Budget Windows, Sunsets and Fiscal Control

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Abstract

Governments around the world have struggled to find the right method of controlling public spending and budget deficits. In recent years, the United States has evaluated policy changes using a ten-year budget *window*. The use of a multi-year window is intended to capture the future effects of policies, the notion being that a budget window that is too short permits the shifting of costs beyond the window's endpoint. But a budget window that is too long includes future years for which current legislation is essentially meaningless, and gives credit to fiscal burdens shifted to those whom the budget rules are supposed to protect. This suggests that there may be an "optimal" budget window, and seeking to understand its properties is one of this paper's main objectives. Another objective is to understand a phenomenon that has grown in importance in U.S. legislation – the "sunset." This paper argues that, with an appropriately designed budget window, the incentive to use sunsets to avoid budget restrictions will evaporate, so that temporary provisions can be taken at face value. The analysis also has implications for how to account for long-term term budget commitments.

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I. Introduction

Governments around the world have struggled to find the right method of controlling public spending and budget deficits. The European Union's Stability and Growth Pact, adopted in 1997 and specifying annual deficit limits and debt-GDP targets, has been left in limbo after a number of recent violations, while the United States has gone through a series of regimes in seeking the right formula. The Gramm-Rudman-Hollings legislation of the 1980s specified a trajectory of deficit targets on a path toward budget balance, requiring each year's budget to satisfy the preset deficit target. After these deficit targets were breached, the next regime, initiated by the Budget Enforcement Act of 1990, specified targets for each year's discretionary spending, and replaced annual deficit targets with limits on *incremental* changes in the deficit as estimated to follow from legislation.[1]

A key element of the regime introduced in 1990 was the budget *window*, the time period over which the estimated effects of legislative changes would be evaluated. For example, a five-year budget window takes into account the current and next four fiscal years when estimating the impact of legislation. Over the years, the length of the budget window has grown, with a ten-year budget window being the effective standard in recent years. The basic argument for using a multi-year budget window is that doing so provides a more accurate picture of the long-run impact of legislation. Some have called for using a much longer budget window, to follow the lead of the Social Security and Medicare programs, which estimate fiscal balance over a 75-year period.

Considering the future impact of legislation is clearly valuable, for short-run and long-run effects can be quite different. As proponents of multi-year budget windows have pointed out, a

[1] See Auerbach (1994) for a further discussion of the details of the successive U.S. budget regimes.

one-year window permits the shifting of expenditures to the next year and revenues to the current year, in a manner that greatly understates the fiscal cost of legislation. But adding years to the budget window does not make this problem disappear. Consider, for example, the case of Roth IRAs, which provide tax-exempt returns on saving (i.e., wage-tax treatment) rather than the traditional IRAs' up-front deduction (i.e., consumption-tax treatment). To a first approximation, the two schemes have similar revenue effects in present value, but they have different revenue patterns over time, with the Roth IRAs' revenue loss showing up relatively later. The Taxpayer Relief Act of 1997, in introducing the Roth IRAs, included a provision permitting taxpayers to transfer funds from traditional IRAs, deferring some taxes due for as many as three years – making the Roth IRA a revenue loser, in present value, but still accelerating to within the budget window all the taxes due on withdrawals from these traditional IRA accounts. President Bush's fiscal year 2004 budget included similar provisions to expand saving incentives and allow transfers within accounts, with the striking result that the estimated revenue impact was positive over the first five fiscal years (Congressional Budget Office 2003, Table 8).

It seems, then, that simply lengthening the budget window by a few years doesn't eliminate the problem of revenue- or expenditure shifting; there is always a first year beyond the budget window, and whether it is two or 11 years from now, we still care about what happens in that year and the years that follow. One potential response is to lengthen the budget window vastly, to the point where it covers the foreseeable future, as in the 75-year approach cited above. But this approach gives rise to a different type of problem that is well illustrated by one recent proposal to resolve the Social Security system's imbalance. In January 1997, Social Security's quadrennial advisory council issued a report (Social Security Advisory Council 1997), laying out three options for achieving solvency. One of these proposals (Option I, "Maintenance of

Benefits") would have closed part of the 75-year gap using an increase in the payroll tax of 1.6 percentage points, starting in *2045*! Clearly, this was not a policy to be taken seriously, as it specified a tax increase beginning only 50 years hence; nevertheless, the long budget window allowed it to "count." Moreover, this proposed tax increase suffered from another, very fundamental problem: it would have failed to deliver on the primary objective of budget rules, which aim to reduce the extent to which fiscal burdens are shifted to future generations.

Thus, a budget window that is too short permits the shifting of costs beyond the window's endpoint, but a budget window that is too long includes future years for which current legislation is essentially meaningless, and gives credit to fiscal burdens shifted to those whom the budget rules are supposed to protect. This suggests that there may be an "optimal" budget window, and seeking to understand its properties is one of this paper's main objectives. Another of the paper's objectives is to understand a phenomenon that has grown in importance in U.S. legislation – the "sunset."

A provision that expires before the end of a multi-year window is said to sunset. Prior to 2001, there were a number of relatively small provisions in the U.S. tax code, for example the Research and Experimentation Credit, which were frequently scheduled to expire and required periodic extension. But sunsets hit the big time in 2001, with the passage of the Economic Growth and Tax Relief Reconciliation Act, President Bush's first major tax cut, which expired in 2010, a year before the 2011 end of the budget window. As passed, the law would have phased in various large tax reductions through 2010 and then reinstated pre-passage tax law. For example, the federal estate tax would have been reduced throughout the budget period, eliminated in 2010, and reinstituted in 2011 at its pre-2001 level. This process seems to have matured with the 2003 passage of the Jobs and Growth Tax Relief Reconciliation Act (Gale and

Orszag 2003). This legislation, evaluated over the budget window 2004-13, introduced marriage penalty relief and tax rate reductions expiring in 2005, and capital gains and dividend tax reductions expiring in 2009, with the expiration dates being shifted around during debate to achieve a desired total revenue cost.

In evaluating budget windows and their design, we will also seek to explain why they may induce provisions with sunsets, and what factors may cause the use of sunsets to increase. In addition, we will address the issue of how to deal with the sunsets in the context of budget "scoring." Some have argued that, as sunsets are designed to sidestep the impact of budget restrictions, they should be ignored by budget rules, i.e., all temporary provisions should be treated as permanent. The evident problem with this approach is that not all temporary provisions arise in response to budget rules. For example, the U.S. investment incentives passed in 2002, and modified in 2003, appear to have been made temporary more as a way of spurring investment, rather than to avoid additional revenue costs within the ten-year budget window. We will argue that, with an appropriately designed budget window, the incentive to use sunsets to avoid budget restrictions will evaporate, so that temporary provisions can be taken at face value.

The next section of the paper lays out the simple model of fiscal policy choices, in which conflicting preferences can lead those in control to borrow and spend preemptively. Section III discusses the role that budget rules might play in such a model, and Section IV derives the optimal form of one such rule, the budget window. Section V demonstrates the budget window's flexibility with respect to fluctuations in economic conditions and desired fiscal policy, while Section VI draws implications of the paper's results for the valuation of implicit fiscal liabilities, a key problem in assessing the state of fiscal policy. The final section of the paper offers some concluding comments.

II. The Model

The model we use, very much in the spirit of earlier work by Persson and Svensson (1989) and Alesina and Tabellini (1990), generates excessive public spending and deficits as an outcome of a struggle for political control, in which each party, when in power, seeks to constrain the future actions of its rival by committing future resources to current use.

Rather than the two-period model often used to analyze problems like this, we construct a three-period model. As will be seen, adding a third period is necessary for the consideration of forward-looking budget rules, given that final-period decisions are constrained by the need to pay off existing national debt.[2]

In our model, there are two representative agents, *D* and *R*, each alive for all three periods and with preferences over private consumption and publicly provided goods. Future consumption of each agent is fully taken into account in the agent's own optimization decisions, so there are no unrepresented future generations. Thus, the model is Ricardian, in that there is no inherent bias toward current spending at the expense of future generations. While this characterization is not necessarily accurate, the point here is to study deviations from policy *relative* to underlying preferences. If there were no policy disagreements in a model of unconnected overlapping generations, the current generation would view its policy choices as optimal and have no interest in designing budget rules to alter its decisions.

In the present model, though, we assume that important policy disagreements do exist, that *D* and *R* differ in their preferences over public spending. This will cause each group, if in power, to spend more currently, on both current public goods and private consumption, than is optimal in the sense of intertemporal resource allocation. Thus, the outcome will be too much

[2] While an infinite-horizon model would be more general, it does not appear feasible to derive analytical results from such a model while maintaining the current model's other attributes.

current spending and too much of a burden shifted onto the future, regardless of whom is in power. If one thinks of future consumption in terms of future generations, each group cares fully about its own future heirs, but still feels compelled to shortchange them because any resources left to them will also be available for the other group to squander on itself and its heirs.

The model's preferences and technology are very basic. We assume that each period's utility is logarithmic in private consumption and government goods, and that there is no production; each individual receives a private-good endowment in each period i, C_i. Initially, to keep the algebra as simple as possible, we will assume that this endowment is constant over time at C, but we will relax this assumption after deriving the main results. We also assume, for simplicity, that the government can borrow and lend in a world capital market, but that there is no private saving. Adding private saving would complicate the model, and would not alter the basic result that households cannot fully offset government policy decisions.[3]

The fiscal side of the model is very stylized, intended to capture to key elements of the problem. We also assume that there are lump-sum taxes that must be assessed uniformly on both individuals, and that there are two types of government goods, G_D and G_R, that cost one unit of the private good each (with no joint consumption, so that the level of public goods per capita and private goods per capita trade off one-for-one). Good G_D provides no utility for group R and good G_R provides no utility for group D. We also assume that the interest rate and the pure rate of discount are both zero, and that preferences for the two groups are identical except for the fact

[3] In the model, governments choose government spending and government borrowing strategically, to limit the spending of future governments. Private saving cannot offset government spending decisions. And while private saving could offset the constraining effects of government borrowing in this model, this would not be true in a more realistic model with distortionary marginal tax rates. For then, even if an increase in private saving offset an increase in government borrowing, future governments would require higher marginal tax rates to support a given level of government purchases, because of the higher level of debt service. This would constrain the future governments' spending.

that different public expenditures are favored.[4] Note that one may think of the spending as either direct expenditures or "tax" expenditures, so one possible scenario is that one group (say *D*) prefers "big" government, with high taxes and high direct spending, while the other (*R*) prefers "small" government, with equally high values of gross taxation reduced by tax expenditures.

The model does not attempt to describe the political process: there are no separate politicians seeking support of the two groups. Rather, one of the agents attains control directly and implements its preferred policy. Given the simplicity of the assumed political structure, we do not attempt to model the transition of power from one group to the next, but assume simply that random factors cause these transitions.

In modeling transitions of power, we define three possible states of nature, with exogenous probabilities of occurrence. In state *d*, group *D* is in control and sets current policy; group *R* sets policy in state *r*. But, in the second and third periods, there is also an intermediate state, *s* (for "stalemate") in which neither group is in control. This state is meant to represent a situation in which it is very difficult (in the model, impossible) to adopt substantive new legislation. We might think of this as occurring because of a government with split control between branches, or one in which power is so equally divided that neither side can exert control.

In this intermediate state, *s*, whatever policy was set in the most recent period in which the economy was not in state *s* will be in force. Note that this is not necessarily the policy that held in that previous period of control, but rather the policy that was established for the current period in that previous one. For example, if *D* is in control at date 1 and announces a large tax cut for period 1 and a smaller one for period 2, it is that smaller tax cut that will prevail at date 2 should the economy transit from state *d* to state *s* between dates 1 and 2. As a consequence of

[4] Given the abstractness of the model, the zero-interest rate assumption is not qualitatively important. However, the fact that actual multi-year budget rules ignore that the interest rate is positive in adding sums from different years is an obvious flaw that has been long noted by economists and ignored by politicians.

the possibility of future stalemate, each group, when in power, announces a policy not only for the current period, but also for all succeeding periods, knowing that there is some probability that these future announced polices will actually occur.[5] Because they may actually take effect if there is a stalemate in which no policy changes can be effected, we assume that announced polices are constrained to be feasible.

As the horizon lengthens, in the model as one shifts from a one-period horizon to a two- or three-period horizon, announced policies lose relevance as the probability of sustained stalemate declines, just as in the real world, announcement of a tax increase scheduled to begin 50 years hence is understood by all to be essentially irrelevant. In a more complex model, in particular in an infinite horizon model with distinct voters and politicians and imperfect information between them, announcements of future policy might also affect reputations, lobbying activity and electoral outcomes, but those factors are not modeled here. Instead, we focus on how the very existence of political transitions affects policy choices and the response to particular budget rules.

We consider first the outcome for the economy in the absence of any external constraints beyond that requiring that all national debt be paid off at the end of the third period. Subsequently, we evaluate the impact of budget rules on policy choices, with the aim of determining how these rules might be designed to accomplish the objectives for which they appear intended.

We assume a Markov transition process with probabilities π_{ij} $(i, j = d, r, s)$ of moving from state i to state j from one period to the next that are the same for transitions beginning in

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[5] The assumption here is that no policies announced for the future apply unless there is a stalemate, and that all policies announced for the future apply if there is a stalemate. In reality, some announcements may be stronger, having some impact even if either *D* or *R* is in control in the future, while other announcements may be weaker, not necessarily applying even if there is a stalemate. Section VI, below, discusses the potential impact of these variations.

periods 1 and 2. With three states of nature and the requirement that the probabilities add to one, this leaves us with six independent probabilities. To determine each agent's optimal policy in each period, we solve backward, starting with decisions in period 3. In each period, i= 1, 2, 3, the only state variable is the level of national debt inherited, in per capita terms represented as B_i. We assume that debt at the beginning of period 1, B_1, is exogenous.

A. Period 3 Solution

If in control at the beginning of period 3, agent D's optimization problem is:

(1) $$\max_{T_3, G_{D3}} \log(C - T_3) + \log(G_{D3}) \quad \ni B_3 + G_{D3} \leq T_3$$

where B_3 is debt per capita at the beginning of period 3, T_3 is per capita taxes in period 3 and G_{D3} is per capita spending on D's preferred public good (it being optimal for D to set $G_{R3} = 0$).[6]

Substituting the budget constraint into the problem and maximizing yields the solution:

(2) $$G_{D3} = (C - B_3)/2 \; ; \qquad T_3 = (C + B_3)/2,$$

and the derived functions of third-period utility as a function of the state variable, B_3:

(3) $$U_{Dd3}(B_3) = 2 \log [(C - B_3)/2] \; ; \; U_{Rd3}(B_3) = \log [(C - B_3)/2]$$

[6] We are assuming here that the utility of government spending is log (G) when one's own type of spending is chosen, and 0 otherwise. This leaves open the possibility that the *level* of current-period utility will be lower when a party is in control than when it is not, if $G < 1$, but that is irrelevant to the issues considered here, which relate only to the marginal incentives for government spending in each state. One could deal with this by specifying that the utility of government consumption is log (1+ G), but this alternative specification would make the algebra somewhat more complicated and would also leave open the possibility of a negative level of government spending being chosen.

where $U_{ijk}(B_k)$ is the utility as of date k achieved by individual i in state j.[7] Note that the utility achieved by R in state d is half that achieved by D, because R gets no utility from D's public expenditure choice (but must still pay taxes). By the problem's symmetry, the same expressions for utility as in (3) apply for state d if one substitutes D for R, R for D, and r for d. Because there is no future and no borrowing decision in period 3, each agent's policy is simply one of deciding how much to spend on its preferred level of public goods. Given the symmetry of preferences, the two agents choose different types but the same level of public spending.

B. Period 2 Solution

We again consider first the choices made by D, taking into account the continuation values of utility in period 3. Agent D must also account for the value of utility he will achieve in period 3, should the economy lapse into stalemate. However, absent any further restrictions on policy announcements (as might be induced by a budget rule), D will wish to announce, in period 2, the same policy for period 3 as he would actually choose in period 3. Thus, if the economy transits to state s in period 3, the outcome for both D and R will be the same as if the economy had remained in state d. Therefore, we can write the optimization problem for D in period 2 is:

$$(4) \qquad \max_{T_2, G_{D2}, B_3} \log(C - T_2) + \log(G_{D2}) + (1 - \pi_{dr}) U_{Dd3}(B_3) + \pi_{dr} U_{Dr3}(B_3) \quad \ni B_3 = B_2 + G_{D2} - T_2$$

Substituting the expression for the evolution of debt into the optimization problem and solving, we obtain:

$$(5) \qquad G_{D2} = \frac{2C - B_2}{4 - \pi_{dr}} \quad ; \quad T_2 = \frac{(2 - \pi_{dr})C + B_2}{4 - \pi_{dr}} \quad ; \quad B_3 = \frac{\pi_{dr} C + (2 - \pi_{dr}) B_2}{4 - \pi_{dr}}$$

[7] We leave aside for the moment whether this is uniquely defined in state s, given that policy will then depend on the previous pattern of control.

The same expressions apply for R's optimization decision, except that π_{dr} is replaced by π_{rd}.

It is worth pausing at this point to note the impact of the potential loss of political control. If $\pi_{dr} = 0$, then the agent in control will set $B_3 = B_2/2$, spreading the payment of the existing national debt evenly between periods 2 and 3, i.e., running equal deficits in both periods. But, if $\pi_{dr} > 0$, borrowing will shift to period 2. Given the constraint that $B_2 < 2C$ (so that it is feasible to have positive consumption in periods 2 and 3 while still paying off the preexisting national debt), it follows that $dB_3/d\pi_{dr} > 0$, $dG_{d2}/d\pi_{dr} > 0$, $dT_2/d\pi_{dr} < 0$ and, reflecting the particular specification of preferences, that precisely half of the extra borrowing goes toward increased government spending and the other half toward reduced taxes. Thus, relative to a situation in which either individual was assured of control throughout the decision-making process, there will be too much government spending *and* too little taxation. Both choices serve to constrain a potential future government of the opposing party from spending resources on its own government projects, but they are costly should the party retain power, for it then has left itself too little to spread over private and public consumption in the future. If one group's hold on power is weaker than the other's then it will choose higher spending, lower taxes, and more borrowing.

Solving for the present value of utility obtained by each group in state d and period 2, we obtain:

(6)
$$U_{Dd2}(B_2) = (4-\pi_{dr})\log(2C-B_2) - (4-\pi_{dr})\log(4-\pi_{dr}) + (2-\pi_{dr})\log(1-\pi_{dr}/2)$$
$$U_{Rd2}(B_2) = (2+\pi_{dr})\log(2C-B_2) - (2+\pi_{dr})\log(4-\pi_{dr}) + (1+\pi_{dr})\log(1-\pi_{dr}/2)$$

As with the third-period solution described in (3), these expressions for utility also apply if one substitutes *D* for *R*, *R* for *D*, *r* for *d* and *d* for *r*.

C. Period 1 Solution

In the first period, *D* (if in control) must announce not only current policy, but also policies for period 2 should a stalemate prevail in that period, and for period 3, should a stalemate prevail in both periods. (If a period-3 stalemate is preceded by control by *R* or *D* in period 2, then the period-2 choice for period 3 will apply.) *D*'s problem is:

$$(7)\quad \max_{T_1,G_{D1},B_2,T_2,G_{D2},B_3} \log(C-T_1)+\log(G_{D1})+\pi_{dd}U_{Dd2}(B_2)+\pi_{dr}U_{Dr2}(B_2) \\ +\pi_{ds}[\log(C-T_2)+\log(G_{D2})+(1-\pi_{sr})U_{Dd3}(B_3)+\pi_{sr}U_{Dr3}(B_3)] \quad \ni B_{i+1}=B_i+G_{Di}-T_i,\ i=1,2$$

in which we have utilized the result, already noted above, that (in the absence of other restrictions), the period 3 policy rule chosen by *D* for state *s* will be the same as for state *d*. It is possible to simplify (7) further, using the same logic, by noting that the choices announced for the second period in state *s*, T_2, G_{D2}, and B_3, are determined by maximizing the term in brackets in (7), which is precisely the same objective that *D* would actually face in period 2 (see expression (4) above), except that the probability π_{dr} is replaced by the probability π_{sr}. Thus, the policy rule announced in period 1 for period 2 and state *s* (and the associated value of utility) will be the same as that already determined above for policy choice in state *d* in period 2, except that the probability π_{dr} is replaced by the probability π_{sr}. That is, looking forward from period 2, all that matters to *D* is the probability of transiting to state *r*, not how the remaining probability is divided between transitions to state *d* and to state s. Given this reasoning, *D*'s problem in period 1 simplifies to:

$$(8)\qquad \max_{T_1,G_{D1},B_2} \log(C-T_1)+\log(G_{D1})+\pi_{dd}U_{Dd2}(B_2)+\pi_{dr}U_{Dr2}(B_2)+\pi_{ds}U_{Ds2}(B_2) \quad \ni B_2=B_1+G_{D1}-T_1$$

where

$$(9) \qquad U_{Ds2}(B_2) = (4-\pi_{sr})\log(2C-B_2) - (4-\pi_{sr})\log(4-\pi_{sr}) + (2-\pi_{sr})\log(1-\pi_{sr}/2)$$

is the continuation utility for *D*, starting in period 2 in state *s*, assuming that *D* has chosen the policy for that date.

Solving the optimization in (8) in the same manner as before, we obtain:

$$(10) \qquad G_{D1} = \frac{3C-B_1}{Z+2} \quad ; \quad T_1 = \frac{(Z-1)C+B_1}{Z+2} \quad ; \quad B_2 = \frac{(4-Z)C+ZB_1}{Z+2},$$

where

$$(11) \qquad Z = \pi_{dd}(4-\pi_{dr}) + \pi_{dr}(2+\pi_{rd}) + \pi_{ds}(4-\pi_{sr}) = \pi_{dd}(4-\pi_{dr}) + \pi_{dr}(2+\pi_{rd}) + (1-\pi_{dd}-\pi_{dr})(4-\pi_{sr})$$

As before, one can derive an expression for *R*'s period-1 choice in the same manner, with the result being the same as (10), but with the subscripts *d* and *r* in the definition of *Z* in (11) reversed. One can also use these expressions for optimal policy in period 1 to solve for the initial levels of utility for *D* and *R* in states *d* and *r*, thereby completing the characterization of decisions and welfare for the basic problem, unconstrained by additional budget rules.

Consider, using (10), the impact of different transition probabilities on optimal private decisions by the agent in control. As noted above, there are six independent probabilities; if we eliminate the three probabilities of ending in stalemate, these six probabilities are π_{dd}, π_{sr}, π_{dr}, π_{rd}, π_{sd}, and π_{rr}. The first four of these appear in expression (11), while the last four appear in the parallel version of (11) that applies for *R*'s policy in period 1. With two future periods, the decisions are more complicated than those for period 2 (discussed above), because it is possible for an agent to lose control and then regain it. The probabilities affect B_2, T_1, and G_1 only through Z, and it is easy to show, using the fact that $3C>B_1$, that $dB_2/dZ < 0$, $dT_1/dZ > 0$, and $dG_1/dZ < 0$. Again, it will also be the case that increases in borrowing will be distributed equally between tax cuts and spending increases. Thus a reduction in Z will correspond to policies that shift resources toward present use.

For D's policy rule, given by (10) and (11), it is straightforward to show that $dZ/d\pi_{dr} < 0$, so that, as for the period-2 decision, an increase in the probability of ceding control to the opposite party causes the party in power to increase private and public consumption in period 1. It is also true that $dZ/d\pi_{sr} < 0$, so that an increased chance of losing control to the other party after a period of stalemate also increases current spending and borrowing. On the other hand, $dZ/d\pi_{rd} > 0$, so the likelihood of regaining power in the third period softens the tendency to pre-commit resources. For the fourth probability in expression (11), π_{dd}, the impact is uncertain: $dZ/d\pi_{dd} = \pi_{sr} - \pi_{dr}$. But this result is not surprising: holding constant the chance of losing power directly to the other party (π_{dr}), the likelihood of retaining power (π_{dd}) matters only if shifting to stalemate affects the probability of losing power in the third period.

One can also ask how combined changes in probabilities affect optimal decisions. For example, what is the effect of a general increase in turnover, defined as equal increases in π_{dr} and π_{rd}? These two changes work in opposite directions, and the combined sign is ambiguous. However, under a variety of additional assumptions corresponding to the notion that the initial level of instability not be too high, such as $\pi_{dd} > \pi_{dr}$ (i.e., that the probability of staying in power is higher than the probability of losing power directly to the other party), an increase in instability will reduce Z and increase the share of resources committed to the present.

III. Budget Rules

Consider, now, why budget rules might arise in the model just described. To begin, let us ask what restrictions the two groups, *R* and *D*, might agree on prior to period 1, before the knowledge of initial control is known.

Presumably, the groups would wish to limit their focus to Pareto-efficient outcomes. We can identify the range of such outcomes as allocations that result from the maximization of a social welfare function based on the expected utilities of *D* and *R*, with varying weights on the two groups. That is, the outcomes should satisfy the problem, for positive weights ω_D and ω_R:

$$\max \sum_{i=1}^{3} \Pi_{di}\left(\omega_D\left[\log(Q_{di}) + \log(G_{Ddi})\right] + \omega_R\left[\log(Q_{di}) + \log(G_{Rdi})\right]\right)$$

$$(12) \qquad + \sum_{i=1}^{3} \Pi_{ri}\left(\omega_D\left[\log(Q_{ri}) + \log(G_{Dri})\right] + \omega_R\left[\log(Q_{ri}) + \log(G_{Rri})\right]\right)$$

$$\ni \sum_{i=1}^{3} \left[\Pi_{di}(Q_{di} + G_{Ddi} + G_{Rdi}) + \Pi_{ri}(Q_{ri} + G_{Dri} + G_{Rri})\right] \leq 3C - B_1$$

where Π_{ji} is the unconditional probability that group *J* is in control in period *i*, and Q_i, G_{Dji}, and G_{Rji} are per capita values of private consumption, expenditures on type-*D* public goods, and expenditures on type-*R* public goods for that state and date.

Clearly, this optimization problem would require the same ratio of G_D to G_R regardless of who is in control, for individual utility functions are not state-dependent. That such rules regarding the composition of expenditures do not exist suggests that they are difficult to implement, perhaps because the relative values of different types of public spending change unpredictably over time. So, let us consider the more limited set of outcomes, where the party in control, *J*, chooses the composition of spending among Q_i, G_{Dji}, and G_{Rji}, and therefore chooses to set $G_{Jji} = Q_i$ and to set the other type of public spending equal to zero. Expression (12) then simplifies to:

$$\max \sum_{i=1}^{3} \Pi_{di}\left(\omega_D 2\log(Q_{di}) + \omega_R \log(Q_{di})\right) + \sum_{i=1}^{3} \Pi_{ri}\left(\omega_D \log(Q_{ri}) + \omega_R 2\log(Q_{ri})\right)$$

(12′)

$$\ni \sum_{i=1}^{3}\left[\Pi_{di} 2Q_{di} + \Pi_{ri} 2Q_{ri}\right] \le 3C - B_1$$

The resulting first-order conditions yield the following conditions on allocations across time and across states:

(13) $Q_{ki}/ Q_{kj} = 1$, $i, j = 1, 2, 3$, $k = d, r$; $Q_{di}/Q_{ri} = (2\omega_D + \omega_R)/(\omega_D + 2\omega_R)$, $i = 1, 2, 3$

That is, spending should be equally divided across periods, regardless of who is in control, with more resources provided to the group with higher weight in the social welfare function, which we might interpret as the group with the stronger bargaining power.

How the search for such constrained-efficient outcomes would result in budget rules determining the allocation of resources is not straightforward. While it is beyond the scope of this paper to model fully the adoption of budget rules, one can see how the process might work. We would expect the group currently in power to have a stronger bargaining position, which would lead to some asymmetry in the application of any rule adopted, with more resources allocated to states in which that group has control. But, if the formulation of rules occurs subject to a very long-term perspective, perhaps because the rules are determined by a different, more difficult process than annual budgetary decisions, then we might expect the rules to reflect long-run control probabilities, in the U.S. system presumably close to equal. This provides some justification for both parties wishing to impose state-independent borrowing rules that force a smoothing of spending over time, as budget rules in practice attempt to do, even though the imposition of the rules appears to disadvantage the group currently in power.

Even with the broad outlines of the rules determined, there are alternative approaches to their implementation. One approach would be limits on public spending, since, in the model, the incentive to borrow too much arises only to constrain the other side's future public spending. But, in a more realistic setting, feasibility is an issue. Recall that we imagine G as covering not just direct spending but also tax expenditures. Any controls on spending would have to cover both, and tax expenditures may be difficult to measure. Indeed, past attempts to put limits on tax expenditures[8] have floundered precisely on the failure to agree on what should be included in this category. With imperfect controls on spending, or control only on some component of spending, broadly defined, spending controls alone won't suffice, and we are left to consider how to implement borrowing controls.

In the model, per-period borrowing limits could be applied, as attempted during the Gramm-Rudman-Hollings period in the United States and currently under the European Union's Stability and Growth Pact. A major drawback of such limits, which ended the Gramm-Rudman-Hollings period and is threatening the Stability and Growth pact, is that they are inflexible with respect to economic circumstances, even with simple cyclical adjustments.

An alternative to direct limits on borrowing is provisions that relate to legislative changes, as currently practiced in the United States. These, too, could be implemented on an annual basis, but the model above provides a motivation for their extension over a budget window longer than one year. Let us focus on the use of such a multi-year budget period and ask how, in the context of the model, the rule should be structured. We begin with an intuitive

[8] For example, in the early 1980s, Senator Nancy Kassebaum introduced the Tax Expenditure Limitation and Control Act, which would have limited the amount of revenue loss from tax expenditures to not more than 30 percent of the net federal revenues collected in any fiscal year. See Sullivan (2001).

discussion and then, in the next section, provide an explicit derivation of the optimal budget window.

First, if there is no chance of stalemate, policies announced for the future are irrelevant – whomever is in control when the future arrives will re-optimize. Thus, future decisions should enter only to the extent that stalemate is possible. Second, the budget rule should apply with more force in early periods than late ones, if the problem is excessive borrowing. Given the government's intertemporal budget constraint, it is redundant to impose a budget rule that restricts borrowing over all periods – policy is already constrained to achieve this. It is borrowing in early periods that should be penalized relative to borrowing in late periods. Finally, a budget rule of the form currently in use, which adds together a certain number of periods' deficits and then ignores deficits thereafter, is unlikely to be optimal, for it presents the decision-maker with a discontinuity.

For example, suppose that the budget rule applied only to borrowing in period 1. Then the government would be induced to shift its excessive borrowing "outside" the budget window, into period 2, and still extract too many resources from period 3; the Roth IRA example given above is a good illustration of this problem. On the other hand, suppose that the rule restricted the sum of deficits in periods 1 and 2. Then, knowing that period 2 decisions don't "count" as much (e.g., unless there is a stalemate, one party or the other will have an opportunity to reset policy), the government in control in period 1 would "use" too much of its borrowing capacity in period 1; the 2001 and 2003 Bush tax cut sunsets are examples of this phenomenon. That is, as was clear during the debate over each bill, the sunsets may be seen as making more "room" available in early years for a larger tax cut, given the overall constraint on aggregate revenue losses. Why not simply pile the entire revenue loss into the first year? This is not attractive because there may not be an opportunity to reset policy next year or in the near future.[9]

These two types of shifting response are in no sense mutually exclusive. In a model with a greater number of periods, we can imagine a multi-year truncated budget window giving rise simultaneously to both types of shifting response, placing burdens in the future for which no penalty at all is assessed, and toward the earlier years of the budget window, when the penalty is small relative to the benefit. Intuitively, the (private) benefit of deficit spending in an announced budget plan goes down as the horizon lengthens, so a penalty that at first doesn't fall at all, and then falls precipitously, will push from the center in both directions. Thus, we should be looking for a rule that gives weight to future periods and does not end abruptly, and does not extend so far into the future that it loses its ability to protect future resources (as was the problem with the proposed increase in the Social Security payroll tax 50 years hence).

IV. The Optimal Budget Window

We consider the optimal budget window for decisions made in period 1, the only period for which the issue has substance in this model, for there is only one borrowing decision made in period 2. After deriving the budget window for period 1, we discuss how the result might be affected if there were a budget restriction imposed on period-2 announcements as well.

There is enough flexibility, given the model, if we specify a period-1 budget rule of the form, $\alpha(B_2 - B_1) + \beta(B_3 - B_2) + \gamma(0 - B_3) \leq -xB_1$, which can also be written (assuming that the constraint is binding) as:

[9] In a richer model, of course, there would be other disadvantages to temporary policy, relating to the potentially greater distortions associated with temporary tax measures. In other cases, though, such temporary measures might have further benefits, as in the case of the temporary investment incentives adopted in 2002 and modified in 2003.

(14) $aB_1 + bB_2 + B_3 = 0$,

where:

(15) $$a = \frac{x-\alpha}{\beta-\gamma} \quad ; b = \frac{\alpha-\beta}{\beta-\gamma}.$$

Note that (15) represents two equations in four unknowns (α, β, γ, x), so there are two free normalizations. It will turn out to be most intuitive to set $\gamma = 0$, so that final-period deficits don't count, since they are already constrained, given deficits in the first two periods, by the government's intertemporal budget constraint. As to the other normalization, note that efficient intertemporal allocation of resources would pay off one-third of the initial debt, B_1, in each period. Thus, $(B_2 - B_1)$ and $(B_3 - B_2)$ would each equal $B_1/3$. It makes sense to relate the constraints on first- and second-period borrowing to the sum of these efficient levels by setting $x = 2/3$. With these normalizations, we can recover α and β from solutions for a and b,

(16) $$\alpha = \frac{2(1+b)}{3(1+a+b)}; \quad \beta = \frac{2}{3(1+a+b)}$$

To determine the optimal values of a and b (and hence α and β), we must first consider the impact of this constraint on D's optimization in period 1. Given that there is now an additional constraint on decisions announced for periods 2 and 3, it will no longer necessarily be optimal for D to announce policies that maximize the continuation values of utility in state s, because such announcements might reduce the scope of D's choices in period 1. As announcements of these future policies and period-1 policies must now be simultaneously determined, D's problem in period 1 (compare to expression 8) is now:

$$\max_{T_1, G_{D1}, B_2, T_2, G_{D2}, B_3} \log(C - T_1) + \log(G_{D1}) + \pi_{dd} U_{Dd2}(B_2) + \pi_{dr} U_{Dr2}(B_2)$$

(17) $$+ \pi_{ds} \{\log(C - T_2) + \log(G_{D2}) + \pi_{sd} U_{Dd3}(B_3) + \pi_{sr} U_{Dr3}(B_3) + \pi_{ss}[\log(C - T_3) + \log(G_{D3})]\}$$

$$\ni B_2 = B_1 + G_{D1} - T_1 \; ; \quad B_3 = B_2 + G_{D2} - T_2 \; ; \quad B_3 + G_{D3} \le T_3 ; \quad aB_1 + bB_2 + B_3 \le 0$$

For period 3, the solution in state *s* will be the same as before, as it takes the debt level B_3 as given and involves no borrowing decision; thus, the term in square brackets in (17) is simply $U_{Dd3}(B_3)$. Making this substitution, we then use the constraints to eliminate G_{D1}, G_{D2}, and B_3 from the optimization problem, and derive first-order conditions with respect to the remaining unknowns, T_1, T_2, and B_2. Substituting the first-order conditions for T_1 and T_2 into that for B_2 yields the following expression, which implicitly provides a solution for B_2 as a function of the various probabilities, the initial debt level B_1, and the budget-rule terms *a* and *b*:

(18) $$\frac{2}{C - B_1 + B_2} - \frac{\pi_{dd}(4 - \pi_{dr}) + \pi_{dr}(2 + \pi_{rd})}{2C - B_2} - \frac{2\pi_{ds}(1+b)}{C - aB_1 - (1+b)B_2} + \frac{\pi_{ds}(2 - \pi_{sr})b}{C + aB_1 + bB_2} = 0$$

Expressions (14) and (18) represent two equations in the two unknown debt levels, B_2 and B_3, in terms of the probabilities, endowment, and the parameters *a* and *b*. Although this system does not provide a closed form solution for the debt levels in terms of the various exogenous parameters and the budget-rule terms *a* and *b*, we do not need a general solution for all values of *a* and *b*. Instead, we move directly to the objective of finding the particular values of *a* and *b* that induce efficient borrowing. That is, we impose the requirement that

(19) $(B_2 - B_1) = (B_3 - B_2) = B_1/3$,

and ask what values of a and b are consistent with this outcome, given the implicit solutions for B_2 and B_3 in (18) and (14). Substituting (19) and (14) into (18) yields:

$$(20) \qquad \frac{2}{C-B_1/3} - \frac{\pi_{dd}\left(2-\frac{\pi_{dr}}{2}\right)+\pi_{dr}\left(1+\frac{\pi_{rd}}{2}\right)}{C-B_1/3} - \frac{2\pi_{ds}(1+b)}{C-B_1/3} + \frac{\pi_{ds}(2-\pi_{sr})b}{C-B_1/3} = 0 .$$

As the terms in (20) all have the same denominator, the result is a simple solution for b, which, with (14) and (19), then gives a solution for a. These solutions (using the substitution $\pi_{ds} = 1 - \pi_{dd} - \pi_{dr}$) are:

$$(21) \quad (a) \qquad a = -\tfrac{1}{3}\left(1+\frac{\pi_{dr}(2+\pi_{dd}-\pi_{rd})}{\pi_{sr}(1-\pi_{dd}-\pi_{dr})}\right); \qquad (b) \qquad b = \frac{\pi_{dr}(1+\pi_{dd}/2-\pi_{rd}/2)}{\pi_{sr}(1-\pi_{dd}-\pi_{dr})}$$

Given the expressions for α and β in (16), these two conditions imply that

$$(22) \qquad \alpha = 1+\frac{b}{2+b}; \quad \beta = 1-\frac{b}{2+b},$$

so that $\alpha+\beta=2$, as desired by the normalization, and $\alpha/\beta = 1+b$. It is clear from (21b) that $b \in [0,\infty]$, so that $\alpha \in [1,2]$ and $\beta \in [0,1]$. The boundaries of these intervals are reached when $\pi_{dr} = 0$, in which case $b = 0$ and $(\alpha,\beta) = (1,1)$, and when $\pi_{sr} = 0$ or $\pi_{dd} + \pi_{dr} = 1$, in which case $b = \infty$ and $(\alpha,\beta) = (2,0)$. To interpret these results, it is helpful to rewrite expression (21b) as

$$(21b') \quad b = \frac{\pi_{dr}(1-\pi_{rd}/2)+\pi_{dd}\pi_{dr}/2}{\pi_{ds}\pi_{sr}}$$

The numerator of (21b′) contains terms that influence the incentive for first-period borrowing. The first term, $\pi_{dr}(1\text{-}\pi_{rd}/2)$, accounts for a loss of control to *R* in the second period, with an adjustment for the fact that *D* may regain control in the third period. The adjustment factor in this first term, π_{rd}, is divided by 2 because it affects control only in one period. The second term, $\pi_{dd}\pi_{dr}/2$, accounts for the potential loss of control to *R* in the third period. Together, these two terms account for all paths of losing control without passing through stalemate in period 2. An increase in the numerator increases the incentive to borrow in the first period, to pre-commit resources to prevent them from being allocated by *R*.

The denominator of expression (21b′) equals the probability of losing control to *R* in the third period after experiencing stalemate in period 2. The higher is this term, the more that *D* will wish to announce second-period borrowing, an announcement that applies only if a second-period stalemate occurs. If stalemate cannot occur ($\pi_{ds} = 0$), or if the occurrence of stalemate has no subsequent adverse consequences that would induce *D* to borrow ($\pi_{sr} = 0$), then *D* has no wish to "waste" any of the budget cap imposed by the constraint on an announced second-period policy. Hence, the optimal budget rule will place no weight on second-period announcements ($\beta = 0$). On the other hand, if there is no chance that *D* can lose control except by passing through stalemate in period 2 ($\pi_{dr} = 0$), then there is no reason to apply additional pressure on the period-1 borrowing decision, so the weights on the two periods' borrowing should be equal ($\alpha = \beta = 1$).

Thus, increases in the importance of stalemate (both its probability of occurrence and the importance of policies announced for it, if it occurs) should increase the weight placed on announced future polices, while increases in the incentive to borrow while in direct control should increase the weight placed on current policy. To get some idea of what expression (21) implies for the values of α and β, consider a numerical example.

Suppose that the probability of maintaining control is ½ for each group ($\pi_{dd} = \pi_{rr} = ½$), that the probability of losing control to the other party is ¼ ($\pi_{dr} = \pi_{rd} = ¼$), and that the probability of moving from stalemate to either party's control is also ¼ ($\pi_{sr} = \pi_{sd} = ¼$). Then b = 4½ and $(\alpha, \beta) = (1\,\frac{9}{13}, \frac{4}{13})$. In this case, most of the weight should be placed on first-period borrowing. If we think of each period as a presidential term of four years, then this suggests that policies announced during one presidential term for the next presidential term should be given some weight, but not very much (in this case, only $\frac{2}{11}$ as much as the polices adopted during the current term).

In light of these results, what can we say about recent changes in policy, in particular the increased use of sunset provisions? For a given overall budget cap, increased sunsets of tax cuts amounts to shifting more borrowing into the earlier part of the budget period. This would be consistent with an increased expectation that the policies announced for the future (after the sunset but still within the budget period) are irrelevant – that there is a lower chance of stalemate, or that there is more political instability, i.e., more danger that the other side will gain power and divert resources for its own preferred uses.

There is one final issue to consider regarding this section's characterization of the optimal budget window. This window was derived for period 1, under the assumption that decisions made in period 2, absent stalemate, were unconstrained. But, one might think that the anticipated application of budget restrictions in the future might affect decisions today and hence today's optimal budget window. It turns out, in this model anyway, that this conjecture is false. While the imposition of a future budget rule in the spirit of the one already analyzed would affect future decisions and each agent's utility, it would not alter the rule just derived.

Because there is only a two-period horizon when decisions are made anew in period 2, there cannot be a "budget window" covering more than one borrowing decision. But, suppose that the government imposes its objective directly through the constraint that borrowing in periods 2 and 3 be equal, i.e., that the debt inherited from period 1 be paid off equally in periods 2 and 3. This would remove the period-2 borrowing decision from the agent in control and, it may be shown, would lead to the following second-period utility levels for *D* and *R* in state *d*:

$$\overline{U}_{Dd2}(B_2) = (4-\pi_{dr})\log(2C-B_2) - (4-\pi_{dr})\log(4) \tag{6$'$}$$
$$\overline{U}_{Rd2}(B_2) = (2+\pi_{dr})\log(2C-B_2) - (2+\pi_{dr})\log(4)$$

with parallel expressions for $\overline{U}_{Rr2}(B_2)$ and $\overline{U}_{Dr2}(B_2)$ in state *r*. The optimal decision in period 1 would then be derived by replacing $U_{Dd2}(B_2)$ and $U_{Dr2}(B_2)$ in expression (17) with $\overline{U}_{Dd2}(B_2)$ and $\overline{U}_{Dr2}(B_2)$. Even though the $\overline{U}(\cdot)$ functions differ from the corresponding $U(\cdot)$ functions in expression (6) (with, as one would expect, $\overline{U} > U$ unless the probability of transition from *d* to *r* or *r* to *d* is zero), their derivatives with respect to the state variable B_2 are the same for all values of B_2, and so would be the new problem's first-order conditions. Thus, one may interpret the rule already derived as taking into account behavior in response to future budget rules as well.

V. Dealing with Economic Fluctuations

Thus far, we have assumed that the economy looks the same in every period. Thus, if budget restrictions are effective, the initial debt B_1 will be paid off smoothly over the three periods, with each period's level of borrowing and government spending being equal. For this case, a simple alternative to imposing penalties on the first- and second-period deficits would have been to impose annual deficit limits. Another approach, suggested recently by some observers in response to the increased use of sunsets in the United States, has been to treat all adopted policies as permanent; that is, the rule would be to ignore announced policies for periods 2 and 3, and to "score" those periods' deficits as if the policy adopted in period 1 were announced for periods 2 and 3 as well. In the model, this simple approach would force the government in period 1 to "choose" the socially optimal deficit, for its only actual choice would be with respect to the division of each period's spending between private and public uses.

Unfortunately, neither of these alternative approaches is robust, even in this simple model, with respect to a minor change in assumptions. In particular, suppose that the endowments C_1, C_2, and C_3 vary across periods. Then, it will be optimal for borrowing to fluctuate in order to smooth resources across the periods, with greater borrowing in any period i when the endowment C_i is below its three-period average, and less borrowing when the endowment exceeds the average. This countercyclical pattern of deficits is perfectly reasonable, but it would not be possible under the simple standards of constant budget deficits or ignoring temporary provisions. If the economy were hit with a low endowment in period 1, for example, any attempt to increase borrowing in period 1 would be ruled out, either directly by the deficit limit or by the requirement that this extra borrowing be projected forward to periods 2 and 3 as well (and hence found to be infeasible).

There are, of course, modifications to annual deficit limits, as under the Stability and Growth Pact, allowing deviations during recession. Presumably, one could modify rules regarding the scoring of temporary provisions, too. But modifications of this sort are ad hoc and unlikely to provide a full solution, for it is hard to determine when and by how much the rules should be relaxed. The approach of imposing penalties on borrowing in different periods is more flexible than either explicit deficit targets or restrictions on the scoring of temporary provisions.

Indeed, at least in the model used here, this approach will serve just as well in the case of fluctuating endowments as in the constant-endowment case already analyzed.

Generalizing the model to allow fluctuating endowments, C_1, C_2, and C_3, we follow the same steps as in the previous sections and obtain a new version of expression (18), the implicit solution for B_2 for the constrained period-1 optimization:

$$(18') \quad \frac{2}{C_1 - B_1 + B_2} - \frac{\pi_{dd}(4-\pi_{dr}) + \pi_{dr}(2+\pi_{rd})}{C_2 + C_3 - B_2} - \frac{2\pi_{ds}(1+b)}{C_2 - aB_1 - (1+b)B_2} + \frac{\pi_{ds}(2-\pi_{sr})b}{C_3 + aB_1 + bB_2} = 0$$

To solve for a and b, we again impose the requirement that the deficits conform to their optimal pattern, allowing equal spending in each period:

$$(19') \quad B_2 = \tfrac{2}{3}B_1 + \overline{C} - C_1\,; \quad B_3 = \tfrac{1}{3}B_1 + 2\overline{C} - C_1 - C_2$$

where $\overline{C}$ is the mean endowment for the three periods. Using (14) and substituting the expressions for B_2 and B_3 in (19′) into (18′) yields

$$(20') \quad \frac{2}{\overline{C} - B_1/3} - \frac{\pi_{dd}\left(2 - \frac{\pi_{dr}}{2}\right) + \pi_{dr}\left(1 + \frac{\pi_{rd}}{2}\right)}{\overline{C} - B_1/3} - \frac{2\pi_{ds}(1+b)}{\overline{C} - B_1/3} + \frac{\pi_{ds}(2-\pi_{sr})b}{\overline{C} - B_1/3} = 0,$$

which is precisely the same as (20) except that $\overline{C}$ has replaced C. Thus, the solution for the optimal value of b is exactly the same, and so will be the implied values of α and β.[10]

[10] To see these additional steps, note that, using (15) and the normalization that $\gamma = 0$, b determines the ratio of α to β. Thus, we may choose the other normalization, of x, to scale α and β so that $\alpha+\beta=2$, as before.

VI. Valuing Future Commitments

The analysis above also provides insight into the debate about how one should value future government commitments. Consider, for example, policies that expand certain entitlement benefits, such as the prescription drug benefit passed by the U.S. Congress late in 2003. Although there was considerable controversy concerning its cost over the official ten-year budget window, this short-run cost pales in comparison to the projected long-run cost, because of phase-in provisions and the long-run growth rate in medical spending. According to estimates in the 2004 Medicare Trustees Report (Table II.C23), the program expansion, in present value, has added an estimated $6.2 trillion dollars of implicit liability, net of premium payments by beneficiaries and projected contributions from states. This increment alone is larger in magnitude than the current explicit U.S. national debt.

How should we account for this liability? The official approach, which represents one extreme, is to exclude it entirely from the national debt. An alternative approach, representing perhaps the other extreme, is to lump such liabilities together with explicit national debt to obtain a comprehensive (and very large) measure of total liabilities (see, e.g., Gokhale and Smetters 2003). Our analysis so far suggests that the right approach is somewhere in between, that the future commitments should be counted only to the extent that current policy impels them to occur, i.e., in future stalemates. This approach would count only some of the projected expenditures, leaving out those projected for states in which either *R* or *D* can reset policy.

But this initial conclusion hinges on the modeling assumption maintained thus far, that policy announcements have no force outside stalemate, and always are enforced within stalemate. In reality, certain announcements may have more force than this, applying to some extent outside of stalemate. After all, references to Social Security as the "third rail" of politics suggest a difficulty of changing announced policy, even if the party that had opposed the policy accedes to power. Policies with greater permanence clearly should be accorded more weight in accounting for future liabilities, and the same conclusion would hold in the model with respect to the appropriate budget window. That is, in an extended version of the model, the weight accorded to future policy announcements would be greater if those announcements were enforceable to some extent in states *r* and *d* as well as in state *s*. On the other hand, policies not fully enforceable even within state *s* (such as components of discretionary spending that might require an explicit annual appropriation to be maintained, regardless of past indications of intent) would have announcements given less weight than in the model.

While this model extension would be straightforward, its application to actual budget practice would not be, for it would require estimates of the strength of different commitments. One may imagine, though, the use of a longer effective budget window to deal with entitlement programs than with discretionary ones, although the illustrative Social Security example from the 1990s given in the introduction suggests that even for entitlement programs a full 75-year present value would be too much.

One might object to the feasibility of this modified approach, arguing that mistakes in the design of program-specific budget windows would allow governments to shift commitments toward policies that are more permanent than is being accounted for and thereby get around the windows' intended impact. But expenditures in different categories of expenditures are not perfect substitutes, so this form of "budget arbitrage" would be self-limiting. Indeed, the rising use of sunsets in response to the existing U.S. scheme indicates that costless substitution among programs does not exist; if it did, then ways could have been found to make future commitments binding, thereby lessening the incentive to eschew the announcement of permanent policies.

VII. Conclusions

This paper has addressed both normative and positive issues. On the normative side, how might one design a multi-year budget window to aid in the control of borrowing in excess of a generally desired level? On the positive side, how can we make sense of the various legislative responses to existing multi-year budget windows, some that push anticipated deficit-producing measures "outside" (i.e., beyond) the budget window, others that concentrate budget costs within the early years of the budget period through the utilization of "sunsets?"

Results based on the paper's model suggest a number of conclusions. First, to have substance, a budget window can't extend forever with full weight given to later periods; otherwise, it simply replicates the government's intertemporal budget constraint. Second, both "sunsets" and shifts of budget costs "outside" the budget window can be understood as optimal responses by governments seeking to satisfy their own spending and borrowing objectives while satisfying a multi-year budget window of the type presently used in the United States, with weights that remain constant over a finite budget window and then fall to zero. Third, within the context of the model, an optimal budget rule is one that places less weight on years further in the future. This discounting of future periods' deficit costs is over and above normal discounting (which is absent in the present model, which assumes a zero interest rate), and reflects two factors: that policies announced for the future are not certain to take effect and, if they do, that their impact will be felt more by those whom budget rules are intended to protect.

The solution identified here is to the shape of the budget window itself, rather than to the characterization of policies. Thus, it is more flexible with respect to the economic environment than alternative approaches that would either impose limits on annual budget deficits or simply rule out time varying policies, such as proposals that would deal with sunsets by treating temporary tax measures as permanent. Even if a well-designed budget window is superior to other budget rules, though, it is not impervious to changes in the political climate. As discussed above, for example, changes in the probability of stalemate or a shift in power can lead to increased use of sunsets.

Finally, the analysis here has been based on a very simple political structure, in which there is no separation between voters and politicians. With greater population heterogeneity, this would not be a feasible approach, and the analysis would necessarily be more complicated. One potential source of heterogeneity among agents is generational. Policies at a given time may affect different cohorts, and policies with similar tax and spending patterns over time might have different cohort-specific impacts. This adds further ambiguity to the measurement of implicit liabilities (see, e.g., Auerbach and Kotlikoff 1987) and further complicates the issues of how budget rules should be designed and how policy choices respond. An extension of the existing framework to deal with the case of incomplete altruism, which is beyond the scope of this paper, would first have to characterize how the interests of future generations are taken into account in the setting of policy.

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