Pre-committed Government Spending and Partisan Politics

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December 7, 1997

PRELIMINARY AND INCOMPLETE
Abstract

An existing literature has examined the strategic opportunities available to partisan governments as a result of the existence of government debt. In models with one government good and political polarization, conservative governments may use debt to limit the ability of future liberal governments to spend. The effects are asymmetric and lead to a bias toward debt. Models with two government goods and political polarization also lead to a bias toward debt, as each government tries to reduce the resources available to future governments that may have different spending priorities.

This paper considers government commitments to ongoing spending programs that require future outlays. Such commitments are pervasive in practice. We contend that spending constraints are important for understanding partisan politics because they may provide a counter-weight to the stubborn conservative’s ability to constrain spending through debt. In a model with one government good, we show that a “stubborn liberal” policy maker can use precommitted spending to prevent a later conservative government from imposing decisive spending cuts. Such commitments may help explain why a welfare state is difficult to scale down. In a model where parties differ about spending priorities, we show that re-election uncertainty may create a permanent bias towards higher government spending and higher taxes.
1. Introduction

A substantial literature in political economy has examined how partisan governments can influence the fiscal choices of their successors by issuing government debt. Persson and Svennson (1989) show that a “stubborn conservative” policy maker might run deficits to reduce the ability of a future “liberal” government to spend.¹ In a model with two categories of government spending, Alesina and Tabellini (1990) show that polarization also produces a bias towards government debt, as each government tries to reduce the resources available to future governments that may have different spending priorities.

This paper considers government commitments to ongoing spending programs that require future outlays. Such commitments are pervasive in practice. We contend that spending constraints are important for understanding partisan politics because they may provide a counter-weight to the stubborn conservative’s ability to constrain spending through debt. In a model similar to Persson and Svennson (1989), we show that a “stubborn liberal” policy maker can use precommitted spending to prevent a later conservative government from imposing decisive spending cuts. Such commitments may help explain why a welfare state is difficult to scale down. In a model where parties differ about spending priorities (similar to Alesina and Tabellini, 1990), we show that re-election uncertainty may create a permanent bias towards higher government spending and higher taxes.

Because some level of forward commitment can be rationalized by efficiency arguments, the challenge here is to show that partisan politics will under some conditions lead to excessive

¹ Throughout, we follow the US usage of the label “liberal” to refer to governments with preferences for high spending.
commitments. That is, once the institution of forward commitment has been established, it is prone to be used in ways that may actually reduce the cost-effectiveness of the production of public goods and services.

Our primary model is an endowment economy with a private good and a publicly provided good. There are two types of government with different preferences over the two goods, as in Persson and Svensson (1989). We will use the label public good for the publicly provided good, even though it may not be a public good in the strict public finance sense. The public good is produced with private sector inputs that are contracted to be employed contemporaneously or one period ahead. Production costs are minimized if both types of contracts are used. We show that there is a basic tension between cost-minimization and partisan politics. On one hand, efficiency considerations provide incentives toward moderation, to ensure that a future government of the other type does not use a grossly inefficient mix of inputs.\(^2\) On the other hand, higher or lower levels of inputs can be used to nudge the next government toward providing more or less of the public good, because the level of precommitted purchase changes the marginal productivity of the contemporaneously purchased input. Outcomes then depend on the strength of preferences and the degree of substitutability between the inputs.

\(^2\) When reelection is uncertain, a government that, say, puts a high value on public goods has an incentive to order fewer pre-committed inputs than when reelection is certain, because the inputs would be inefficiently used in the event a low-spending government comes to power. A low-spending government has a corresponding incentive to undertake a higher level of forward spending than under certain reelection, because a future high-spending government would otherwise buy too much on the spot market. An intermediate level of forward commitment is most efficient.
Most interesting, and perhaps practically most relevant is the case of highly substitutable inputs, so that the efficiency loss of mismatched inputs is small— it does not matter much when goods are ordered. Then a high-spending government may find it optimal to precommit to spending so much that a subsequent government with low preferences for government spending is driven to (or almost to) a corner solution. In practical terms, a high spending government puts in place a big bureaucracy and/or long-term procurement contracts that force future governments to maintain a “big government”, like it or not. This effect is asymmetric. Low pre-committed orders do not bind a later high-spending government, because the high-spending government can always buy on the spot market. Hence, precommitment generates a bias towards high-spending.

All public goods inputs are financed by lump-sum taxes. Hence, Ricardian equivalence applies so that government debt is neutral and can be ignored. This is important, because precommitted government spending can be interpreted as a government liability. With lump-sum taxes, the payment date and the liability characteristic of precommitted spending is irrelevant (Bohn, 1992), showing that our “real” precommitment mechanism works in a very different way than government debt.

Our first set of results are based on the assumption of an endowment economy. When we incorporate capital investment into the model, the analysis is complicated significantly because of an interdependence between savings and government spending. We use a two-period model with capital to show that savings are likely to strengthen the liberal government’s incentives to precommit spending. Precommitted spending increases capital investment and
that investment in turn increases future actual spending by reducing the marginal utility of consumption.

We also examine the situation where the precommitment is of transfer payments rather than a government good. In this case, we find that the results from the main model apply analogously. There is an asymmetry and, when precommitment is available, the government with the higher preference for transfer payments can compel the following party to spend more than it otherwise would.

Finally, we consider an Alesina and Tabellini (1990) type model with two categories of public goods and governments that disagree about spending priorities, as in Alesina and Tabellini (1990). This model also produces a bias towards high spending when current and pre-committed purchases are close substitutes, because each government will buy its preferred good on the spot market and must honor forward commitments for the other good incurred by previous governments.

Forward spending commitments come in a variety of forms. Most obviously, most government budgeting systems distinguish between current-year appropriations (the actual spending) and authorizations that empower the executive branch to incur spending commitments for future years (in the US: “Budget Authority”). Such authorizations are rationalized easily because it is often more cost-efficient to procure goods and services with advance notice than to use spot markets. A well-known example is military procurement contracts for major weapons programs, which would be virtually impossible without long-term planning. Less explicitly, most government programs require a physical and human
infrastructure (office buildings and permanent staff) that cannot be reduced without incurring significant cost.

In the US and many other countries, “mandatory” transfer programs such as social security and unemployment insurance are another large category of government outlays that is removed from the standard annual appropriations process. We will show that entitlements can also be interpreted as precommitted government spending, distinct from debt, in the context of our model.

This paper is organized as follows: Section 2 examines the basic model with a single public good and two types of government with different preferences for the public good. Section 3 explores the implications of capital investment. Section 4 shows how to interpret transfer programs as precommitted spending items. Section 5 examines a model with two categories of public goods and governments that disagree about spending priorities. Section 6 concludes.

2. Partisan disagreement about the size of government

This section considers a model with a single public good and a private good. Two types of government differ in their relative preferences over public versus private goods.

2.1 The basic model

We set up the basic model with a one-period precommitment and no government debt.

Government of type \( i (i = R, L) \) maximizes

\[
\nu^i = \sum_{t=1}^{\infty} \beta^t E \left[ u(c_t) + \alpha^t v(g_t) \right] 
\]  

(1)
where \( c_t \) is the private good and \( g_t \) is a publicly provided good (public, for short) good. The public good is produced with two inputs, one of which must be chosen one period in advance. For concreteness, we will label the predetermined input \( B_t \), for bureaucracy, and the variable input \( O_t \), for operating cost. We assume:

\[
g_t = G(B_t, O_t),
\]

where \( G_O > 0 \), \( G_B > 0 \), \( G_{oo} \leq 0 \) and \( G_{BB} \leq 0 \). (Additional regularity conditions are imposed below.) The input \( O_t \geq 0 \) is chosen in period \( t \), and \( B_t \geq 0 \) in period \( t-1 \). The model may be interpreted literally as a model of government administration. Then \( B \) represents the expenses for personnel, office space, and other items that are fixed in the short run, while \( O \) captures variable cost, such as phones, photocopying, and perhaps temporary staff. The model may also be interpreted more broadly as applying whenever precommitted inputs are potentially involved in the provision of government goods or services. For example, the government may have a choice between alternative procurement contracts. It may place “rush” orders for quick delivery (type \( O \) expenses) or place contracts that allow sufficient lead time for low cost production (type \( B \) expenses).

In some cases, both inputs may be essential for producing public services so that \( B \) and \( O \) are complements in production, \( G_{BO} > 0 \), as in the case of personnel and phones. In other cases, \( B \) and \( O \) may be close substitutes, \( G_{BO} < 0 \), and differences in \( G_B \) and \( G_O \) may be small. In military procurement, for example, pre-planned spending may be more efficient for some expenses (it may be difficult to produce an aircraft carrier on the spot), while spot contracts are more efficient in other cases (say, when flexibility is valued). To be general, our model
will allow both substitutes and complements in production. We will also show how the model generalizes to the case of transfers.

For any interpretation or inputs, a key assumption is that the two possible types of government differ about the valuation of the resulting public good. Specifically, the type $L$ government is assumed to have a relatively strong preference for public goods, $\alpha^L > \alpha^R > 0$. We will also assume that elections occur every period, so a period should be interpreted as the time between successive elections.

We assume that all spending is financed by contemporaneous lump-sum taxes levied on a constant endowment stream, $Y$. The resource constraint is:

$$c_t = Y - O_t - B_t$$

Each period, $t$, the government in power chooses $B_{t+1}$ and $O_t$, taking as given the level of pre-committed purchases, $B_t$. The optimal decision about $B_{t+1}$ clearly depends on how future government choices vary with $B_{t+1}$. We assume perfect foresight (rational expectations) about the policy function $O'_{t+1}(B_{t+1})$ of the next government. Election outcomes follow a Markov process, where $\pi^i$ is the probability of re-election of type $i$, and expectations are taken with respect to election results as there is no other uncertainty. Denote $V^i(B_t)$ as the value function of a government of type $i$ if a government of type $j$ is in power. Then, optimal government decisions must satisfy the following Bellman equation:

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3 Financing decisions are irrelevant in this context. If the government partially debt-financed its purchases, consumption opportunities would remain unchanged, assuming lump-sum taxes and no capital investment. A significant assumption is that $B_t$ has a real resource cost in period $t$ and does not represent a use of period $t - 1$ endowments. This timing issue is examined in the next section.
\[ V^{ii}(B_t) = \max_{O_t, B_{t+1}} \left\{ u(Y - O_t - B_t) + \alpha' v G(O_t, B_t) \right\} + \beta \left\{ \pi' V^{ii}(B_{t+1}) + (1 - \pi') V^{ii}(B_{t+1}) \right\}, \]

for \( i = L, R \) and \( j \neq i \), where:

\[ V^{ii}(B_{t+1}) = \left\{ u(Y - O_{t+1} - B_{t+1}) + \alpha' v G(O_{t+1}, B_{t+1}) \right\} + \beta \left\{ \pi' V^{ii}(B_{t+2}) + (1 - \pi') V^{ii}(B_{t+2}) \right\}. \]

This problem simplifies considerably because there are no intertemporal linkages except for the precommitted purchase. For this reason, the solution for \( O_t \) only depends on the current period utility:

\[ O_t = O'(B_t) = \arg\max \left\{ u(Y - O_t - B_t) + \alpha' v G(O_t, B_t) \right\}. \]

It is characterized by the first order condition

\[ \alpha' v' G(O_t, B_t) G(O_t, B_t) + \alpha'' G(O_t, B_t) - u' (Y - O_t - B_t) + \lambda_i = 0, \]

where \( \lambda_i \) is the shadow value of the non-negativity condition \( O_t \geq 0 \); that is, \( \lambda_i \geq 0 \), \( \lambda_i O_t = 0 \).

In case of an interior solution, the second-order condition

\[ \alpha' v' G_{oo} + \alpha'' G_{oo} + u'' < 0 \]

is satisfied provided \( v' > 0 \), \( G_o \geq 0 \), \( G_{oo} \leq 0 \), \( v'' \leq 0 \), \( u'' \leq 0 \), with at least one of the weak inequalities being strict.\(^4\) This also ensures a unique solution for \( O_t \). To simplify notation, define:

\[ f^i_O = v' \left( G(O_t, B_t) \right) G(O_t, B_t) > 0, \]
\[ f^i_B = v' \left( G(O_t, B_t) \right) G_B(O_t, B_t) > 0, \]
\[ f^i_{oo} = v' \left( G(O_t, B_t) \right) G_{oo}(O_t, B_t) + v'' \left( G(O_t, B_t) \right) G_B(O_t, B_t) = 0, \]
\[ f^i_{ob} = v' \left( G(O_t, B_t) \right) G_{ob}(O_t, B_t) + v'' \left( G(O_t, B_t) \right) G_{ob}(O_t, B_t) G_B(O_t, B_t). \]

Then, the first order condition (function arguments will be dropped when no ambiguity would result) of \( O \) can be written more compactly as

\[ \alpha' f^i_O - u' + \lambda_i = 0, \quad (4) \]

\(^4\) For the discussion, we treat all these inequalities as strict, though the examples will include limiting cases with some equalities.
and the second order condition is $\alpha_i f_{oo}^i - u_i'' < 0$.

The possibility of a corner solution is important in this context, because pushing the next government into a corner is a straightforward way in which a government can constrain its successor. A corner solution with $O_i(B_i) = 0$ obtains if:

$$h_i'(B_i) = \alpha_i v'(G(0, B_i))G_o(0, B_i) - u'(Y - B_i) + \lambda_i < 0,$$  \hspace{1cm} (5a)\]

Because $h_i'(B_i)$ is increasing in $\alpha'$ and $\alpha^L > \alpha^R > 0$, the $B$-values for which the type-$L$ government is constrained is a subset of the values for which $R$ is constrained. More generally, the marginal benefit of additional current spending varies with precommitted spending according to:

$$\frac{d(\alpha_i f_{ob}^i - u_i)}{dB_i} = \alpha_i f_{ob}^i + u_i''.$$  \hspace{1cm} (5b)\]

If current and precommitted spending are substitutes in production, $G_{ob} \leq 0$ and $v'' < 0$, the expression $f_{ob}^i$ is strictly negative, which implies (a) that interior solutions for $O_i(B_i)$ depend negatively on $B_i$ and (b) that the corner solution $O_i(B_i) = 0$ applies if and only if $B_i$ exceeds a critical value, $\bar{B}^i$, where $\bar{B}^L > \bar{B}^R$. While $G_{ob} \leq 0$ is a sufficient condition for a negative relation between $O$ and $B$, a negative dependence should be considered the “normal,” intuitively plausible case even if $O$ and $B$ are complements. This is because declining marginal utilities ($v'' < 0$ and $u'' < 0$) will make (5b) negative even if $O$ and $B$ are complementary, unless the complementarity is very strong. Unless otherwise noted, we will assume that $\alpha_i f_{ob}^i + u_i'' < 0$, for both $i = L$ and $i = R$.

For interior solutions, we can explicitly compute

$$O_i^j = \frac{d O^j_i(B_i)}{dB_i} = -\frac{u_i'' + \alpha^i f_{ob}^j}{u_j + \alpha^i f_{oo}^j}.$$  \hspace{1cm} (6)\]
Assuming $f_{ij}^i > f_{ij}^i$ (which is implied by $f_{ij}^i < 0$ and constant returns to scale), we have

$$O_B' > -1,$$

so that

$$\frac{d(O_i + B)}{dB} = 1 + O_B^i > 0.$$ Even if a government reduces spot-market spending in response to a high $B$, higher precommitted spending implies higher total spending.

The critical strategic question is then how $B_{t+1}$ is determined. The first order condition for $B_{t+1}$,

$$\beta \left\{ \pi \frac{dV^i(B_{t+1})}{dB_{t+1}} + (1 - \pi)\frac{dV^j(B_{t+1})}{dB_{t+1}} \right\} = 0,$$

does not involve $B_i$. Hence, $B_{t+1}$ does not depend on $B_i$. The overall solution to the problem of determining $B$ is a pair of real numbers $(B^L, B^K)$ denoting the optimal choices of the $L$ and $R$ governments, respectively. Using the optimal policy functions $O^i(B)$ to evaluate $V^i(B_{t+1})$ and $V^j(B_{t+1})$, we find that $B_{t+1}$ is characterized by the first order condition

$$\pi \left( \alpha^i f_{B_i}^i - u_i \right) + (1 - \pi) \left( \alpha^j f_{B_j}^j + f_{O_B}^j O_B^j \right) - u_i (1 + O_B^j) = 0,$$

where $i = R, L, j \neq i$, provided $O^j_{t+1}(B_{t+1})$ is differentiable at $B_{t+1}$. Here, the envelope theorem has been invoked to delete terms involving $O_B^i$; but the envelope theorem does not apply to the other government’s choice, $O_B^j$. Since government $j \neq i$ sets $O_{t+1}$ differently than government $i$ would have wanted, government $i$ may have an incentive to manipulate $B_{t+1}$ to affect the choices of a successor government of the other type.

To obtain benchmark values for type $R$ and $L$’s choices of $B$, note that strategic issues are absent if the probability of re-election is $\pi' = 1$. Invoking (4), the first order condition for $B$
reduces to $G_o = G_B$. So, the optimal solution for $\pi' = 1$ is entirely driven by technical efficiency considerations. Efficiency requires that the marginal products of current and pre-committed spending are equalized. If $G(\cdot)$ has constant returns to scale, this condition further implies that the efficient ratio of inputs $\frac{B}{O} = \phi$ is a constant that does NOT depend on government type. For reference below, let $B^*^R$ and $B^*^L$ be the optimal choices of $B$ without re-election uncertainty. They satisfy $B^*^R < B^*^L$.

If re-election is uncertain, $\pi' < 1$, additional considerations apply. Most interesting is the optimization problem of a type $i = L$ government in period $t$ facing the possibility of type $j = R$ government taking power in period $t + 1$. Then two cases arise. First the government chooses a $B$ value above $B^*^R$ (but below $B^*^L$) in which case $O^R(B_{t+1}) = 0$ and $O^R_b = 0$; then $B_{t+1}$ must satisfy the first order condition for a corner solution,

$$\alpha^L \pi^L (f_b^L - f_o^L) + (1 - \pi^L)\left(\alpha^L u'(G(0,B))G_B(0,B) - u'(Y - B)\right) = 0. \quad (8a)$$

Second, the type-$L$ government may choose a $B$ value below the critical value $B^*^R$ at which $R$ is not at the corner solution. In this case $B_{t+1}$ must satisfy the first order condition for interior solutions,

$$\alpha^L \pi^L (f_b^L - f_o^L) + \alpha^L (1 - \pi^L)\left(f_b^R - f_o^R\right) + (1 - \pi^L)(\alpha^L - \alpha^R) f_o^R(1 + O^R_b) = 0, \quad (8b)$$

where (4) has been used to eliminate $u'$ from (7).

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5 Notation for optimal choices is indicated by a *, corner solution values are indicated by a -.  
6 A value $B_{t+1} > B^L$ will never be chosen because then $O_{t+1} = 0$ with probability one, which would be blatantly inefficient and suboptimal. To be more precise, for $B_{t+1} > B^L$, the first order condition for $B$ is $\alpha^L u'(G(0,B))G_B(0,B) - u'(Y - B) = 0$, since $O = 0$ would then apply with probability one. But, since corner solutions for $O$ satisfy $\alpha^L u'(G(0,B))G_B(0,B) - u'(Y - B) < 0$ and since $G_B(0,B) > G_B(0,B)$, we have $\alpha^L u'(G(0,B))G_B(0,B) - u'(Y - B) < 0$, showing that the first order condition for $B$ cannot be satisfied with $B_{t+1} > B^L$.  

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In case of a corner solution, it is very likely that $B_{t+1}^L$ exceeds the otherwise optimal $B^*$. For example the government may pick an inefficiently high level of pre-determined government spending, for strategic reasons. A sufficient condition for $B_{t+1}^L > B^*$ is $\alpha L f_{OB} L + u_L^{''} < 0$ at $B^*$. Since $u^{''} < 0$ and $f_{OB} = v' G_{OB} + v'' G_{OB} G_B$ is negative unless $G_{OB} > 0$, the sufficient condition is satisfied unless $O_B$ and $B$ are strongly complementary in production.

In case of an interior solution, the conclusions are more conditional. The ability to raise total spending in period $t+1$ by raising $B_{t+1}^L$ provides a clear strategic incentive to raise $B^L$ above $B^*$; this is captured by the positive term $(1 - \pi L) (\alpha L - \alpha R) f_{OB} (1 + O_B^R)$ in (8b). On the other hand, the fact that type $R$ will pick a low $O$ value implies that the $f_{BR} - f_{OR}$ term in (8b) is likely negative. Intuitively, choosing a high $B$ value induces $R$ to produce the public good in an inefficient way. Knowing this, type $L$ has an incentive to set a lower value. Following Persson and Svensson’s language, the issue is one of relative stubbornness versus accommodation. If $L$ is a “stubborn liberal” that has preferences $\alpha L > \alpha R$, and $O$ and $B$ are close substitutes so that the cost of inefficient input choices is relatively small ($f_{BR} - f_{OR}$ is small) and an increase in $B$ does not trigger a sharp reduction in $O^R$ ($O_B^R$ is small, so that $R$ is accommodating, $1 + O_B^R > 0$), then the strategic argument will likely dominate so that $B_{t+1} > B^* L$. But if $R$ is a “stubborn conservative” that sets $O_B^R$ close to -1 and $O$ and $B$ are not close substitutes, the strategic factor is likely to be small relative to the efficiency.

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7. This is because at $B = B^* L$, $h^L_i - f^L_i$ and $\alpha L f_{OB} L - u_L^{''} = 0$. The condition $\alpha L f_{OB} L - u_L^{''} > 0$ ensures that $\alpha L f_{OB} L - u_L^{''}$ is decreasing in $O$, which implies that $\alpha L f_{OB} L - u_L^{''} (0, B) G_{OB} (0, B) - u_L^{''} (Y - B) > 0$, so the left hand side of (8b) is strictly positive at $B = B^* L$. Combined with the second order condition for $B$, this implies that a solution of (8b) must satisfy $B > B^* L$.

8. The second order condition implies that the derivative of (8a) with respect to $B$ is negative. Also, (8a) is negative at $B = B^* L$ since $f_{OR} < f_{OB}$ at $0 = 0$. Hence, if (8a) is positive at some $B$ value (here $B^* L$), continuity implies that there is a solution above.
considerations, resulting in “accommodating” behavior of L, meaning $B_{t+1} < B^L$. The numerical examples in the next section show that both cases can occur.

2.2 Examples

This section provides a number of examples illustrating the strategic interactions between the $R$ and $L$ governments.

Example 1: $L$ pushes $R$ into a corner

An example in which $L$ pushes $R$ into a corner is the case of perfect substitutes, $G(O, B) = O + B$. When the government with the higher preferences, type $L$, is in power, it can always set the amount of government in the following period to its optimal, $g^L$, by setting $B_{t+1} = g^L$, without regard to the particulars of the utility function. Type $L$, if it follows a type $R$ will just increase current spending to $g^L$. Therefore Type $R$ cannot constrain type $L$. A type $R$ can only reduce $g$ below $g^L$ by holding office for at least two consecutive periods.

Example 1 illustrates the role of corner solutions. Since there is no “real” technological interaction between $O$ and $B$ ($O$ and $B$ enter additively in both preferences and the budget constraint), $B$ does not affect the next government’s choices unless the later government is at a corner solution.
Example 2: Power Utility and CES Production

This example provides a more systematic analysis of how preferences and the production technology for the public good affects the strategic interaction between $L$ and $R$ governments. One important issue is the role of substitution versus complementarity between $O$ and $B$ in the production of public goods. To explore this issue, we assume power utility and CES production:

$$u(c) = \begin{cases} 
\frac{c^{1-\mu}}{1-\mu} & \text{if } \mu \neq 1 \\
\ln(c) & \text{if } \mu = 1 
\end{cases}$$

$$v(g) = \begin{cases} 
\frac{g^{1-\eta}}{1-\eta} & \text{if } \eta \neq 1 \\
\ln(g) & \text{if } \eta = 1 
\end{cases}, \quad \text{and}$$

$$G(O, B) = [a O^{-\varepsilon} + (1-a) B^{-\varepsilon}]^{\frac{1}{\varepsilon}},$$

with elasticity of substitution $\frac{1}{1+\varepsilon}$.

The first complication one encounters in the general case is the possibility of multiple solutions to the FOC. Despite the concavity assumptions about production and technology, governments may face objective functions with several local maxima. Intuitively, if a Type $L$ government set $B^L$ low enough that $O^R(B^L)$ is far from zero, the derivative $O^R_B$ may be so close to negative one that $L$ has little incentive to manipulate $B$ for strategic reasons. Then the optimal choice for $L$ may be an $B$-value near $B^* \text{^L}$. However, for higher $B$ values, $O^R(B^L)$ may be so close to zero that $O^R_B$ is small in absolute value, giving the $L$ government a substantial incentive to set $B$ even higher to influence the public good provision of a later $R$ government yielding another local maximum at $B >> B^* \text{^L}$.

Note that corner solutions do not exist in this context. For CES production, the marginal product of $O$ becomes very large at small $O$-values, $G_o \to \infty$ when $O \to 0$. Still, if type $L$ picks a high $B$-value, $R$ would be forced into setting $O$ so close to zero that $O^R_B$ will also be
near zero, implying that $L$ still has a chance to manipulate its successor government. In fact, the first order conditions for $L$ have two solutions when $\varepsilon \to -1$, one of which pushes $R$ near a corner, while the other is at a much smaller $B$-value at which $O^R_B$ is near minus one.

Example 2a illustrates this possibility.

**Example 2a**: Consider the parameters $\alpha^L = 2$, $\alpha^R = 1$, $\varepsilon = 0.99$, $\mu = \eta = 1$, and $\pi = 0.5$.

There are two local maximums for $L$. One local maximum is in the vicinity\(^9\) of $B^L = 0.36$, and the global maximum is near $B^L = 0.72$. Both are greater than $L$’s optimal choice with re-election certainty, $B^* = 0.33$. Party $R$ has a unique cooperative solution of $B^R = 0.26$ compared to $B^* = 0.25$.

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<td>$c^R$</td>
<td></td>
<td>0.33</td>
<td>0.49 and 0.28</td>
<td>0.49</td>
</tr>
<tr>
<td>$g^L$</td>
<td>0.33</td>
<td>0.25</td>
<td>0.34 and 0.36</td>
<td>0.33</td>
</tr>
<tr>
<td>$g^R$</td>
<td></td>
<td></td>
<td>0.26 and 0.36</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Expected Utility</strong></td>
<td>-3.32</td>
<td>-2.08</td>
<td>-3.37 and -3.33</td>
<td>-2.1</td>
</tr>
</tbody>
</table>

An exhaustive study of conditions under which multiple or “near corner” solutions might occur is not undertaken because that would distract from the main objectives of the paper.

For a variety of less extreme values for the elasticity of substitution, we do find unique solutions.

---

\(^9\) Numerical methods were used and accuracy is only to the nearest hundredth.
Example 2b: Here, we use the same parameterization as example 2a, except $\alpha^L = 4$ and $\alpha^R = 0.5$. In this case, $\alpha^L$ and $\alpha^R$ are far enough apart for $L$ to have a sufficient strategic incentive to push $R$ near a corner, in the vicinity of $B^L = 0.89$.

Table 2

<table>
<thead>
<tr>
<th></th>
<th>$L, \pi = 1$</th>
<th>$R, \pi = 1$</th>
<th>$L, \pi = 0.5$</th>
<th>$R, \pi = 0.5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B$</td>
<td>0.4</td>
<td>0.1667</td>
<td>0.89</td>
<td>0.20</td>
</tr>
<tr>
<td>$O^L$</td>
<td>0.4</td>
<td>0.17</td>
<td>$8.5 \times 10^{-47}$</td>
<td>0.13</td>
</tr>
<tr>
<td>$O^R$</td>
<td>0.2</td>
<td>0.11</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>$c^L$</td>
<td>0.66</td>
<td>0.11</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>$c^R$</td>
<td>0.4</td>
<td>0.44</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>$g^L$</td>
<td>0.17</td>
<td>0.44</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>$g^R$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Expected Utility</strong></td>
<td>-5.27</td>
<td>-1.3</td>
<td>-5.47</td>
<td>-1.68</td>
</tr>
</tbody>
</table>

For less extreme $\varepsilon$-values, we typically find “less extreme” solutions to the first order conditions.

Example 2c: Consider the parameters $\alpha L = 4$, $\alpha R = 1$, $\varepsilon = -0.5$, $\mu = \eta = 1$. The governments choose $B$-values of $B^*^R = 0.25$ and $B^*^L = 0.4$. When the probability of re-election is $\pi = 0.5$, the governments choose $B$-values of $B^R = 0.259$ and $B^L = 0.418 > B^*^L$. This example illustrates the intuition discussed in the introduction. Realizing that $L$ may come to power and is determined to provide a high level of $g$, $R$ is accommodating in the interest of efficiency and sets $B$ above the value it would otherwise choose. For the same parameters, $L$ sets $B$ above $B^*^L$ to prevent a later $R$ government from setting $g$ too low. That is, $L$ acts strategically. The

---

10 There are two interesting results here. The first is that, in the absence of uncertainty, $\varepsilon$ effects the total amount of the government good provided, but not $B$. The second is that only changing $\varepsilon$ can cause agents to change from extreme to accommodating behavior.
manipulation succeeds because a high $B^L$ reduces the marginal cost of $g$ so much that even an $R$ government sets $O$ fairly high.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>$L, \pi = 1$</th>
<th>$R, \pi = 1$</th>
<th>$L, \pi = 0.5$</th>
<th>$R, \pi = 0.5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B^L$</td>
<td>0.4</td>
<td>0.25</td>
<td>0.418</td>
<td>0.259</td>
</tr>
<tr>
<td>$O^L$</td>
<td>0.4</td>
<td></td>
<td>0.38</td>
<td>0.52</td>
</tr>
<tr>
<td>$O^R$</td>
<td></td>
<td>0.25</td>
<td>0.16</td>
<td>0.24</td>
</tr>
<tr>
<td>$c^L$</td>
<td>0.2</td>
<td></td>
<td>0.2</td>
<td>0.22</td>
</tr>
<tr>
<td>$c^R$</td>
<td></td>
<td>0.5</td>
<td>0.42</td>
<td>0.5</td>
</tr>
<tr>
<td>$g^L$</td>
<td>0.4</td>
<td></td>
<td>0.4</td>
<td>0.38</td>
</tr>
<tr>
<td>$g^R$</td>
<td></td>
<td>0.25</td>
<td>0.27</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Expected Utility</strong></td>
<td>-5.27</td>
<td>-2.08</td>
<td>-5.66</td>
<td>-2.28</td>
</tr>
</tbody>
</table>

Example 2d: Consider the parameters $\alpha^L = 4$, $\alpha^R = 1$, $\varepsilon = 0.5$, $\mu = \eta = 1$. The governments again choose $B$-values of $B^R = 0.25$ and $B^L = 0.4$ when there is no re-election uncertainty. 11 When the probability of re-election is $\pi = 0.5$, they choose $B$-values of $B^R = 0.283$ and $B^L = 0.393$. This confirms the obvious: efficiency may dominate party politics. The objective of this paper is to show that the opposite may occur, but we do not deny that less spectacular cases may also occur.

11 The fact that the optimal precommitted amounts are the same with reelection certainty is an artifact of the weighting of the inputs in the CES production function equally. Given reelection certainty, the FOC’s require $G_0(O, B) = G_0(O, B)$. This implies $(\frac{a}{1-a})^2 = \frac{O}{B}$. The left side always equals one when $a = 1/2$, and $O$ and $B$ are equal and independent of $\varepsilon$. 
Table 4

<table>
<thead>
<tr>
<th></th>
<th>L, π = 1</th>
<th>R, π = 1</th>
<th>L, π = 0.5</th>
<th>R, π = 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>0.4</td>
<td>0.25</td>
<td>0.393</td>
<td>0.283</td>
</tr>
<tr>
<td>O_L</td>
<td>0.4</td>
<td>0.25</td>
<td>0.40</td>
<td>0.46</td>
</tr>
<tr>
<td>O_R</td>
<td></td>
<td></td>
<td>0.22</td>
<td>0.24</td>
</tr>
<tr>
<td>c_L</td>
<td>0.2</td>
<td>0.5</td>
<td>0.2</td>
<td>0.26</td>
</tr>
<tr>
<td>c_R</td>
<td></td>
<td>0.2</td>
<td>0.39</td>
<td>0.47</td>
</tr>
<tr>
<td>g_L</td>
<td>0.4</td>
<td></td>
<td>0.4</td>
<td>0.35</td>
</tr>
<tr>
<td>g_R</td>
<td>0.25</td>
<td></td>
<td>0.29</td>
<td>0.26</td>
</tr>
<tr>
<td>Expected Utility</td>
<td>-5.27</td>
<td>-2.08</td>
<td>-5.59</td>
<td>-2.23</td>
</tr>
</tbody>
</table>

In principle, there could be two other classes of equilibria. Both parties could choose more “extreme” B-values than without re-election uncertainty; and Party L could choose less “extreme” B-values, while Party R chooses more extreme values. We were unable to find any parameterization that generated these theoretically possible behaviors. That is, we could not find a way to induce R to become more extreme. At most, we could find some special cases in which R’s choice of B was not affected by election uncertainty. They are as follows.

Example 3: Separable indirect utility functions

Assume that the technology \( G(O, B) \) is Cobb-Douglas (Elasticity of substitution = 1) and that utility over government spending is logarithmic. Then, the indirect utility over \( (c, O, B) \) is separable, \( u(c) + \alpha \nu(G(O, B)) = u(c) + \alpha \left( a \ln (O) + (1 - a) \ln (B) \right) \), precluding any interdependence between \( O \) and \( B \), except through the budget constraint. In two special cases, even this budgetary interdependence vanishes:

Example 3a: Suppose utility is linear over consumption, \( u(c) = c \). Then, higher B-values crowd out private consumption only and do not affect \( O \). The optimal choices are \( O’ = \alpha a \) and \( B’ = \alpha (1 - a) \), showing that the optimal solution for \( O \) does not depend on \( B \), \( O_{b} = 0 \).
Because $O_i = 0$, neither government has an incentive to manipulate its choice of $B$; $B$ does not depend on re-election probabilities. In setting $O$, the government ignores $B$ because there is no income effect. Total provision of the government good will change as $B$ changes, but the currently provided portion, $O$, will not change.

**Example 3b:** Assume log utility over all goods, including the private good, $u(c) = \ln(c)$.

Then the optimal spending shares are constant. In this case, the first order conditions for $O$ can be solved explicitly to obtain $O^i(B) = \frac{\alpha^i a (Y - B)}{1 + \alpha^i a}$, which illustrates the dependence on $B$ and on the government type. Substituting the specific functional forms into (8b) for $L$, one finds

$$
\alpha^i \pi^L \left( \frac{1 - a}{B} - \frac{a}{O^L} \right) + \alpha^i \left( 1 - \pi^L \right) \left( \frac{1 - a}{B} - \frac{a}{O^R} \right) + \left( 1 - \pi^L \right) (\alpha^L - \alpha^R) \frac{a}{O^R} \left( 1 - \frac{\alpha^R a}{1 + \alpha^R a} \right) = 0,
$$

$$
\Leftrightarrow \alpha^i \pi^L \left( \frac{1 - a}{B} - \frac{1 + \alpha^L a}{\alpha^L(Y - B)} \right) + \alpha^i \left( 1 - \pi^L \right) \left( \frac{1 - a}{B} - \frac{1 + \alpha^L a}{\alpha^L(Y - B)} \right) + \left( 1 - \pi^L \right) \frac{\alpha^L - \alpha^R}{\alpha^R(Y - B)} = 0,
$$

$$
\Leftrightarrow \frac{1 - a}{B} - \frac{1 + \alpha^L a}{\alpha^L(Y - B)} = 0,
$$

which does not depend on $\pi^L$. The explicit solution is $B^L = \frac{\alpha^L (1 - a)Y}{1 + \alpha^L}$. Similar arguments apply for $R$.

Again, the optimal choice of $B$ does not depend on re-election probabilities. Here, the irrelevance of re-election probabilities has more of a knife-edge character than in Example 3a. A high precommitted $B$ does reduce $O$. But for log-utility, efficiency concerns and strategic incentives exactly offset.
Example 4: Leontief Production

The case of perfect complements, \( G(O, B) = \min (a O, (1 - a)B) \) where \( 0 < a < 1 \) provides an example in which \( L \) cannot manipulate \( R \). Let \( g^* \) be \( R \)'s preferred level of spending without election uncertainty, and let \( B^* \) and \( O^* \) be the associated \( B \) and \( O \) values,

\[
(1 - a)B^* = aO^* = g^*.
\]

If the Type \( L \) government is in power with electoral uncertainty, and it sets \((1 - \alpha)B_t + 1 > g^*\), it effectively reduces the available resources, \( Y - B_t + 1 \), of a subsequent Type \( R \) government. \( R \) treats \( B \) as sunk cost. The result would be that \( R \) would pick \( O_t < O^* \) and \( g < g^* \), which would reduced \( L \)'s expected utility. Hence, party \( L \) cannot gain by picking a \( B \)-value above \( B^* \) and will therefore choose \( B_L \leq B^* \). This weak inequality applies regardless of preferences, but for a positive probability of \( R \) being elected, the inequality is likely to be strict, meaning that \( L \) accommodates \( R \). In the case of log utility over \( c \) and \( g \), the inequality is strict: at \( B^* \),

\[
O^R = \frac{\alpha^R(1 - B)}{1 + \alpha^R}.
\]

Example 4 is the only example we found in which \( L \) accommodates \( R \) without \( R \) accommodating \( L \). To see how sensitively this example relies on the Leontief technology, consider the slight modification in example 5.
Example 5: Choice of technologies

Consider the same Leontief production function as in Example 4, but suppose there is an alternative, higher-cost technology that can produce $g$ and only uses $O$ as input. The overall production is then defined by

$$G = \begin{cases} 
\min \left( a \ O, (1-a) \ B \right) & \text{if } O \leq \frac{(1-a)}{a \ B}, \text{ where } a < 1, \ b > 1. \\
B + b \left( \gamma - \frac{(1-a)}{a \ B} \right) & \text{otherwise}
\end{cases}$$

Here, we think of $B$ as a capacity choice (say, the size of the bureaucracy). Current spending, $O$, is assumed to complement the predetermined $B$ until the capacity is fully used; up to $O \leq \frac{(1-a)}{a \ B}$, the variable cost of producing $G$ is only $a < 1$, and the total unit cost is 1. For $O \geq \frac{(1-a)}{a \ B}$, service capacity must be put in place in short notice at a high cost, so that unit cost is $b > 1$.

If $L$ follows $R$, the $L$ government can always produce as much $G$ as it desires at unit cost $b$. Hence, the $R$ government cannot stop a stubborn $L$ government from spending and therefore has an incentive to set $B^R$ high, in the interest of efficiency.

Example 5 supports the intuition that $R$ governments cannot effectively constrain a determined $L$ government for a reasonable specification of technologies. In practice, almost any good or service can be produced without much advance notice, if one is willing to pay the price. (For example, office buildings can be rented quickly instead of built.) Therefore, we consider Example 5 to be more practically relevant than Example 4.
Overall, this section has shown theoretically how governments can influence their successors by fixing inputs to the production of public goods, and we have provided examples suggesting that for reasonable production parameters, a high-spending “liberal” government can manipulate a subsequent “conservative” government, without the reverse being true.

Table 5

<table>
<thead>
<tr>
<th>Summary of Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example 1 - perfect substitutes. L pushes R into a corner and always obtains its optimal g.</td>
</tr>
<tr>
<td>Example 2 - CES production and Log utility. Multiple solutions for L may exist. L may be more extreme or cooperate. R cooperates.</td>
</tr>
<tr>
<td>Example 3 - Cobb-Douglas production and log utility for g. If ( u(c) = c ), O is independent of B, and B is independent of re-election probabilities. If ( u(c) = c ), B is still independent of re-election probabilities, but O is decreasing in B.</td>
</tr>
<tr>
<td>Example 4 - Leontief Production. L cannot manipulate R, and R is never accommodating.</td>
</tr>
<tr>
<td>Example 5 - Leontief Production with an alternative technology. R now accommodates L.</td>
</tr>
</tbody>
</table>

3. A Two Period Model with Capital

The extension to add savings decisions complicates the analysis significantly, because savings and government spending are interdependent. Individually optimal savings depend on future taxes, i.e. on expected future government spending. Intuitively, this interdependence is likely to strengthen a partisan government’s incentives to act strategically. By setting \( B \) high, a type-\( L \) government can signal to individuals that next period’s government spending will be high, inducing them to save more. The increased savings reduce next period’s marginal utility of consumption and thereby encourage higher on-the-spot spending, \( O \). Conversely, by setting \( B \) low, \( R \) governments can induce individuals to save less, which raises next period’s marginal utility and deters a subsequent \( L \) government from spending too much. Optimal (for the current government) spending depends on the marginal utility of consumption, which
depends on past savings decisions. Since a two-period setting is sufficient to illustrate the conceptual points, we examine the government problem with savings in a simple two-period version of our model. We also provide an example that highlights the differences between this extension and the basic model.

As before, we assume lump-sum taxes. Thus, Ricardian equivalence applies and debt per se does not matter. Any effects of precommitted government spending must therefore be “real” effects that do not depend on financing decisions.

Assuming period-1 savings, \( k \), yield return \( F(k) \), \( F'(k) > 0 \) and \( F''(k) < 0 \), individual consumption in the two periods is:

\[
\begin{align*}
c_1 &= Y - k - O_1 - B_1, \\
c_2 &= Y + F(k) - O_2 - B_2.
\end{align*}
\]

We assume that each agent is small enough that she does not take into consideration the effect of her choice of \( k \) on the government’s choice of \( O \) and \( B \). She maximizes:

\[
V(k) = u(1 - k - O_1 - B_1) + \beta \left( \pi u(1 + F(k) - O_2 - B_2) + (1 - \pi) u(1 + F(k) - O_2^l - B_2) \right).
\]

The following first order condition must hold: \( u'(c_1) = \beta F'(k) E[u'(c_2)] \).

Therefore, \( k = k(B_2, O_2^l, O_2^u, O_1 + B_1, \pi) \). At \( t_2 \), the government in power maximizes, with respect to \( O \): \( V_2(O_2) = u(Y + F(k) - O_2 - B_2) + \psi G(O_2, B_2) \). The first order condition \( u'(c_2) = \alpha \psi'(g_2) g_0(O_2, B_2) \) must hold. Therefore, \( O_2 = O(B_2, k, \alpha) \). The new item here is the dependence of \( O \) on the capital stock. A higher \( k \) reduces the marginal utility of private consumption and therefore encourages more government spending.
The party in power maximizes, over $O_1$ and $B_2$:

$$V^i = u(Y - k - O_1 - B_1) + \alpha' G(O_1, B_1) + \beta E\left[u(Y + F(k) - O_2 - B_2) + \alpha' G(O_2, B_2)\right],$$

where: $k = k(B_2, O_2^L, O_2^R, \pi)$ and $O_2' = O(B_2, k, \alpha')$.

The first order conditions are:

$$\frac{dV^i}{dO_1} = \alpha' f_{o1} - u_1' + \beta E\left[\alpha' f_{o2} - u_2' \left(\frac{\partial O_2}{\partial O_1} + \frac{\partial O_2}{\partial k} \frac{\partial k}{\partial O_1}\right)\right],$$

and

$$\frac{dV^i}{dB_2} = E[\alpha' f_{b2} - u_2'] + \beta E\left[\alpha' f_{o2} - u_2' \left(\frac{\partial O_2}{\partial B_2} + \frac{\partial O_2}{\partial k} \frac{\partial k}{\partial B_2}\right)\right].$$

The first two terms reflect the same efficiency and strategic issues as in Section 2. The last term is new and reflects the indirect effect of $B_2$ on $O_2$ through capital investment. To the extent that $B_2$ raises expected period-2 lump-sum taxes, individuals will save: $\frac{d k}{d B_2} > 0$.

Capital investment in turn increases spending on $O_2$ by reducing the marginal utility of period-2 consumption, $\frac{d O_2}{d k} > 0$. Therefore, savings are likely to strengthen the government’s ability to raise total period-2 spending by setting precommitted spending, $B_2$, to a high value.

This section also resolves the question of whether or not it matters if $B_t$ has a real resource cost in period $t$ or $t - 1$: If resources can be shifted over time through a reasonable elastic capital investment technology, the difference does not matter (In the limiting case of a linear $F(k = k$ technology, not at all).
Example 6

Consider log utility over all goods $u(c) = \ln (c)$, $v(g) = \ln g$, $O B^-$, and $F(k = k)$. 

Recall that these are the same functional forms as example 3b, which was a special case where $B$ was independent of $\pi$. Here, we show that with savings that independence disappears.

As in example 3b, we can solve the first order conditions explicitly for $O$ and $B$:

$$O^i = \frac{\alpha^i (Y + k - B)}{1 + \alpha^i a}, \text{ and }$$

$$B^i_2 = \frac{(2 - B_1)\alpha^i \beta(1 - a)}{\alpha^i \beta(1 - a) + \phi + \beta a(1 - \pi)(\alpha^i - \alpha^j)},$$

where

$$= \frac{1 + \beta \left( \pi(1 + \alpha^i a) + (1 - \pi)(1 + \alpha^i a) \right)}{1 - \frac{\alpha^i a}{1 + \alpha^i \left( \frac{1}{1 + \beta} \right)}}.$$

Assume the parameters $Y$, $\alpha^L$, $\alpha^R$, $B_1$, $\beta = 1$, and $\phi = 0.5$. When re-election is certain, $\pi$ will precommit $B = 0.267857$ and $L = B_2$.

re-election uncertainty, $\pi$ and show that the presence of savings allows both parties to behave strategically. In fact, the same example results in extreme behavior by , when without savings we were unable to find extreme behavior by with any functional forms or parameters.
The results from this two-period model should be taken with some caution. If we had more than two periods, the qualitative interaction of savings and spending commitments would be similar, but the quantitative impact of precommitted spending on savings would likely be much smaller, because $B$ provides a signal about near-term spending only, while individuals would smooth consumption over a much longer horizon.

4. Transfer Payments

Transfer programs account for a large fraction of government budgets in many countries. This section will explain why the strategic issues discussed above apply analogously to the transfer programs, and not just to real expenditures. Most transfer programs require an extensive administrative infrastructure to identify potential recipients and to monitor their eligibility (say, for welfare). The benefits of a transfer program, $TR$, depend on the transferred funds and on how efficiently the program is administered, which is a function of the available infrastructure. As before, let $O$ be the current cost - for transfers plus current administrative spending - and $B$ be the precommitted infrastructure, and assume $TR = TR(O_t, B_t)$ where $TR_O > 0$, $TR_B > 0$, $TR_{OO} < 0$, and $TR_{BB} < 0$.

To motivate transfers, it is natural to consider a heterogeneous agent setting. Hence, we assume that there are two types of agents with incomes $Y_1$ and $Y_2$ respectively. The partisan disagreement is now about the merit of transfers from one group to the other. To be specific, assume $Y_1 > Y_2$ and let the disagreement be about the size of transfers from the rich (type-1) to the poor (type-2). The agents’ consumption depend on income and transfers:
c_{1t} = Y_t - O_t - B_t, and \( c_{2t} = Y_t + O_t - B_t \). The parties differ over how much negative utility they derive from income inequality. The government of type \( i \) (\( i = L, R \)) maximizes:

\[
 w = \sum_{t=1}^{\infty} \beta^t E\left[ u(c_{1t}) + u(c_{2t}) - \rho \left| u(c_{1t}) - u(c_{2t}) \right| \right], \quad \leq \rho' < 1.
\]

Provided \( TR(O_t, B_t) < Y_1 - Y_2 - O_t - B_t \), we have \( c_{1t} > c_{2t} \) and can write

\[
 \frac{w'}{1 - \rho'} = \sum_{t=1}^{\infty} \beta^t E[u(c_{1t}) + \alpha' u(c_{2t})], \quad \text{where} \quad \alpha' = \frac{(1 + \rho')}{(1 - \rho')}.\]

Showing that the analysis of section 2 can be interpreted as a model of transfer programs.

5. Partisan disagreements about spending priorities

This section considers an Alesina-Tabellini (1989) type model with two government goods, disagreement about composition, but no disagreement about ideal level of total spending. We show that this model is also prone to a spending bias in addition to the deficit bias discussed by Alesina and Tabellini. To simplify, we again consider a model without capital.

The model is as follows. There are two public goods, \( g_1 \) and \( g_2 \). Good \( g_1 \) is produced with inputs \( O_1 \) and \( B_1 \), while good \( g_2 \) is produced with inputs \( O_2 \) and \( B_2 \): \( g_{1t} = G(O_{1t}, B_{1t}) \) and \( g_{2t} = H(O_{2t}, B_{2t}) \). The inputs \( B_{1t} \) and \( B_{2t} \) are precommitted in the prior period. Inputs \( O_{1t} \) and \( O_{2t} \) are committed in period \( t \). A government of type \( i \) (\( i = R, L \)) maximizes:

\[
 u' = \sum_{t=0}^{\infty} \beta^t \cdot E[u(c_t) + \alpha' v(g_{1t}) + (1 - \alpha')v(g_{2t})].
\]

The type \( L \) government is assumed to have a relatively strong preference for good \( g_1 \) while the type \( R \) government prefers good \( g_2 \); \( \alpha^L > \alpha^R \). In contrast to the previous section, we
assume symmetric preferences over total private versus public spending, with utility weights on $g_1$ and $g_2$ that sum to one for both governments, $0 \leq \alpha_i \leq 1$.

We still assume that all spending is financed by contemporaneous lump-sum taxes levied on a constant endowment stream, $Y = 1$. The technical analysis is similar to the basic model of Section 2 except that the dimensionality doubles with two goods. Because of the analytical similarities and cumbersome notation, the details are left to an appendix.

As in section 2, interior and corner solutions are possible. An example of a corner solution is the case of perfect substitution between $O_1$ and $B_1$, and between $O_2$ and $B_2$. As in example 1, when the inputs are perfect substitutes the party with higher preferences for a good can always put the other party in a corner solution for that good. It does this by simply precommitting its optimal amount. An example with interior solutions is the following.

Example 7: CES Production

Assume log utility over all goods and CES production for both government goods,

$$G(O_1, B_1) = \left[ a O_1^{\epsilon} + (1 - a) B_1^{\epsilon} \right]^{\frac{1}{\epsilon}}, \quad \text{and} \quad G(O_2, B_2) = \left[ a O_2^{\epsilon} + (1 - a) B_2^{\epsilon} \right]^{\frac{1}{\epsilon}}.$$

When $a = \frac{1}{2}$, $\epsilon = -\frac{1}{2}$, $\alpha^L = \frac{3}{4}$, $\alpha^R = \frac{1}{4}$ we obtain the following results:
Thus, both parties become more extreme when there is re-election uncertainty. Each party sets precommitment for the preferred good higher than when re-election is certain, while each sets precommitment for the other good lower. Total government spending and taxes go up with probability one, while consumption falls, in the presence of electoral uncertainty.

### 6. Conclusions

We have presented and analyzed simple models of forward commitment of government spending. We argued that forward commitment arises out of efficiency considerations, but its existence provides strategic opportunities for political parties that differ in preferences. We showed that in a model with one government good, and no savings, where the parties differ in preferences for the size of government, asymmetric strategies arise. It is easy to specify technologies where the party with higher preferences will actually forward commit more than its optimal amount to force the other party to provide more government when they are in power. The party with lower preferences for the government good is driven by efficiency.
reasons to accommodate the other party. In the event of electoral uncertainty, the party with lower preferences will usually provide more forward commitment than it would otherwise choose. Electoral uncertainty can cause both parties to commit more than they otherwise would.

When savings is added to the model, we found that extreme behavior is even more likely for both parties. With re-election uncertainty, the party with lower preferences may precommit even less than it otherwise would in order to constrain the following government’s spending. The party with high preferences for the government good may precommit more than it would in the absence of re-election uncertainty or savings to force the following government to spend more than it otherwise would.

In a model with two government goods where parties differ in preferences for the goods, forward commitment is biased upwards. Both parties commit greater amounts of their preferred good in order to encourage the other party to supply more of that good. A result of re-election uncertainty is that taxes are higher and consumption is lower relative to allocations with certain re-election.
References


-------- Fiscal Year 1997a. “Historical Tables.”


Mathematical appendix

Section 5

The resource constraint is: $c_t = Y_t - O_t - B_t - L_t - K_t$. As in Section 2, one can show that current spending levels (now a vector $(O_t, L_t)$) depends on predetermined spending (the vector $(O_{2t}, B_{2t})$) and that each government picks a vector of new commitments $(B_{1t+1}, B_{2t+1})$ that depend on government preferences but not on history. Corner solutions may again exist if a government with low preferences for a good is faced with a high level of precommitted purchases set by a previous government of the opposite type.

With re-election uncertainty, two first order conditions need to be met:

$$\alpha^i \pi^i (f^i_{B_i} - f^i_{O_i}) + (1 - \pi^i) \alpha^i (f^i_{B_i} - f^i_{O_i}) + (1 - \pi^i) (\alpha^i - \alpha^j) f^i_{K} (1 + O^i_{B_i}) + (1 - \pi^i) L^i_{B_i} (1 - \alpha^j) f^i_{K} = 0$$

$$\alpha^j \pi^j (f^j_{B_j} - f^j_{O_j}) + (1 - \pi^j) \alpha^j (f^j_{B_j} - f^j_{O_j}) + (1 - \pi^j) (\alpha^j - \alpha^i) f^j_{K} (1 + O^j_{B_j}) + (1 - \pi^j) L^j_{B_j} (1 - \alpha^i) f^j_{K} = 0$$

Except for the last term in each equation, these equations are identical to the single good case, equation (8a). Intuitively, the last term represents the requirement that the value-weighted marginal product of inputs be equal across final goods. With this term, the strategic considerations are complicated relative to the single good case because the amount of an input forward committed by $i$, say to force $j$ to provide more of $i$’s preferred good, will effect the marginal product of the inputs in the production of the less desired good.

Derivation

Optimal government decisions must satisfy the following Bellman equations:
\[ V_i(B_1, B_2) = \max_{O_1, O_2, B_1, B_2} \left[ u\left( Y - O_i - B_i - O_2 - B_2 \right) + \alpha_i \nu \left( G_i(O_i, B_i) \right) + (1 - \alpha_i) \nu \left( G(O_2, B_2) \right) + \beta_i \left( \pi V_i(B_{i+1}, B_{i+1}) + (1 - \pi) V_i(B_{i+1}, B_{i+1}) \right) \right] \]

for \( i = L, R \) and \( j \neq i \) and:

\[ V_i(B_{i+1}, B_{i+1}) = \]

\[ u\left( Y - O_{i+1} - B_{i+1} - O_{i+1} - B_{i+1} \right) + \alpha_i \nu \left( G_i(O_{i+1}, B_{i+1}) \right) + (1 - \alpha_i) \nu \left( G(O_{i+1}, B_{i+1}) \right) + \beta_i \left( \pi V_i(B_{i+2}, B_{i+2}) + (1 - \pi) V_i(B_{i+2}, B_{i+2}) \right) \].

As before, the problem simplifies. The solution for \( O_{1t} \) and \( O_{2t} \) only depend on the current period’s utility

\[ \left( O_{1t}, O_{2t} \right) = \left( O_i(B_{1t}, B_{2t}), O_{i}(B_{1t}, B_{2t}) \right) = \]

\[ \max_{O_{1t}, O_{2t}} u\left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) + \alpha_i \nu \left( G(O_{1t}, B_{1t}) \right) + (1 - \alpha_i) \nu \left( G(O_{2t}, B_{2t}) \right) \]

and are characterized by the first order conditions:

\[ \alpha_i \nu \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) - u \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) + \lambda_{1t} = 0, \]

\[ (1 - \alpha_i) \nu \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) - u \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) + \lambda_{2t} = 0. \]
Here, $\lambda_{1t}$ and $\lambda_{2t}$ are the shadow prices of the non-negativity conditions $O_{1t}, O_{2t} \geq 0$ respectively. That is, $\lambda_{1t} > 0$, $\lambda_{1t}O_{1t} = 0$; $\lambda_{2t} > 0$, $\lambda_{2t}O_{2t} = 0$. For interior solutions, the conditions simplify to:

$$\alpha' \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) = u' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) = \left( 1 - \alpha \right) \gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t})$$

The second order condition for an interior solution requires that the determinant of the Hessian be positive.

$$\begin{align*}
&\left( \alpha' \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) + \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) \right) + u'' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) \\
&\left( 1 - \alpha \right) \left( \gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) + \gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) \right) + u'' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) \\
&- u'' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right)^2 > 0
\end{align*}$$

This simplifies to:

$$\begin{align*}
&\alpha' \left( \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) + \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) \right) \left( 1 - \alpha \right) \\
&\gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) + \gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) + \alpha' \\
&\gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) + \gamma \left( G(O_{1t}, B_{1t}) \right) G_{O_{1t}}(O_{1t}, B_{1t}) u'' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) + \left( 1 - \alpha \right) \\
&\gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) + \gamma \left( G(O_{2t}, B_{2t}) \right) G_{O_{2t}}(O_{2t}, B_{2t}) u'' \left( Y - O_{1t} - B_{1t} - O_{2t} - B_{2t} \right) > 0
\end{align*}$$

The condition is satisfied when $u'' \leq 0$, $v'' \leq 0$, $H_{O_{1t}O_{1t}} \leq 0$, $G_{O_{2t}O_{2t}} \leq 0$, $v' > 0$ and either $v'' < 0$, or both $H_{O_{2t}O_{2t}}$ and $G_{O_{1t}O_{1t}} < 0$. Now, we simplify as before. Define:

$$u_i' = u \left( Y - O_{1t} (B_{1t}, B_{2t}) - B_{1t} - O_{2t} (B_{1t}, B_{2t}) - B_{2t} \right)$$

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\[ u_i'' = u'' \left( Y - O'_1(B_{1i}, B_{2i}) - B_{1i} - O_2(B_{1i}, B_{2i}) - B_2 \right) , \]

\[ f_{O_1}^{\prime} = v \left( G \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) G_{O_1} \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) \right) > 0 , \]

\[ f_{B_1}^{\prime} = v \left( G \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) G_{B_1} \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) \right) > 0 , \]

\[ f_{O_2}^{\prime} = v \left( G \left( O_2(B_{1i}, B_{2i}, B_{2i}) \right) G_{O_2} \left( O_2(B_{1i}, B_{2i}, B_{2i}) \right) \right) > 0 , \]

\[ f_{B_2}^{\prime} = v \left( G \left( O_2(B_{1i}, B_{2i}), B_{2i} \right) G_{B_2} \left( O_2(B_{1i}, B_{2i}), B_{2i} \right) \right) > 0 , \]

\[ f_{O_1, O_2}^{\prime} = v \left( G \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) G_{O_1} \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) \right) \]

\[ + v \left( G \left( O'_2(B_{1i}, B_{2i}), B_{1i} \right) G_{O_2} \left( O'_2(B_{1i}, B_{2i}), B_{1i} \right) \right) \]

\[ G_{O_1, O_2} \left( O'_1(B_{1i}, B_{2i}), B_{1i} \right) \]

\[ f_{O_1, B_2}^{\prime} = v \left( G \left( O_2(B_{1i}, B_{2i}, B_{2i}) \right) G_{O_2} \left( O_2(B_{1i}, B_{2i}, B_{2i}) \right) \right) \]

\[ G_{O_2, B_2} \left( O_2(B_{1i}, B_{2i}, B_{2i}) \right) \]

The first order conditions for interior solutions can then be written as

\[ \alpha f_{O_1}^{\prime} = u_i' = (1 - \alpha) f_{O_2}^{\prime} . \]

The arguments in section two have their analogs here, with slightly more complexity. If

\[ h'(B_{1i}) = \alpha f_{O_1}^{\prime} - u_i' = \alpha f_{O_1}^{\prime} - (1 - \alpha) f_{O_2}^{\prime} < 0 \] at \( O_{1i} = 0 \),

then, a corner solution exists with respect to \( O_{1i} \). Since an interior solution for

\[ O'_1(B_{1i}, B_{2i}) = 0 \] is negative in \( B_{1i} \) and \( B_{2i} \), a corner solution results when the combination of

\( B_{1i} \) and \( B_{2i} \) is greater than or equal to some critical value. Similarly, if

\[ h'(B_{2i}) = (1 - \alpha) f_{L}^{\prime} - u_i' = (1 - \alpha) f_{L}^{\prime} - \alpha f_{O_1}^{\prime} < 0 \] at \( L_i = 0 \),
then a corner solution exists with respect to \( L_t(B, K) \). An interior solution for \( L_t(B, K) \) is also negative in \( B_t \) and \( B_2 \), a corner solution will result when the combination of \( B_t \) and \( B_2 \) is greater than or equal to some critical value.

For an interior solution, the response functions can be calculated:

\[
\alpha f'_{O_1} = u' \quad \text{and} \quad (1 - \alpha) f'_{O_2} = u' .
\]

\[
\alpha \left( f'_{O_1} dO_1 + f'_{O_1} dB_1 \right) = -u'' \left( dO_1 + dB_1 + dO_2 + dB_2 \right) \quad \text{and}
\]

\[
(1 - \alpha) \left( f'_{O_2} dO_2 + f'_{O_2} dB_2 \right) = -u'' \left( dO_1 + dB_1 + dO_2 + dB_2 \right) .
\]

In matrix form:

\[
\begin{vmatrix}
\alpha f'_{O_1} + u'' & u'' \\
\alpha f'_{O_2} + u'' & (1 - \alpha) f'_{O_2}
\end{vmatrix}
\begin{vmatrix}
dO_1 \\
dO_2
\end{vmatrix}
= \begin{vmatrix}
-u'' & -u'' \\
-u'' & -u'' - (1 - \alpha) f'_{O_2}
\end{vmatrix}
\begin{vmatrix}
dB_1 \\
dB_2
\end{vmatrix},
\]

where \( \Delta \) is the determinant of the Hessian, \( \Delta = \left( \alpha f'_{O_1} + u'' \right) \left( 1 - \alpha \right) f'_{O_2} - u''^2 > 0 \).

This simplifies:

\[
\begin{vmatrix}
dO_1 \\
dO_2
\end{vmatrix} = \frac{1}{\Delta}
\begin{vmatrix}
-u'' & -u'' \\
-u'' & -u'' - (1 - \alpha) f'_{O_2}
\end{vmatrix}
\begin{vmatrix}
dB_1 \\
dB_2
\end{vmatrix},
\]

so, if

\[
\begin{align*}
f'_{O_1} & \leq 0 \Rightarrow \frac{dO_1}{dB_1} < 0, \\
f'_{O_1} & \geq 0 \Rightarrow \frac{dO_1}{dB_1} < 0, \\
f'_{O_2} & \leq 0 \Rightarrow \frac{dO_2}{dB_2} < 0, \\
f'_{O_2} & \geq 0 \Rightarrow \frac{dO_2}{dB_2} < 0.
\end{align*}
\]
Continuing:
\[
\begin{vmatrix}
\frac{dO_1}{dO_2} = \frac{1}{\Delta} \\
\alpha''(\alpha f_{i,B_1}^i + u^{-}) - \alpha''(\alpha f_{i,B_1}^i + u^{-}) - \alpha''(\alpha f_{i,B_1}^i + u^{-}) + \alpha''(\alpha f_{i,B_1}^i + u^{-}) + \alpha''(\alpha f_{i,B_1}^i + u^{-})
\end{vmatrix}
\begin{vmatrix}
dB_1 \\
dB_2
\end{vmatrix}
\]

This simplifies:
\[
\begin{vmatrix}
\frac{dO_1}{dO_2} = \frac{1}{\Delta} \\
-\left(1 - \alpha f_{i,B_2}^i + u^{-}\right)\alpha f_{i,B_1}^i + u^{-}(1 - \alpha f_{i,B_2}^i - f_{i,B_2}^i) - \left(1 - \alpha f_{i,B_2}^i + u^{-}\right)\alpha f_{i,B_1}^i + u^{-}(1 - \alpha f_{i,B_2}^i - f_{i,B_2}^i)
\end{vmatrix}
\begin{vmatrix}
dB_1 \\
dB_2
\end{vmatrix}
\]

Furthermore, because:
\[
\begin{align*}
\frac{dO_1}{dB_1} &= -\left(1 - \alpha f_{i,B_2}^i + u^{-}\right)\alpha f_{i,B_1}^i + u^{-}(1 - \alpha f_{i,B_2}^i - f_{i,B_2}^i) \\
\frac{dO_2}{dB_2} &= -\left(1 - \alpha f_{i,B_2}^i + u^{-}\right)\alpha f_{i,B_1}^i + u^{-}(1 - \alpha f_{i,B_2}^i - f_{i,B_2}^i)
\end{align*}
\]

\[
\begin{align*}
\left\{\begin{array}{l}
t_{i,B} \geq t_{i,0} \Rightarrow \frac{dO}{dB} \geq -1 \\
t_{i,L} \geq 0 \Rightarrow \frac{dL}{dK} \geq -1
\end{array}\right.
\]

Again, the strategic question is how are \(B_{I+1}\) and \(B_{2+1}\) determined? The first order conditions for \(B_{I+1}\) and \(B_{2+1}\) are:

\[
\beta \left\{\begin{array}{l}
\pi^i \frac{d\nu^i(B_{I+1}, B_{2+1})}{dB_{I+1}} + (1 - \pi^i) \frac{d\nu^i(B_{I+1}, B_{2+1})}{dB_{I+1}} = 0 , \\
\pi^i \frac{d\nu^i(B_{I+1}, B_{2+1})}{dB_{2+1}} + (1 - \pi^i) \frac{d\nu^i(B_{I+1}, B_{2+1})}{dB_{2+1}} = 0 .
\end{array}\right.
\]
The solutions are characterized by the following equations (we again invoke the envelope theorem for the terms involving $O^i_{1b_1}$, $O^i_{1b_2}$, $O^i_{2b_1}$, and $O^i_{2b_2}$ but not those with the superscript $j$ as explained previously) :

\[ \pi_i \left( \alpha f^i_{B_1} - u^i \right) + (1 - \pi_i) \left( \alpha f^i_{B_1} + f^i_{O_1} \right) + (1 - \alpha) f^i_{2B_1} L^{i}_{B_1} - u^j_1 \left( 1 + O^i_{B_1} + L^i_{B_1} \right) = 0, \quad \text{and} \]

\[ \pi_i \left( (1 - \alpha) f^i_{B_2} - u^i \right) + (1 - \pi_i) \left( \alpha f^i_{B_2} + f^i_{O_2} \right) + (1 - \alpha) f^i_{2B_2} L^{i}_{B_2} - u^j_1 \left( 1 + O^i_{B_2} + L^i_{B_2} \right) = 0. \]

If no uncertainty exists, these conditions reduce to:

\[ \alpha_i \pi_i \left( G(O^i_{1b_1}, B^i_{1b_1}) \right) G_{O_1}(O^i_{1b_1}, B^i_{1b_1}) = \alpha_i \pi_i \left( G(O^i_{1b_1}, B^i_{1b_1}) \right) G_{B_1}(O^i_{1b_1}, B^i_{1b_1}) = u_i \left( Y - O^i_{1b_1} - B^i_{1b_1} - O^i_{2b_1} - B^i_{2b_1} \right), \]

\[ (1 - \alpha_i) \pi_i \left( G(O^i_{2b_1}, B^i_{2b_1}) \right) G_{O_1}(O^i_{2b_1}, B^i_{2b_1}) = (1 - \alpha_i) \pi_i \left( G(O^i_{2b_1}, B^i_{2b_1}) \right) G_{B_1}(O^i_{2b_1}, B^i_{2b_1}) = u_i \left( Y - O^i_{1b_1} - B^i_{1b_1} - O^i_{2b_1} - B^i_{2b_1} \right) \]

Just as before, unless $G_{O_1}(0, B_1) < G_{B_1}(0, B_1)$ or $G_{O_2}(0, B_2) < G_{B_2}(0, B_2)$, technical efficiency dominates and there will be current commitment of both government goods.

If election uncertainty exists, then two first order conditions must be satisfied.

\[ \alpha_i \pi_i \left( f^i_{B_1} - f^i_{O_1} \right) + (1 - \pi_i) \alpha_i \left( f^i_{B_1} + f^i_{O_1} \right) + (1 - \alpha_i) \left( \alpha - \alpha_i \right) f^i_{O_1} \left( 1 + O^i_{B_1} \right) + (1 - \pi_i) L^i_{B_1} \left( 1 - \alpha_i \right) f^i_{O_2} - \alpha_i f^i_{O_1} \]

\[ (1 - \alpha_i) \pi_i \left( f^i_{B_2} - f^i_{O_2} \right) + (1 - \pi_i) \left( \alpha_i f^i_{B_2} + f^i_{O_2} \right) + (1 - \alpha_i) \left( \alpha - \alpha_i \right) f^i_{O_2} \left( 1 + L^i_{B_2} \right) + (1 - \pi_i) O^i_{B_2} \]

\[ \left( \alpha_i f^i_{O_1} - (1 - \alpha_i) f^i_{O_2} \right) = 0 \]