Why a Stubborn Conservative would Run a Deficit: Policy with Time- Inconsistent Preferences

Author(s): Torsten Persson and Lars E. O. Svensson
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WHY A STUBBORN CONSERVATIVE WOULD RUN A DEFICIT: POLICY WITH TIME-INCONSISTENT PREFERENCES*

TORSTEN PERSSON AND LARS E. O. SVENSSON

A conservative government, in favor of a low level of public consumption, knows that it will be replaced by a government in favor of a larger level of public consumption. We show that the resulting level of public consumption is in between the levels the two governments would choose if each were in power both in the present and in the future. In particular, we show that if the conservative government is more stubborn (in a particular sense) than the succeeding government, the conservative government will borrow more than it would had it remained in power in the future.

I. INTRODUCTION

Suppose that the current government knows that it will be replaced in the future by a new government with different objectives, for instance, a government that is in favor of a larger public sector. How does that affect the current government's behavior? More specifically, what are the implications for the current government's choices between distortionary taxes and borrowing? In particular, will the current government run fiscal deficits when it knows that its successor's choice of public spending will be influenced by the level of public debt that the successor inherits? These are the questions that we attempt to answer in this paper.[1]

We can think of the described situation as one where the two governments have time-inconsistent *preferences*. As is well-known, time-consistency problems also arise if governments have time-inconsistent *constraints*, for instance, because demand or supply functions for some tax base differ ex ante and ex post. In order to

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1. Alesina and Tabellini [1986] have independently pursued a very interesting analysis of public debt in the complementary case when different governments have preferences for different kinds of public goods, rather than as in our case preferences for different volumes of the same public good. A comparison with their analysis and results is given in the concluding section.

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isolate the problem of time-inconsistent preferences, we shall make assumptions such that constraints are time-consistent.

Our work in this paper is related to the small but growing literature on political models of fiscal policy; see Alesina and Tabellini [1988] for a recent survey. Our work is, of course, also related to the rapidly growing literature on time consistency of government policy; see Rogoff [1987] and Persson [1988] for recent surveys. In particular, it is closely related to the papers by Lucas and Stokey [1983], Persson and Svensson [1984], and Persson, Persson, and Svensson [1987]. These papers show that the second-best optimal fiscal and monetary policy under commitment can be enforced under discretionary policy-making, if each government leaves its successor with a particular maturity structure of the public debt. This specific result suggests a more general principle: as long as the current government can affect some state variable that enters (in an essential way) in its successor's decision problem, it can affect the policy carried out by the successor.

In this paper the (level of the) public debt is the state variable that gives the current government an instrument to control the future government. We show that a conservative government may borrow more, when it knows that it will be succeeded by a more expansionary government, than when it knows that it will remain in power in the future. Since borrowing more creates a distorted tax profile over time, such a policy is optimal only if the government is "stubborn" (in a sense to be specified), however. We believe our analysis may shed some new light on the U. S. fiscal deficits that have been caused by the Reagan administration. But we also believe that the general principle has wider applications, as further discussed in the concluding section.[2]

The paper has six sections. Section II presents the model and derives the equilibrium for time-consistent preferences; that is, for the situation when the same government remains in power both in the current period and in the future. Section III derives and discusses the equilibrium with time-inconsistent preferences; that is, when a new government with more expansionary preferences is

2. Phelps and Pollak [1968] provide an early analysis of equilibrium savings ratios in a model with time-inconsistent preferences. In their analysis there are nonoverlapping generations, such that each generation lives for only one period, but has preferences over consumption of future generations. Each generation discounts the utility from future generations' consumption in a way that makes generations' preferences time-inconsistent. There is no state variable through which a generation can affect future generations' behavior. Hence the issue of how to affect your successor in an optimal way does not arise.

in power in the future. Section IV discusses an alternative interpretation, with capital controls. Section V discusses some empirical material. Section VI concludes and mentions possible extensions. Some of the mathematical details are collected in the Appendix.

II. Taxation with Time-Consistent Preferences

We assume a small open economy. There are two periods, 1 and 2. There is one good. The economy can borrow and lend at a given world rate of interest equal to zero. (A model of a closed economy, where the technology was linear in capital would produce similar results.) Therefore, present-value prices of the good in the two periods are equal to unity, $p_1 = p_2 = 1$. Goods output in the two periods, y_1 and y_2, are produced with labor input, l_1 and l_2, according to a linear technology, $y_1 = l_1$ and $y_2 = l_2$. It follows, that the competitive before-tax wage rate is unity in both periods.

The representative consumer has a labor endowment of one unit in each period. Preferences over private consumption of goods, c_1 and c_2, and labor supply, l_1 and l_2, in the two periods are described by an additively separable concave utility function, increasing in consumption and decreasing in labor supply,

$$(1) \qquad u(c_1,l_1,c_2,1_1) = f(c_1) + h_1(1 - l_1) + c_2 + h_2(1 - l_2).$$

Maximizing (1) subject to the intertemporal budget constraint that the present value of consumption equals the present value of after-tax wage income gives rise to an indirect utility function $U(w_1,w_2)$ of after-tax wage rates w_1 and w_2, and to labor supply functions $L_1(w_1)$ and $L_2(w_2)$ in the two periods.

The additive separability and the linearity in period 2 consumption of the utility function (1) make labor supply in each period depend only on the after-tax wage rate in the same period. This makes sure that ex ante and ex post labor supply in period 2 coincide, which is necessary for the governments' constraints to be time consistent. The indirect utility function $U(w_1,w_2)$ and the labor supply functions $L_1(w_1)$ and $L_2(w_2)$ summarize consumer behavior. Next we look at government behavior.

Consumers' preferences for *government* (public) consumption may enter in an additively separable way in the above utility function. The different governments considered below can then be viewed as representing different parts of the population with different preferences for government consumption (but with the same preferences over private consumption of goods and leisure). Alternatively, we can think of consumers as being indifferent to the level of government consumption, with the governments having their own preferences over public consumption, independent of consumers' preferences.

There is government consumption in period 2 only. Government consumption in period 1 can easily be introduced, and below we shall also report results on that case. The government in power in period 1 is called government 1. For future reference we first look at the case when government 1 is in power in both periods 1 and 2. Government consumption in period 2, g, enters government 1's overall preferences:

$$U(w_1,w_2) + v^1(g), \tag{2}$$

the sum of private (indirect) utility and a concave utility function $v^1(g)$ of government consumption.

We assume that government consumption can be financed only by wage taxes. Lump sum taxes are excluded, since otherwise the problem would be trivial. Capital taxes are excluded to avoid more than one source of time-consistency problems. Tax revenues in the two periods are functions of the after-tax wage rates, $(1 - w_1)L_1(w_1)$ and $(1 - w_2)L_2(w_2)$, respectively. (Since the before-tax wage rate is unity, the wage taxes in period 1 and 2 are equal to $1 - w_1$ and $1 - w_2$.) The intertemporal budget constraint can be split up into a budget constraint for each period,

$$(1 - w_1)L_1(w_1) = -b \quad \text{and} \quad (1 - w_2)L_2(w_2) = b + g, \tag{3}$$

where b is net government borrowing in period 1 (absent government consumption in period 1 net borrowing will be negative). It is assumed—although not explained—that the government in period 2 always honors the debt that it inherits.

Government 1 would like to choose w_1, w_2, b, and g, so as to maximize (2) subject to (3). It is convenient to treat this decision problem in several steps. *First,* the after-tax wage rates can be solved as functions of borrowing and government consumption from the budget constraints (3), $w_1(b)$ and $w_2(b + g)$.[3] If we substitute these wage functions into the indirect utility function

3. The solutions to (3) need not be unique. If two or more wage rates are solutions to (3), the wage functions correspond to the largest of these wage rates, which are the wage rates that minimize welfare loss. It is only these wage rates that solve an optimum taxation problem. (This reasoning is equivalent to being on the relevant side of the Laffer curve.)

$U(w_1,w_2)$, we get a new indirect utility function that expresses private utility (of private consumption) as a function of borrowing and government consumption:

$$(4) \qquad V(b,g) \equiv U(w_1(b),w_2(b+g)).$$

Second, by choosing the level of borrowing so as to maximize $V(b,g)$ for given government consumption, government 1 determines its preferred borrowing policy. We describe the preferred policy by the *preferred-debt function* $b(g)$; a function of government consumption defined by the first-order condition,

$$(5) \qquad V_b(b(g),g) \equiv 0.$$

(If the labor supply functions in the two periods are symmetric, the preferred debt function is simply $b(g) = -g/2$. That is, half of government consumption is financed by period 1 taxes, and half by period 2 taxes.) *Third,* if we substitute the preferred-debt function into the indirect utility function $V(b,g)$, we get yet another indirect utility function that expresses private utility as a function of government consumption only, $\overline{V}(g) \equiv V(b(g),g)$. *Finally,* government 1 chooses government consumption so as to maximize

$$(6) \qquad \overline{V}(g) + v^1(g).$$

We define the ex ante marginal cost of government consumption as $\overline{\lambda}(g) \equiv \overline{V}_g(g)$, and we denote the marginal utility of government consumption for government 1 by $\mu^1(g) \equiv v_g^1(g)$. Then the first-order condition for the maximum of (6) can be written as

$$(7) \qquad \overline{\lambda}(g) = \mu^1(g).$$

An illustration is provided in the upper half of Figure I. The preferred government consumption for government 1, $\overline{g}^1$, is given by the intersection between the marginal cost curve $\overline{\lambda}(g)$ and the marginal utility curve $\mu^1(g)$ at point A. As is usual in optimum taxation problems, the second-order conditions are not necessarily fulfilled. The second-order condition here is that the slope of the ex ante marginal cost curve is larger than the slope of the marginal utility curve, $\overline{\lambda}_g > \mu_g^1$. The marginal utility curve is downward-sloping by the concavity assumption. We assume that the ex ante marginal cost curve is upward-sloping, as in Figure I, $\overline{\lambda}_g > 0$.

An alternative illustration in (b,g) space is provided in the lower half of Figure I. (Since there is no government consumption in period 1, $b(g)$ is negative for positive g unless private preferences are very asymmetric.) An indifference curve for the function

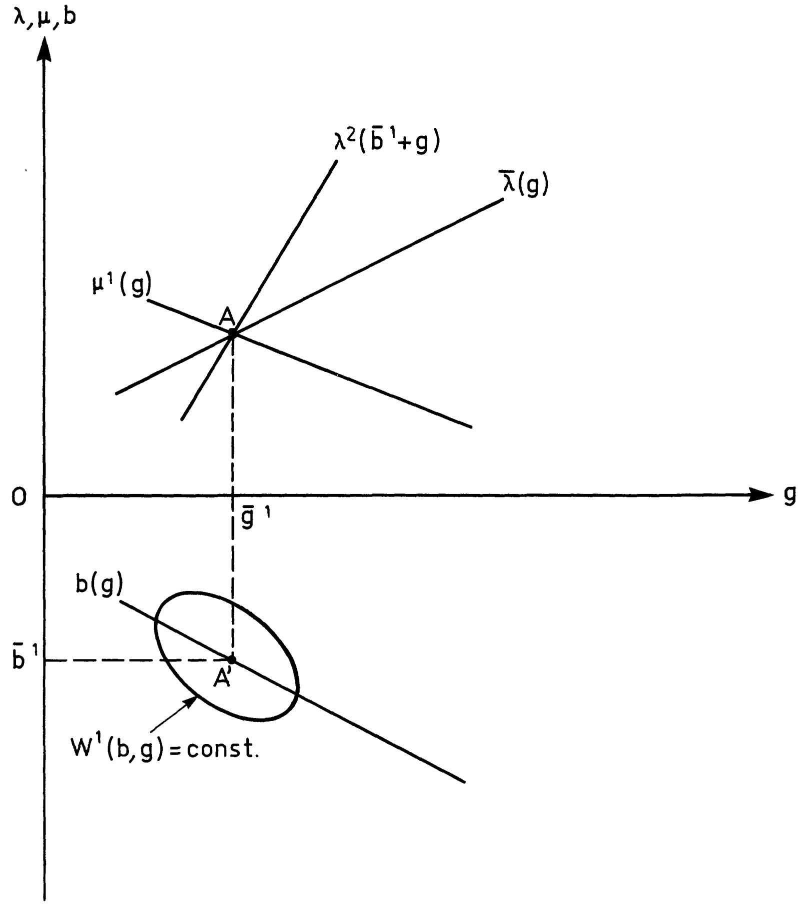


FIGURE I

$W^1(b,g) \equiv V(b,g) + v^1(g)$ is shown, as well as the preferred-debt function $b(g)$. The function (6) is given by the value of $W^1(b,g)$ along $b(g)$. The maximum occurs for $g = \bar{g}^1$ and the corresponding preferred debt level is $\bar{b}^1 = b(\bar{g}^1)$.

Let us also describe the behavior of government 1 ex post, if it remains in power in period 2. Ex post, government 1 has to use period 2 tax revenues to finance total government expenditure in period 2, namely of the sum of government consumption g and repayment of predetermined debt $\bar{b}^1$. Default on the debt is ruled out. (For the case without period 1 government consumption, the debt level is negative so there is no incentive to default.) The after-tax period 2 wage rate consistent with expenditure $\bar{b}^1 + g$ will be given by the function $w^2(\bar{b}^1 + g)$ derived above. As in the ex ante problem, one can define an ex post marginal cost of government consumption, $\lambda^2(\bar{b}^1 + g)$.[4] Ex post, then, government 1 chooses government consumption to equate the ex post marginal cost and marginal utility of government consumption.

This is also illustrated in Figure I. The ex post marginal cost curve is steeper than the ex ante marginal cost curve. The reason is that when government consumption is raised ex post, only the period 2 tax rate is raised, since the period 1 tax rate is predetermined. This is more distortionary than when both periods' tax rates are raised as in the ex ante problem underlying the ex ante marginal cost curve. The ex post marginal cost curve intersects the marginal utility curve at point A, for the same level of government consumption as the ex ante marginal cost curve. This illustrates that the constraints of government 1 are time consistent: ex post it has incentive to pursue the same policy as it had ex ante. As further discussed in Persson and Svensson [1987], with a different private utility function the ex post marginal cost curve will intersect the marginal utility curve at a different level than the ex ante marginal cost curve, giving rise to a time-consistency problem even with time-consistent preferences.

III. TAXATION WITH TIME-INCONSISTENT PREFERENCES

Now instead let a new government, called government 2, be in power in period 2. It differs from government 1 in having a different utility function for government consumption, $v^2(g)$. As illustrated in Figure II, the marginal utility of government consumption for government 2, $\mu^2(g) \equiv v_g^2(g)$, exceeds that of government 1 for all levels of g, $\mu^2(g) > \mu^1(g)$. Government 2 faces the same ex post optimum taxation problem as the one discussed for government 1

4. The ex post indirect utility of private consumption can be written as a function of predetermined period 1 consumption and labor supply, savings from period 1, and the wage rage in period 2. With additive separability the indirect utility function can eventually be written as $U^2(w_2; l_1,w_1)$ (see Svensson and Persson [1987] for details). Define the ex post indirect utility function, $V^2(b + g; l_1,w_1) \equiv U^2(w_2(b + g); l_1,w_1)$, and define the ex post marginal cost of government consumption as

$$\lambda^2(b + g) \equiv -V_G^2(b + g).$$

(Since the period 2 indirect utility function $V^2(b + g; l,w_1)$ will be additively separable in $b + g$, the ex post marginal cost will be independent of period 1 labor supply and after-tax wage rate. Total government expenditure in period 2, $b + g$, is denoted by G.)

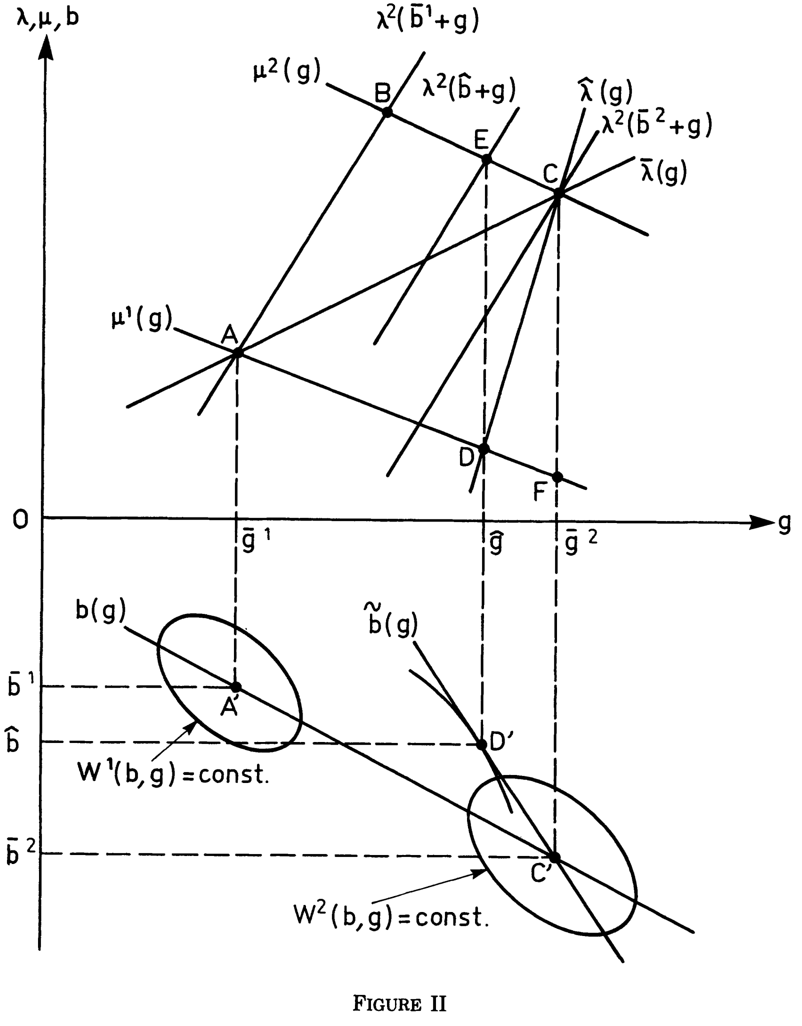


FIGURE II

above, and hence the same ex post marginal cost curve for government consumption. Given the level of debt it inherits from government 1, it equates the ex post marginal cost of government consumption with its own marginal utility of government consumption. If government 2 inherits the government 1 preferred debt level $\bar{b}^1$, it would choose the level of government consumption corresponding to point B, the intersection between the ex post marginal cost curve for $\bar{b}^1$ and the marginal utility curve. If government 2 were in power in both periods, it would choose its preferred level of government consumption, $\bar{g}^2$, given by the intersection of the ex ante marginal cost curve and its marginal utility curve at point C. The corresponding preferred level of debt, $\bar{b}^2$, makes the ex post marginal cost curve also intersect the marginal utility curve at point C.

The situation for government 2 is also illustrated in (b,g) space in Figure II. An indifference curve for its ex ante objective function, $W^2(b,g) \equiv V(b,g) + v^2(g)$, is shown, as well as its preferred level of government consumption, $\bar{g}^2$ and debt $\bar{b}^2$ at point C'. The preferred-debt function $b(g)$ is common for the two governments, since by (5) it depends only on the indirect utility function $V(b,g)$ and not on the governments' preferences for government consumption, $v^1(g)$ and $v^2(g)$.

For an arbitrary level of debt b, government 2 will hence choose government consumption, $g^2(b)$, such that its ex post marginal cost curve intersects the marginal utility curve,

$$\lambda^2(b + g) = \mu^2(g). \tag{8}$$

It follows that government consumption is a decreasing function of inherited debt. The inverse of that function, also a decreasing function, is denoted $\tilde{b}(g)$ and called the *required-debt function.* This function gives the debt level required to induce government 2 to choose a particular level of government consumption. The required-debt function has a slope steeper than -1,[5] and is hence steeper than the preferred-debt function $b(g)$. It is also shown in Figure II.[6]

Let us now return to the behavior of government 1, when it anticipates that it will be replaced by government 2 in period 2. The required-debt function enters as an incentive-compatibility constraint in the decision problem of government 1. Government 1 then simply maximizes $W^1(b,g)$ subject to $b = \tilde{b}(g)$, which results in the time-consistent level of borrowing $\hat{b} = \tilde{b}(\hat{g})$. This is illustrated in Figure II, where an indifference curve for the function $W^1(b,g)$ is tangent to the curve describing the required debt function at point D', for $(\hat{b},\hat{g})$.

The time-consistent equilibrium can also be illustrated in another way. In order to see this, first, when the level of borrowing is

5. We have $\tilde{b}_g = -(\lambda_G^2 - \mu_g^2)/\lambda_G^2 \leq -1$.

6. Note that the required debt function is the locus of points for which the indifference curves of the function $V^2(b + g; l_1,w_1) + v^2(g)$ (not shown in the figure) are horizontal, *not* the locus where indifference curves of the function $W^2(b,g) = V(b,g) + v^2(g)$ (shown in the figure) are horizontal.

given by the required-debt function, we define the indirect utility function $\hat{V}(g) \equiv V(\tilde{b}(g),g)$, and the time-consistent marginal cost of government consumption $\hat{\lambda}(g) = -\hat{V}_g(g)$. Then the first-order consumption for a maximum of $\hat{V}(g) + v^1(g)$ can be written as

$$\hat{\lambda}(g) = \mu^1(g); \tag{9}$$

the time-consistent marginal cost of government consumption should equal the marginal utility of government consumption for government 1. This first-order condition again defines the time-consistent level of government consumption $\hat{g}$. In Figure II the time-consistent marginal cost curve $\hat{\lambda}(g)$ intersects the marginal utility curve of government 2 for the level of government consumption $\bar{g}^2$, at point C. The time-consistent curve $\hat{\lambda}(g)$ is at least as steep as the ex post marginal cost curve $\lambda^2(\bar{b}^2 + g)$ (see the derivation of inequality (A.20) in the Appendix). It intersects the marginal utility curve of government 1 at point D, at the time-consistent level of government consumption $\hat{g}$.

It follows from Figure II that the time-consistent level of government consumption $\hat{g}$ corresponding to point D is a compromise between the two governments' preferred levels,

$$\bar{g}^1 < \hat{g} < \bar{g}^2. \tag{10}$$

It also follows from Figure II that government 1 induces government 2 to choose a lower level of government consumption by leaving government 2 with a higher level of debt than government 2 prefers. That is,

$$\hat{b} > \bar{b}^2. \tag{11}$$

This is obvious since any tangency of indifference curves from $W^1(b,g)$ must be to the left of $\bar{g}^2$, when the required debt curve has a negative slope.

But, is the time-consistent level of borrowing $\hat{b}$ larger or smaller than the level of borrowing $\bar{b}^1$ that government 1 would choose if it were in power in both periods? This depends on whether the point E vertically above D is to the left or right of point B in the upper half of Figure II, or whether point D' is above or below point A' in the lower half of Figure II. If to the left and above, time-consistent borrowing is larger; if to the right and below, time-consistent borrowing is smaller. Numerical examples demonstrate that both cases can occur, and we cannot expect to find general global results, since the curves in Figure II may have a variety of shapes.

We have, however, been able to derive a local result (for technical details, see the Appendix). Suppose that points A and C (and A' and C') in Figure II are close. Then we can show that the time-consistent level of borrowing is larger or smaller depending upon whether the marginal utility curve for government 1 is steeper or flatter than the marginal utility curve for government 2. That is,

$$\hat{b} \gtrless \bar{b}^1 \text{ if and only if } -\mu_g^1 \gtrless -\mu_g^2. \tag{12}$$

Let us extend on the intuition for that result. Government 1 is trading off two different distortions. One is to have too much government consumption, what we call the volume distortion. The other is to have, for a given level of government consumption, a time profile of taxes that differs from the ex ante optimum taxation solution, what we call the intertemporal distortion. Consider again Figure II. Suppose that government 1 would leave to government 2 the debt level $\bar{b}^2$ preferred by government 2. Then government 2 would choose its preferred level of government consumption, $\bar{g}^2$, corresponding to point C. The equilibrium would be the one government 2 would have chosen if it were in power in both periods, and there would be no intertemporal distortion. From the point of view of government 1, however, there would be a considerable volume distortion. The marginal cost of government consumption would be given by the distance between the horizontal axis and point C, but the marginal utility would be much less, given by the distance between the horizontal axis and point F. It is better for government 1 to decrease the volume distortion by increasing the debt level, shifting the ex post marginal utility curve to the left, and forcing government 2 to cut back on government consumption. This causes period 1 tax rates to be too low relative to period 2 tax rates, and hence creates an intertemporal distortion. If government 1 has a relatively steep marginal utility curve for government consumption, it puts relatively large weight on the volume distortion, and is therefore prepared to create a considerable intertemporal distortion. In this case, we say that government 1 is "stubborn." Hence, our result (12) can be interpreted as saying that if government 1 is relatively stubborn, it increases the level of borrowing so much that the ex post marginal cost curve actually shifts to the left of the marginal utility curve for $\bar{b}^1$. Then it borrows more than it would if it had remained in power in both periods.[7]

7. In terms of the lower half of the figure, a flatter marginal utility curve for government 2 makes the required debt curve flatter, which tends to move the tangency point D' up.

Let us finally comment on the situation when there is government consumption also in period 1. Think of government 1 as having preferences over government consumption g_1 and g_2 in periods 1 and 2 described by the additively separable utility function $v_1^1(g_1) + v_2^1(g_2)$. If government 1 were in power in both periods, it would choose optimum levels of government consumption, $\bar{g}_1^1$ and $\bar{g}_2^1$, say, and an optimum level of borrowing $\bar{b}^1$. In the time-consistent equilibrium when government 1 is replaced by government 2 in period 2, would the time-consistent level of government consumption in period 1, $\hat{g}_1$, fall short of or exceed $\bar{g}_1^1$? The answer is that as long as the above utility function is additively separable, the time-consistent level of government consumption in period 1 is larger or smaller depending upon whether the time-consistent level of borrowing is larger or smaller than the level when government 1 is in power in both periods:

$$\hat{g}_1 \gtrless \bar{g}_1^1 \text{ if and only if } \hat{b} \gtrless \bar{b}^1. \tag{13}$$

The reason is that if borrowing is larger, for a constant level of period 1 government consumption, the period 1 tax rate on labor is smaller, and the distortion in period 1 is lower. This makes the marginal cost of period 1 government consumption lower, and allows an expansion of period 1 government consumption. (With intertemporal distortion of relative taxes, the marginal cost of government consumption in the two periods differs.)

IV. Capital Controls

We shall now show an alternative setup that leads to the same formal analysis.[8] Consider a two-period small open exchange economy with one good. Governments have access to a world credit market, but due to capital controls consumers lack access to a credit market. Lump sum taxes are feasible. The only distortion is hence consumers' lack of access to the world credit market. A conservative government with preferences for a low government consumption is in power in period 1, and a more expansionary government is in power in period 2.

More precisely, let the private utility function be

$$u(c_1) + u(c_2). \tag{14}$$

8. We owe the idea for this alternative interpretation to Maurice Obstfeld.

With lump sum taxes T_1 and T_2 and no private borrowing, the private budget constraints are

$$c_1 = y_1 - T_1 \text{ and } c_2 = y_2 - T_2, \tag{15}$$

where y_1 and y_2 are given private endowments of the one good.

The budget constraint of government 1 is

$$b + T_1 = 0 \text{ and } g + b = T_2, \tag{16}$$

where b is international borrowing by the government (the world real interest rate is set to zero).

Substitution of (15) and (16) into (14) makes it possible to define the indirect utility function,

$$V(b,g) \equiv U(y_1 + b, y_2 - (b + g)), \tag{17}$$

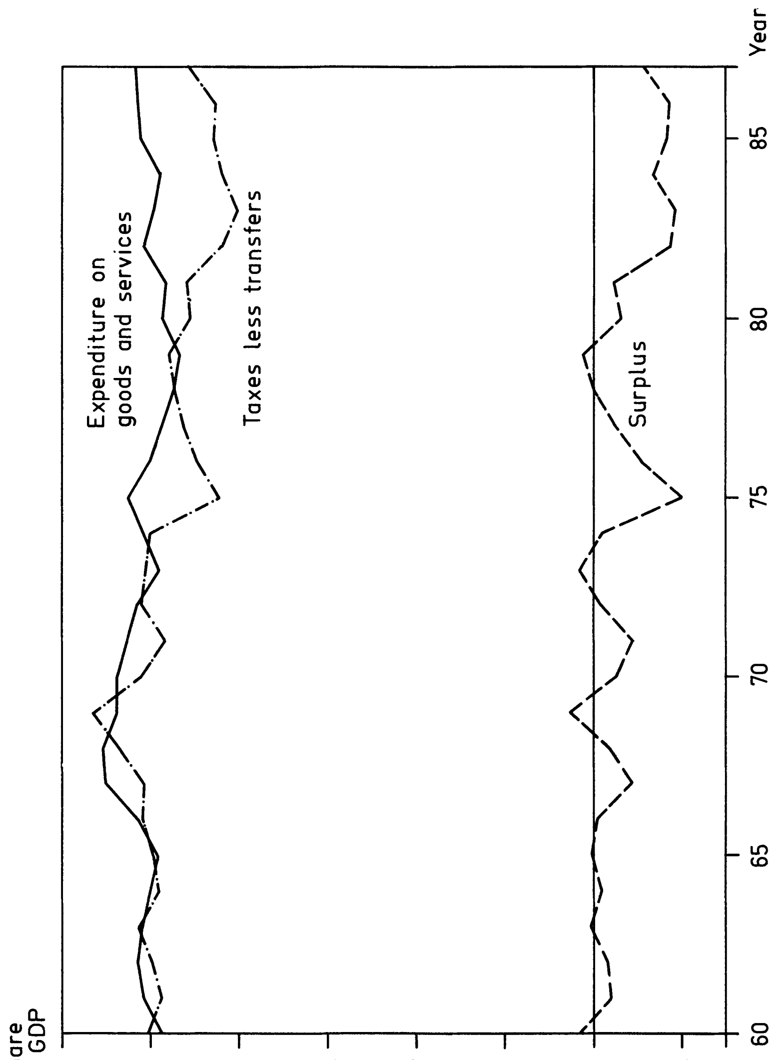
which is analogous to the indirect utility function defined in (4). The analysis can then proceed almost exactly as in Sections II and III.

V. EXAMPLES

We have shown how one may construct a theory where elements of political strategy influence the design of fiscal policy. Obviously, our model rests on many drastic simplifications in order to make our point as clearly as possible. But even if some assumptions were relaxed—along the lines suggested in the next section—the political considerations would only be one out of several determinants of fiscal policy. Finding clear empirical evidence in support of this theory will therefore not be easy.

Our argument rests on two basic premises: (a) when taking decisions on fiscal policy, governments look forward with a strategic motive, to influence prospective opposition governments; and (b) the inherited public debt influences a newly elected government's decision on taxation and spending.

Premise (a) is probably the harder one to verify. One of our motivations when writing the paper, was the allegations about discussions in the (first) Reagan administration that the only way to lower government spending in the future was to lower current taxes in order to affect future congresses and administrations. The decrease in (total) U. S. government tax revenue less of transfers in the 1980s and the deterioration in the budget position is clear from



GENERAL GOVERNMENT FINANCES: U.S.A 1960–87

FIGURE IIIa

Figure IIIa.[9] Unfortunately, we cannot yet check how the massive buildup of public debt during the Reagan administration affects the next presidential administration along the lines of premise (b).

Premise (b) is, of course, not unique to our theory. It also underlies more conventional analyses of dynamic fiscal policy where the government is viewed as a Pigouvian agent interested in the welfare of the representative consumer (as in the references cited in the Introduction). Recent developments in countries other than the United States suggest that public debt inherited from previous governments do affect tax and spending policies. The Swedish experience in the last 10–15 years is a case in point. After a long period of Social Democratic rule, a nonsocialist government took office in 1976. As can be seen from Figure IIIb, the previous growth in government expenditures continued in the six years of nonsocialist rule, whereas net taxes were lowered a bit.[10] This led to an even greater increase in the government (net) deficit (as a share of GDP) than for the United States during the 1980s. After 1982 when the Social Democrats were reelected, government spending has been virtually flat, however, while taxes have increased again to close the deficit and even create a surplus. The "bad public finances" and the accumulating government debt was indeed one of the main official motivations for the crunch in growth of public spending after 1982 and for the increase in net taxes. This is documented, for instance, in *The Swedish Budgets* (1983, especially pp. 21–23, and 36–37; 1984, especially pp. 30–31 and 41–43). It remains to be seen whether Figure IIIa, when redrawn in the mid-1990s, will show a similar change in U. S. fiscal policy from 1989 and onward.

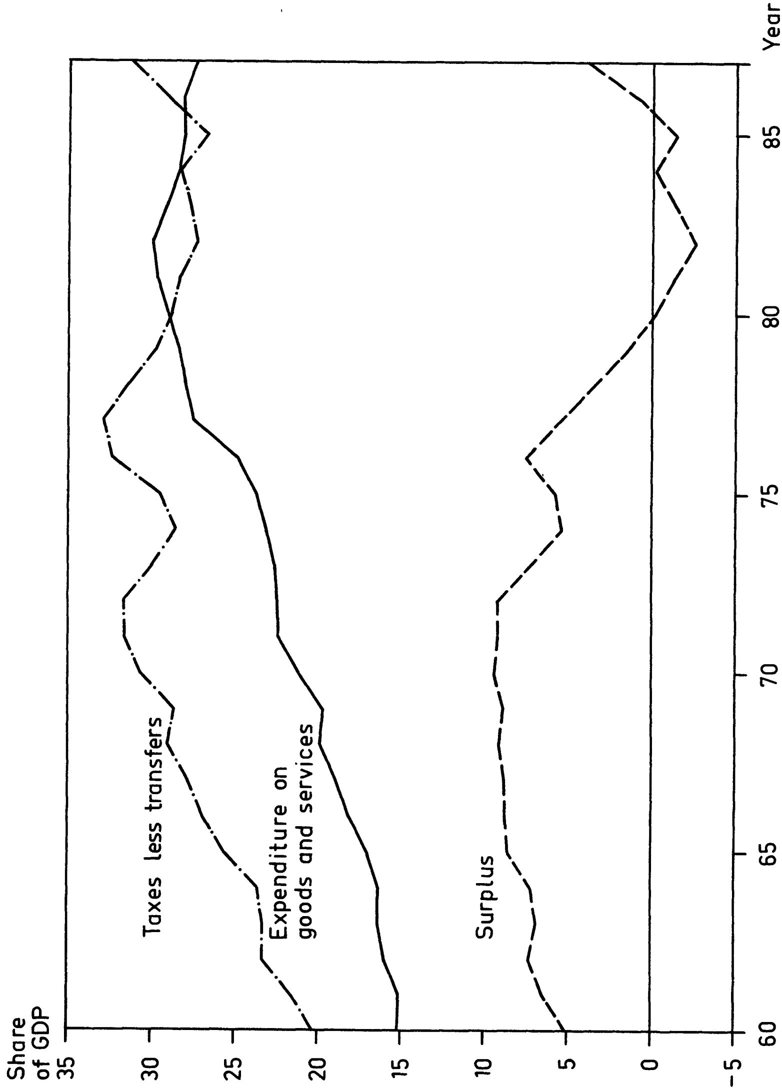
What we have cited in this section is at best circumstantial evidence. Clearly, much more substantial empirical work is necessary to test the political theory of fiscal policy.

VI. Conclusions and Possible Extensions

We have shown how a government can exert some influence over the future level of government consumption when preferences over government consumption are time inconsistent. A government, which is conservative in the sense of being less expansionary than

9. The U.S. data are from the *Economic Report of the President 1988*.

10. The Swedish data are from the *National Accounts: Annual Reports* (various issues).



GENERAL GOVERNMENT FINANCES: SWEDEN 1960–87

FIGURE IIIb

its (liberal) successor, will collect less taxes and leave more public debt than what the successor would prefer. This makes the time-consistent level of government consumption somewhere in between what each of the two governments would prefer if they would rule on their own. Especially, if the conservative government is relatively stubborn, it may end up borrowing more when it knows that it will be succeeded by the liberal government, compared with when it knows that it will remain in power. Stubbornness here refers to the weight the government attaches to reach its preferred level of government consumption relative to the welfare cost of a distorted tax profile over time. Of course, the argument is completely symmetric, so a "stubborn" liberal government would choose to borrow less if it knew it would be succeeded by a more conservative government. Stretching our model slightly, it suggests that politically motivated deficits would be run by stubborn conservatives and "pragmatic" liberals.

Technically, the problem we have dealt with is a principal-agent problem, with government 1 being the principal and government 2 being the agent. The behavior of government 2 enters as an incentive-compatibility constraint in the decision problem of government 1.

There are several extensions of our analysis that may be worth pursuing. We have simplified the problem to a two-period perfect-foresight framework, where the current government knows with certainty that it will be succeeded by a more expansionary government. This framework may still be rather realistic when it refers to a president in his second term, with the constitution prohibiting reelection.[11] Nevertheless, it is clearly desirable to extend the analysis to one with several periods, and to one where there is uncertainty about the nature of succeeding governments, because of electoral uncertainty.

Such an analysis has independently been provided in a recent very interesting paper by Alesina and Tabellini [1986]. They consider a situation with two governments that prefer different *kinds* of public goods, rather than different *levels* of the same public good as in our model. There is uncertainty in each period about whether the current government will remain in power or will

11. Another interpretation is that there is uncertainty about the preferences of the successor, that the probability distribution over preferences is one-dimensional (conservative-liberal) and has a finite support, and that the current government is extreme in the sense of being at the conservative (liberal) end of the support. Then any succeeding government, and the expected succeeding government, is more liberal (conservative) than the current one.

be succeeded by the other government.[12] Since each current government knows that with some probability it will be succeeded in the next period by a government that will spend taxes on a kind of public good that the current government does not like, it perceives a low expected marginal utility of next period's public consumption. This provides an incentive to restrict next period's public consumption by borrowing more in the current period, compared with a situation when the current government would remain in power next period with certainty. Both governments perceive the same incentive to borrow more, hence there will be a bias toward larger public debt levels, whichever government is in power.

As mentioned, our analysis allows for the distinction between more and less expansionary (conservative and liberal) governments. The analysis ought to be extended to a situation with uncertainty and many periods, but we conjecture that uncertainty about whether the current government is succeeded or remains in power would not fundamentally change the behavior we have derived under perfect foresight.

Another very interesting expansion, although as far as we can see a very complicated one, would be to make the probability of being reelected depend upon the policy pursued. Additional extensions include the consideration of other state variables than public debt. For instance, if public goods can be produced only after previous investment in a public capital stock, the level and perhaps the composition of that public capital stock becomes an obvious state variable through which a government can affect its successor.

As already mentioned, the idea that a government can influence its successor by affecting the constraints of the successor is a very general one, and extends far beyond fiscal policy. Recent examples include the privatization policy of the Thatcher government in Britain, or the settlements policy of previous Likud governments in Israel, both of which policies will change (or have already changed) the constraints for succeeding governments with possibly very different preferences. In our view, this general view of "creating facts" for your successor sets an exciting agenda for future research.

APPENDIX: DERIVATION OF (12)

Consider the following parameterization of government 2. Let the parameter γ in the utility function $v^2(g,\gamma)$ denote how expan-

12. Exogenous uncertainty about the composition of the electorate creates uncertainty about election outcomes, when voters vote for the government whose preferences are most similar to the voters' own preferences.

sionary government 2 is, in the sense that an increase in γ shifts up the marginal utility curve $\mu^2(g,\gamma)$. We call γ the expansion index. It follows that the level of government consumption if government 2 is in power in both periods will be an increasing function $\bar{g}^2(\gamma)$ of the expansion index. The time-consistent level of government consumption will also be an increasing function $\hat{g}(\gamma)$ of the expansion index. Choose the parameterization such that $\hat{g}(0) = \bar{g}^2(0) = \bar{g}^1$. That is, when the expansion index is zero, the two governments would prefer the same level of government consumption, which then of course coincides with the time-consistent level of government consumption. The time-consistent level of borrowing is also a function $\hat{b}(\gamma)$ of the expansion index. When the expansion index is zero, the time-consistent level of borrowing will coincide with the preferred level of borrowing of government 1 and government 2 (the level of borrowing each of them would choose if each were in power in both periods), $\hat{b}(0) = \bar{b}^1 = \bar{b}^2(0)$.

Now consider a small increase (from 0) in the expansion index. Whether the time-consistent borrowing increases above, or decreases below the level of borrowing $\bar{b}^1$, is determined by the sign of the derivative $\hat{b}_\gamma(\gamma)$ for $\gamma = 0$. More precisely, let $\hat{b}(\gamma) \equiv \tilde{b}(\hat{g}(\gamma,\gamma)$, where

$$\lambda^2(\tilde{b}(g,\gamma) + g) = \mu^2(g,\gamma), \tag{A.1}$$

$$\begin{aligned} \hat{\lambda}(g,\gamma) \equiv & -L_1[w_1(\tilde{b}(g,\gamma)]w_{1b}(\tilde{b}(g,\gamma))\tilde{b}_g(g,\gamma), \\ & - L_2[w_2(\tilde{b}(g,\gamma) + g)]w_{2G}(\tilde{b}(g,\gamma) + g)(\tilde{b}_g(g,\gamma) + 1) \end{aligned} \tag{A.2}$$

and

$$\hat{\lambda}(\hat{g}(\gamma),\gamma) = \mu^1(\hat{g}(\gamma)). \tag{A.3}$$

The expression for $\hat{\lambda}(g,\gamma)$ in (A.2) follows since $\hat{\lambda} = -\hat{V}_g$ and

$$d\hat{V} = dV = l_1 dw_1 + l_2 dw_2. \tag{A.4}$$

Similarly,

$$\lambda^2(b + g) = -L_2[w_2(b + g)]w_{2G}(b + g), \tag{A.5}$$

since

$$dV^2 = l_2 dw_2. \tag{A.6}$$

For $\gamma = 0$ we have

$$\hat{g}(0) = \bar{g}^1 \text{ and } \hat{b}(0) = \bar{b}^1. \tag{A.7}$$

We assume that $L_1(w_1)$ and $L_2(w_2)$ are identical, that is, that the utility function (1) is symmetric in x_1 and x_2. Let $\bar{w}_1 = w_1(\bar{b}^1)$ and

$\overline{w}_2 = w_2\overline{b}^1 + \overline{g}^1$). Then

$$\text{(A.8)} \qquad \overline{w}_1 = \overline{w}_2 = \overline{w},$$

and for $w_1 = w_2 = \overline{w}$ we have

$$\text{(A.9)} \quad l_1 = l_2, \qquad L_{11} = L_{22}, \qquad w_{1b} = -w_{2G}, \qquad \text{and } w_{1bb} = w_{2GG}.$$

Differentiation of (A.2) with respect to g for $\gamma = 0$ and use of (A.9) yields

$$\text{(A.10)} \quad \hat{\lambda}_g(\overline{g}^1,0) = [-L_{22}(w_{2G})^2 - l_2 w_{2GG}][(\tilde{b}_g)^2 + (\tilde{b}_g + 1)^2].$$

Differentiation of (A.5) gives

$$\text{(A.11)} \qquad \lambda_G^2(\overline{b}^1 + \overline{g}^1) = -L_{22}(w_{2G})^2 - l_2 w_{2GG}.$$

Together (A.10) and (A.11) imply that for $\gamma = 0$

$$\text{(A.12)} \qquad \hat{\lambda}_g = \gamma_G^2[(\tilde{b}_g)^2 + (\tilde{b}_g + 1)^2].$$

Similarly, differentiating (A.2) with respect to γ at $\gamma = 0$, we obtain

$$\text{(A.13)} \qquad \hat{\lambda}_\gamma = \lambda_G^2(2\tilde{b}_g + 1)\tilde{b}_\gamma.$$

From (A.1) we get

$$\text{(A.14)} \qquad \tilde{b}_g = -(\lambda_G^2 - \mu_g^2)/\lambda_G^2 \leq -1$$

and

$$\text{(A.15)} \qquad \tilde{b}_\gamma = \mu_\gamma^2/\lambda_G^2 > 0,$$

and from (A.3)

$$\text{(A.16)} \qquad \hat{g}_\gamma = -\hat{\lambda}_\gamma/(\hat{\lambda}_g - \mu_g^1).$$

Finally, from (A.1) we have

$$\text{(A.17)} \qquad \hat{b}_\gamma = \tilde{b}_g\hat{g}_\gamma + \tilde{b}_\gamma.$$

We can use the results in (A.12)–(A.14) and (A.16) to evaluate $\hat{b}_\gamma$ as expressed in (A.17). We carry out the substitutions and manipulate the resulting expression to get

$$\text{(A.18)} \qquad \hat{b}_\gamma = \tilde{b}_\gamma(\mu_g^2 - \mu_g^1)/[(\tilde{b}_g)^2 + (\tilde{b}_g + 1)^2 - \mu_g^1/\lambda_G^2].$$

The denominator is positive, and by (A.15) $\tilde{b}_\gamma > 0$.

It follows that

$$\text{(A.19)} \qquad \text{sign } \hat{b}_\gamma = \text{sign } [-\mu_g^1 - (-\mu_g^2)].$$

Note that (A.12) and (A.14) imply that

$$\hat{\lambda}_g \geq \lambda_G^2. \tag{A.20}$$

INSTITUTE FOR INTERNATIONAL ECONOMIC STUDIES, UNIVERSITY OF STOCKHOLM

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