figure A.1 represents the case where the point where the constraint has a kink, $x+e$, falls to the right of the value that maximizes W, $\omega-e$. In this case, that is when $e>\bar{e}\equiv(\omega-x)/2$, the value $d=\omega-e$ also maximizes the constrained welfare function. Thus for $e>\bar{e}$, $D^c(e)=\omega-e$.

Appendix Figure A.2 shows the case where the point at which the constraint has a kink, $x+e$, falls to the left of point $\omega-e$, that is $e<\bar{e}$. At the same time, the slope of the constraint, $p\varphi$, is lower than the slope of the welfare function at the point $x+e$, $W_d(x+e,e)=(\omega-e)-(x+e)>0$; that is, $e<\underline{e}\equiv\bar{e}-p\varphi/2$. Therefore, the constrained welfare function keeps rising beyond point $x+e$, and achieves an interior optimum at $d=\omega-e-p\varphi=argmax\ [W-p\varphi(d-x-e)]$. Hence, for $e<\underline{e}$, the optimal policy is $D^c(e)=\omega-e-p\varphi$.

Finally, Appendix Figure A.3 portrays the case where the kink, $x+e$, falls to the left of point $\omega-e$; that is, $e<\bar{e}$; but the slope of the constraint, $p\varphi$, is larger than the slope of the welfare function at the point $x+e$; that is, $e>\underline{e}$.

Figure A.3. Case $x+e<\omega-e$, and $p\varphi>(\omega-e)-(x+e)$



Source: Author's calculations.

In this case, the constrained welfare function has a kink and a maximum at point $d=x+e$. Thus for $\underline{e}<e<\bar{e}$, the optimal policy is $D^c(e)=x+e$, which completes the proof.

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