Budget deficit, size of the public sector and majority voting

Jens Siebel
University of Siegen

Discussion Paper No. 120-05

ISSN 1433-058x
Budget deficit, size of the public sector and majority voting

Jens Siebel*

University of Siegen
Department of Economics
Institute of Public Finance and Environmental Economics
Hölderlinstr. 3
D-57068 Siegen

Tel.: ++49 (0)271 740 3152
Fax: ++49 (0)271 740 2732
jp.siebel@vwl.wiwi.uni-siegen.de

Abstract:
In this paper Tabellini’s and Alesina’s (1990) median voter model for the explanation of budget deficits is modified by endogenizing the private sector. Debt finance is supplemented by taxing a private consumption which serves as an additional source of revenue for funding the public sector. The introduction of the private sector enables us to explain the budget balance as a result of political polarization with a left-wing party and a right-wing party having different preferences for the size of the public sector.

JEL: H61, H62

* The author likes to thank Rüdiger Pethig for his continuous support.
1. Introduction

Public debt has a long history in many countries. Since long time many economic explanations of public debt have been offered. Recently, political-economic explanations have gained more and more interest. In those models politicians, voters, voting procedures and institutional settings of democratic countries are analyzed with respect to their inherent tendency to run debts. Surveys are provided by Alesina and Perotti (1995) and Persson and Tabellini (1999 and 2000).

One of the more recent theoretical papers on that issue is Tabellini and Alesina (1990) which presents a very interesting explanation of public deficits in a democracy. In their two-period model Tabellini and Alesina explore a first-period median voter’s incentive to run a budget deficit when there is uncertainty about the second-period median voter’s preferences or when it is certain that the second-period median voter will favour another composition of government consumption. Under certain conditions the first period median voter is shown to alter the second period’s allocation of two public goods to better fit her own preferences by issuing a budget deficit or a surplus. Decisive for this result are the assumptions that outstanding debt needs to be served at the end of the second period i. e. that repudiation is ruled out effectively.

Tabellini and Alesina do not model the private sector at all. In addition to issuing or repaying public debt each government is assumed to have at its disposal a lump sum amount of money (tax revenues) in order to finance its expenditures. Such a setting allows determining the allocation of both public goods but not the allocation of resources between the public and the private sector; more specifically, it does not allow determining the size of the public and the private sector.

The following analysis aims at explaining budget deficits in a democracy by means of a two-period median voter model under certainty. In contrast to the work of Tabellini and Alesina (1990) a private sector will be endogenized which is taxed in order to finance a public good. This assures that both the public budget balance and the size of the public sector are determined endogenously.
The paper is organized as follows: first, the general properties of the models will be introduced in chapter 2. Chapter 3 examines the model under several assumptions about the median voters’ preferences. Chapter 4 concludes.

2. The model
2.1 Basic Assumptions

$g_i$ is the amount of a public good consumed, which is provided for free charge and $x_i$ is the consumption of a private good. Let $\chi_i$ be the size of the private sector and $g_i$ the size of the public sector in period $i$, $i=1,2$ with $\chi_i = \sum_{j=1}^{n} x_i^j$. $j=1,\ldots,n$ stands for consumer $j$. The number of consumers is the same in both periods. $x_i^j$ is consumer $j$’s share of the private sector in period $i$. This share is assumed to equal $x_i^j = \frac{\chi_i}{n}$ in both periods and for simplicity we set $n=1$ and $j \in [0,1]$ which is equivalent to $x_i^j = \chi_i \quad \forall j$. Thus the superscript $j$ can be suppressed in the following analysis. In revealing her preference for the size of the public sector consumer $j$ also reveals her preferences for private consumption and vice versa. Consumer $j$, characterized by the preference parameter $\alpha_j$ has the intertemporal utility

\begin{equation}
W(\alpha_j, g_1, x_1, g_2, x_2) = \alpha_j U(g_1) + (1-\alpha_j)U(x_1) + \alpha_j U(g_2) + (1-\alpha_j)U(x_2),
\end{equation}

where $U_k(k) > 0$, $U_k'(k) < 0$ and $\lim_{k \to 0} U_k(k) = \infty$ has to be satisfied for $k = g, x$.

The consumer’s income is 1 in each period. With costless consumption of the public good and in the absence of a private capital market the consumer’s budget constraint is

\begin{equation}
(1+\tau_i) x_i = 1 \quad i = 1, 2,
\end{equation}

where $1+\tau_i$ is the consumer price of the private good and $\tau_i$ is the tax rate on private consumption. As is obvious from (2), for given $\tau_i$ each consumer consumes the same amount $x_i = \frac{1}{1+\tau_i}$ independent of her preference parameter $\alpha_j$. Now the public sector is to be modelled. In the first period the government’s supply of the public good, $g_1$, is financed by
consumption tax revenues, \( \tau_i x_i \), corrected by the budget balance (surplus or deficit) generated by a borrowing or lending on a foreign capital market, \( b \). Hence the public budget constraint is

\[(3) \quad g_1 = \tau_i x_i + b.\]

The period 2 budget constraint is:

\[(4) \quad g_2 = \tau_2 x_2 - b.\]

The supply of the public good in period 2 is also financed by a consumption tax, with the qualification that the funds borrowed by the government of period 1 have to be paid back or that the public savings from running a budget surplus in period 1 need to be spent in period 2. When (2), (3) and (4) are considered in (1) the consumer’s utility is directly determined by the public decision variables \( \tau_1, b \) and \( \tau_2 \). We assume that every consumer is perfectly informed about the government’s options of taxing and spending and hence she knows that (2) and (3) as well as (2) and (4) lead to

\[(5) \quad g_1 = \frac{\tau_1}{1 + \tau_1} + b \land g_2 = \frac{\tau_2}{1 + \tau_2} - b.\]

(2) and (5) are now inserted in (1) to yield the indirect utility function

\[
\begin{align*}
\bar{W}^1(\alpha', \tau_1, \tau_2) &= \alpha' U\left( \frac{\tau_1}{1 + \tau_1} + b \right) + (1-\alpha') U\left( \frac{1}{1 + \tau_1} \right) \\
&\quad + \alpha' U\left( \frac{\tau_2}{1 + \tau_2} - b \right) + (1-\alpha') U\left( \frac{1}{1 + \tau_1} \right).
\end{align*}
\]

At the beginning of each period a government is elected via majority voting. In view of (6) the activities of these governments can be completely described as follows: The government of period 1 determines the values of \( \tau_1 \) and \( b \) while the government of period 2 fixes \( \tau_2 \).
2.2 The second period

First, the majority vote of period 2 is analyzed. We examine which policy \( \tau_2 \) is chosen by a voter when a budget deficit \( b \) has to be served. Her utility maximization is

\[
\text{max}_{\tau_2} \tilde{W}^2(\alpha'_2, \tau_2, b) = \alpha'_2U\left(\frac{\tau_2}{1+\tau_2} - b\right) + (1-\alpha'_2)U\left(\frac{1}{1+\tau_2}\right).
\]

The first order condition

\[
\alpha'_2U_{g_2}\left(\frac{\tau_2}{1+\tau_2} - b\right) - (1-\alpha'_2)U_{x_2}\left(\frac{1}{1+\tau_2}\right) = 0,
\]

characterizes an interior maximum, because the function \( \tilde{W}^2 \) in (7) is strictly concave in \( \tau_2 \).

\( \tau_2' := \text{arg max} \tilde{W}^2(\alpha'_2, \tau_2, b) \) is the tax rate the voter \( \alpha'_2 \) prefers to all other tax rates.

Obviously (8) implies a functional relationship between \( \tau_2' \), \( b \) and \( \alpha'_2 \), which we describe by a function \( \tau_2' = T^2(\alpha', b) \). The partial derivatives of that function are

\[
T^2_{\alpha'_2} = \frac{-\left(U_{g_2} + U_{x_2}\right)(1+\tau_2)^2}{\alpha'_2U_{g_2} + (1-\alpha'_2)U_{x_2}} > 0 \quad \text{and} \quad T^2_b = \frac{\alpha'_2U_{g_2} + (1-\alpha'_2)U_{x_2}}{\alpha'_2U_{g_2} + (1-\alpha'_2)U_{x_2}} > 0.
\]

Having identified all voters by their most preferred tax rates, we want to know which programme is realised by the elected government. With each voter’s utility function \( \tilde{W}^2 \) being single peaked in \( \tau_2 \) the median voter’s favourite programme is realised (Black, 2\textsuperscript{nd} ed., 1969).

The median voter is that voter whose favourite tax rate \( \tau_2 = \tau_2'' \) is the median of the favourite tax rates of all voters. Since \( T^2_{\alpha'_2} \) (as established in (9)) the median voter can also be identified unambiguously by her preference parameter \( \alpha''_2 \). Combining (5) and (9) yields the supply of the public good as a function \( g^m_2 = G^2(\alpha''_2, b) := \frac{T^2(\alpha''_2, b)}{1+T^2(\alpha''_2, b)} - b \) whose first derivatives are
\[
G^2_{a_1} = \frac{-(U_{g_2} + U_{x_2})}{\alpha^m_2 U_{g_2} + (1-\alpha^m_2)U_{x_2}} > 0 \quad \land \quad G^2_b = \frac{-(1-\alpha^m_2)U_{x_2}}{\alpha^m_2 U_{g_2} + (1-\alpha^m_2)U_{x_2}} < 0.
\]

Involving (2) and (9) we specify the preferred size of the private sector as
\[
x^m_2 = X^2(\alpha^m_2, b) = \frac{1}{1 + T^2(\alpha^m_2, b)}.
\]

The derivatives of the function \(X^2\) are
\[
X^2_{a_1} = \frac{-(U_{g_2} + U_{x_2})(1 + \tau_2)^2}{\alpha^m_2 U_{g_2} + (1-\alpha^m_2)U_{x_2}} < 0 \quad \land \quad X^2_b = -\frac{\alpha^m_2 U_{g_2}}{\alpha^m_2 U_{g_2} + (1-\alpha^m_2)U_{x_2}} < 0.
\]

Closer inspection of (10) and (11) shows that
\[
G^2_{a_1} + X^2_{a_1} = 0 \quad \land \quad G^2_b + X^2_b = -1.
\]

We have established that the amount of the private and the public good provided depend on the budget balance and the median voter’s preferences. These functions \(G^2\) and \(X^2\) are strictly monotone in all their variables.

Next we investigate the polar cases in which the median voter’s preferences take on either the value \(\alpha^m_2 = 1\) or the value \(\alpha^m_2 = 0\):

For \(\alpha^m_2 = 1\), the function \(\tilde{W}^2\) from (7) simplifies to
\[
\tilde{W}^2(1, \tau_2, b) = U\left(\frac{\tau_2 - b}{1 + \tau_2}\right).
\]

Since \(\tilde{W}^2_{\tau_2}(1, \tau_2, b) = U_{g_2} G^2_{\tau_2} > 0\) for all \(\tau_2\), the median voter’s utility function has no maximum in \(\tau_2\). In order to obtain a well defined optimization problem nonetheless, we introduce a ceiling\(^1\) \(\overline{\tau}_2 > 0\) such that the tax rate in the second period is effectively restricted to
\[
\tau_2 \in [0, \overline{\tau}_2].
\]

The consequence of restricting \(\tau_2\) to the interval \([0, \overline{\tau}_2]\) is that there is a critical

---

\(^1\) Such a ceiling could be introduced by law or constitution, like Proposition 13 of the California Constitution for example. An increase of the state’s consumption tax must be approved by at least two-thirds of all members of both houses of the Legislature (Article 13A, Section 3, http://www.leginfo.ca.gov/.const/article_13a). An increase in local taxes must be approved by at least two-thirds of the qualified electors in the affected region. (Article 13A, Section 4, http://www.leginfo.ca.gov/.const/article_13a).
value \( \bar{\alpha}_2^m \in ]0,1[ \), such that \( \tau_2^m \left< \bar{\alpha}_2^m \right\rangle \bar{\tau}_2 \) for all \( \alpha_2^m \left< \bar{\alpha}_2^m \right\rangle \). \( \alpha_2^m \geq \bar{\alpha}_2^m \) implies \( T_b^2 = 0 \) and we conclude that

\[
g_2^m = \frac{-\bar{\tau}_2}{1 + \bar{\tau}_2} - b \land x_2^m = \frac{1}{1 + \bar{\tau}_2} > 0 \text{ if } \alpha_2^m \in [\bar{\alpha}_2^m, 1].
\]

It is interesting to observe that \( x_2^m > 0 \) rather than \( x_2^m = 0 \) in case of the median voter’s extreme preferences for the public sector. The reason for not completely abolishing private consumption is that the taxation of private consumption is the only source of finance for the provision of the public good in the second period.

Suppose now \( \alpha_2^m = 0 \). In that case (7) simplifies to \( \tilde{W}_2^2(0, \tau_2, b) = U \left( \frac{1}{1 + \bar{\tau}_2} \right) \) such that the median voter’s favourite program is

\[
g_2^m = 0 \land x_2^m = 1 - b \land \tau_2 = \frac{b}{1 - b} \text{ if } \alpha_2^m = 0.
\]

With the median voter having extreme preferences for the private good, her optimal choice is \( x_2^m = 1 \) and \( \tau_2^m = 0 \) if \( b = 0 \). In case of a predetermionated positive value of \( b \) it is necessary to raise a tax with rate \( \tau_2^m = \frac{b}{1 - b} > 0 \) in order to serve the debt incurred in period 1. If a surplus was run in period 1 (e. g. \( b < 0 \)) a “tax” with a negative rate \( \tau_2^m \in \left[ \frac{1}{2}, 0 \right] \) (i. e. a. subsidy) needs to be implemented.

\[\footnote{Note that \( \bar{\alpha}_2^m \) depends on \( b \), as total differentiation of \( T_\tau^2(\alpha_2^m, b) = \bar{T}_\tau \) with respect to \( \alpha_2^m \) and \( b \) yields \[\frac{d\alpha_2^m}{db} = -\frac{T_{\tau_2}^1}{T_{\alpha_2^m}^1} < 0 \). In the various cases of the model it is assumed that the values of \( \alpha_2^m \) and \( b \) prevent the appearance of that problem. See also footnote 3.} \]
2.3 The first period

In the first period each voter drives utility from consuming both goods in both periods. But the consumption of the second period is determined by the second period’s median voter with preference parameter $\alpha_m^2$. By assumption every voter who participates in the election of the government of the first period knows the preference parameter $\alpha_m^2$ (and the policy of the second period) and thus she solves

$$
\max_{\tau_i, b} \hat{W}^1(\alpha_i', \alpha_m'^2, \tau_i, b) = \alpha_i' U \left( \frac{\tau_i}{1 + \tau_i} + b \right) + \left( 1 - \alpha_i' \right) U \left( \frac{1}{1 + \tau_i} \right) + \alpha_i' U \left( \frac{T^2(\alpha_m'^2, b) - b}{1 + T^2(\alpha_m'^2, b)} \right) + \left( 1 - \alpha_i' \right) U \left( \frac{1}{1 + T^2(\alpha_m'^2, b)} \right).
$$

(15)

$\hat{W}^1$ from (15) is defined over a two-dimensional policy space $\left\{ (\tau_i, b) \mid \tau_i \in \left[ -\frac{1}{2}, \tau_i \right] \cap b \in [-1, 1] \right\}$. With a two-dimensional policy space, the existence of a voting equilibrium cannot be established unless rather specific conditions are satisfied. To make progress the two-dimensional policy space will be reduced to the dimension $b$ only by partial maximization of $\hat{W}^1$ with respect to $\tau_i$, hoping at the same time, that the resultant function is single peaked in $b$.

The first order condition for maximizing $\hat{W}^1$ with respect to $\tau_i$ is

$$
\alpha_i' U_{\tau_i} - \left( 1 - \alpha_i' \right) U_{\tau_i} = 0.
$$

(16)

As the second derivative has a negative sign, (16) characterizes a maximum. Total differentiation of (16) with respect to $\tau_i, \alpha_i'$ and $b$ yields a function $\tau_i^* = T^1(\alpha_i', b)$ whose first derivatives are

$$
T_{\alpha_i'}^1 = \frac{-\left( U_{\alpha_i} + U_{x_i} \right)(1 + \tau_i)^2}{\alpha_i' U_{\tau_i} + \left( 1 - \alpha_i' \right) U_{x_i}} > 0 \land T_b^1 = \frac{-\left( U_{\alpha_i} + U_{x_i} \right)(1 + \tau_i)^2}{\alpha_i' U_{\tau_i} + \left( 1 - \alpha_i' \right) U_{x_i}} < 0.
$$

(17)
Because of (5) the public good consumption is then given by
\[ g^i = G^i(\alpha^i, b) = \frac{T^i(\alpha^i, b)}{1 + T^i(\alpha^i, b)} + b \]
where
\[ G^i_{a^i} = \frac{-\left(U_{x_1} + U_{x_1}^i\right)}{\alpha^i U_{\beta x_1} + (1 - \alpha^i) U_{x_1 x_1}} \] and \[ G^i_{b} = \frac{(1 - \alpha^i) U_{x_1 x_1}}{\alpha^i U_{\beta x_1} + (1 - \alpha^i) U_{x_1 x_1}} > 0 \].

Invoking (2) we get \( x^i = X^i(\alpha^i, b) = \frac{1}{1 + T^i(\alpha^i, b)} \) and the derivatives of the function \( X^i \) are
\[ X^i_{a^i} = \frac{U_{x_1} + U_{x_1}^i}{\alpha^i U_{\beta x_1} + (1 - \alpha^i) U_{x_1 x_1}} < 0 \] and \( X^i_{b} = \frac{\alpha^i U_{\beta x_1} + (1 - \alpha^i) U_{x_1 x_1}}{\alpha^i U_{\beta x_1} + (1 - \alpha^i) U_{x_1 x_1}} > 0 \).

(18) and (19) imply
\[ G^i_{a^i} + X^i_{a^i} = 0 \] and \[ G^i_{b} + X^i_{b} = 1 \].

Repeating our procedure in analyzing the second period we now calculate the implications of the extreme preference parameters \( \alpha^i = 1 \) and \( \alpha^i = 0 \).

For \( \alpha^i = 1 \) \( \tilde{W}^i \) from (15) simplifies to \( \tilde{W}^i(1, b, \tau^i) = U \left( \frac{\tau^i}{1 + \tau^i} - b \right) \). Since \( \tilde{W}^i = U G^i_{\beta \tau^i} > 0 \) for all \( \tau^i > 0 \), the voter’s utility function has no maximum in \( \tau^i \). To obtain a well-defined maximization problem we introduce again a ceiling on the tax rate, denoted \( \overline{\tau} \), and we set \( \tau^i = \overline{\tau} \) for simplicity. Similar as in the context of the second period we find that there is a critical value \( \overline{\alpha}^i \) such that \( \tau^i = \overline{\tau} \) for all \( \alpha^i \leq \overline{\alpha}^i \) and that \( \overline{\alpha}^i \geq \overline{\alpha}^i \) for all \( \alpha^i \geq \overline{\alpha}^i \).

According to (6) the optimal values of public and private consumption are given by
(21) \hspace{100pt} g'_i = \frac{\tau_i}{1+\tau_i} + b \quad \text{and} \quad x'_i = \frac{1}{1+\tau_i} > 0 \text{ if } \alpha'_i \in \overline{\alpha'_i}, 1.] \\

For \( \alpha'_i = 0 \) (15) simplifies to \( \bar{W}^1(0, \tau_i, b) = U\left(\frac{1}{1+\tau_i}\right) \). Hence the voter’s favours

(22) \hspace{100pt} g'_i = 0 \quad \text{and} \quad x'_i = 1 + b \quad \text{and} \quad \tau'_i = \frac{-b}{1+b} \quad \text{and} \quad b = \frac{-\tau'_i}{1+\tau'_i} \quad \text{if } \alpha'_i = 0. \\

If the voter has an extreme preference for the private good and if \( b = 0 \) she clearly opts for \( x'_2 = 1 \) and \( \tau'_i = 0 \) if \( b = 0 \). In case of a deficit the private sector can be subsidized by choosing a negative tax rate \( \tau'_i < 0 \). On the other hand a budget surplus \( b \in ]-1, 0[ \) requires a tax rate \( \tau'_1 > 0 \).

Now we replace in (1) the variables \( g_1, x_1, g_2 \) and \( x_2 \) by \( G_1(\alpha'_1, b), X_1(\alpha'_1, b), G_2(\alpha^n_b, b) \) and \( X^2(\alpha^n_b, b) \) respectively, and consider the utility maximization problem

\[
\max_b V^1(\alpha'_1, \alpha^n_b, b) = \alpha'_1 U\left[G_1(\alpha'_1, b)\right] + (1-\alpha'_1) U\left[X_1(\alpha'_1, b)\right] \\
+ \alpha'_1 U\left[G_2(\alpha^n_b, b)\right] + (1-\alpha'_1) U\left[X^2(\alpha^n_b, b)\right].
\]

After consideration of (16) and (20) the first order condition can be rearranged to read

(24) \hspace{100pt} \alpha'_1 U_{\alpha'_1} - v(\alpha'_1, \alpha^n_b, b) = 0 \quad \text{with} \quad v(\alpha'_1, \alpha^n_b, b) := -\alpha'_1 U_{\alpha'_1} G_2^2 - (1-\alpha'_1) U_{\alpha^n_b} X^2_b.

In (24) \( v(\alpha'_1, \alpha^n_b, b) \) is the marginal damage of the budget deficit or the marginal utility of the budget surplus, respectively, in the second period.

Denote by \( b^1 \) the value of \( b \) satisfying (24). \( b^1 \) is clearly a maximum of \( V^1 \) from (23) if \( V^1 \) is strictly concave (and if an interior maximum exists). Tabellini and Alesina (1990) show

\[3 \text{ Here, } \alpha^n_b \text{ depends on } b, \text{ and following the methodology in footnote 2 we get } \frac{d\alpha^n_b}{db} = -\frac{T^1_b}{T^1_{\alpha^n_b}} > 0. \text{ Again, we assume that this problem does not appear in the various cases of the model.}\]
that strict concavity of $V^1$ can be secured by imposing some ‘mild’ restriction\(^4\) on the functional form $U$. In our further analysis we assume that this condition is satisfied. Now each voter with preference parameter $\alpha^j_1$ can be identified by her preferred budget balance. Under these conditions a majority vote ensures that the first period median voter’s preferred budget balance $b^m$ is realised. Throughout the following analysis this median voter is identified by her preference parameter $\alpha^m_1$.

By using (10) and (11) and setting $\alpha^j_1 = \alpha^m_1$ we turn $v(\alpha^j_1, \alpha^m_2, b)$ into

$$
(25) \quad v(\alpha^m_1, \alpha^m_2, b) = \frac{\left[U_{g_z}\right]^2 \left[U_{x_z}\right]^2 \left[\alpha^m_1 U_{x_z g_z} + \left(1-\alpha^m_1\right) \frac{U_{g_z}}{U_{x_z}}\right]}{\left[U_{g_z}\right]^2 \left[U_{x_z}\right]^2 \left[U_{g_z} + U_{x_z}\right]^2}.
$$

The quotient

$$(26a) \quad \lambda(k) := -\frac{U_{k}(k)}{\left[U_k(k)\right]^2},$$

is called concavity index of the utility function $U(k)$ with $k = g, x$. Furthermore, it is helpful to consider a function $R$ defined by

$$(26b) \quad R(k) := -\frac{U_{k}(k)}{U_k(k)}.$$

---

\(^4\) According to Tabellini and Alesina (1990) the following condition is sufficient for strict concavity of $V^1$ in $b$:

$$
(1') \quad R(x) = R(g) + R(g) + R(x) + (1-\gamma) R(x) + \gamma R(g) + (\gamma - 1) R(x) > 0
$$

$\gamma$ is defined as $\gamma = \frac{1-\alpha^m_1}{\alpha^m_1 - \alpha^m_2}$ and $R(k) := -\frac{U_{k}(k)}{U_k(k)}$ is the degree of absolute risk aversion in case of uncertainty. We assume that (1’) is fulfilled throughout the paper.
Like in the model of Tabellini and Alesina (1990) (26a) and (26b) enable us to transform (25) into

\[ v(\alpha_1^m, \alpha_2^m, b) = \frac{\alpha_1^m U_\alpha R(x_2^m) + (1 - \alpha_1^m) U_\mu R(g_2^m)}{R(g_2^m) + R(x_2^m)}. \]

Owing to the strict concavity of \( V^1 \) in \( b \), the sign of \( b^m \) can be easily determined by the sign of \( V^1_b(\alpha_1^m, \alpha_2^m, 0) \). More specifically, we have \( b^m = \begin{cases} > 0 & \text{if and only if } V^1_b(\alpha_1^m, \alpha_2^m, 0) > 0 \\ < 0 & \text{if and only if } V^1_b(\alpha_1^m, \alpha_2^m, 0) < 0 \end{cases} \).

Differentiating (27) with respect to \( \alpha_2^m \) leads to

\[ v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = \frac{\alpha_2^m - \alpha_1^m}{1 - \alpha_2^m} \left\{ R(x_2^m) \left[ R(g_2^m)^2 + R(x_2^m) \right] + R(g_2^m) \left[ R(x_2^m)^2 + R(x_2^m) \right] \right\} \]

Combining (26a) and (26b) yields

\[ \left[ R(k) \right]^2 + R_k = \lambda_k(k) U_k. \]

Recalling (11) and the assumption \( U_{g_2} > 0 \) we find that the sign \( v_{a_2^m} \) from (28) depends on the signs of \( \lambda_k(k) \) and the difference \( \alpha_1^m - \alpha_2^m \) as shown in table 1.

<table>
<thead>
<tr>
<th>( \lambda_k(k) )</th>
<th>( \alpha_2^m &lt; \alpha_1^m )</th>
<th>( \alpha_1^m = \alpha_2^m )</th>
<th>( \alpha_2^m &gt; \alpha_1^m )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \lambda_k(k) &lt; 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) &gt; 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) &lt; 0 )</td>
</tr>
<tr>
<td>( \lambda_k(k) = 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = 0 )</td>
</tr>
<tr>
<td>( \lambda_k(k) &gt; 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) &lt; 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) = 0 )</td>
<td>( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) &gt; 0 )</td>
</tr>
</tbody>
</table>

**Table 1:** Sign of \( v_{a_2^m}(\alpha_1^m, \alpha_2^m, b) \) depending on \( \alpha_1^m - \alpha_2^m \) and \( \lambda_k(k) \)

Inspection of table 1 reveals that \( v(\alpha_1^m, \alpha_2^m, b) \) attains a maximum or a minimum, if \( \alpha_1^m = \alpha_2^m \).
3. Solutions for various combinations of $\alpha_1^m$ and $\alpha_2^m$

If $\alpha_1^l = \alpha_1^m$ the first period’s median voter maximizes $V^1$ from (23) with respect to $b$ and (24) then becomes

\[(30) \quad \alpha_1^m U_{g1} - v(\alpha_1^m, \alpha_2^m, b) = 0.\]

A popular (though probably oversimplified) thesis is that a median voter with a high preference for the public sector is associated with a left-wing party and a median voter with little preference for the public sector is associated with a right-wing party. Throughout the paper we will follow that assumption, associating $\alpha_1^m = 0$ with a right-wing government, $\alpha_1^m \in [0, \overline{\alpha}_1^m]$ with a moderate government and $\alpha_1^m \in [\overline{\alpha}_1^m, 1]$ with a left-wing government in period $i = 1, 2$.

Case (i): $\alpha_2^m \in [0, \overline{\alpha}_2^m]$

Case (i, a): $\alpha_2^m \in [0, \overline{\alpha}_2^m]$ and $\alpha_1^m \in [0, \overline{\alpha}_1^m]$

According to table 1 $v(\alpha_1^m, \alpha_2^m, b)$ reaches its maximum value if $\alpha_1^m = \alpha_2^m$. (30) simplifies to

\[(1-\alpha_1^m)U_{\lambda_1} - (1-\alpha_1^m)U_{\lambda_2} = 0, \] which implies $U_{\lambda_1} = U_{\lambda_2}$ as well as $U(x_1^m) = U(x_2^m)$, $x_1^m = x_2^m$

and $\tau_1^m = \tau_2^m$ because of (2). Moreover, $U_{g1} = U_{g2}$ holds if and only if $U(g_1^m) = U(g_2^m)$ and hence $g_1^m = g_2^m$. Finally, equation (5) and $\tau_1^m = \tau_2^m$ yield $b^m = 0$ and $\tau_1^m = \tau_2^m \geq 0$.

Proposition 1:

A median voter of period 1 with preferences $\alpha_1^m \in [0, \overline{\alpha}_1^m]$ who is certain to be the second period’s median voter favours a balanced budget to smooth out intertemporal tax rates. Those tax rates are always non-negative.

Table 1 also shows that for $b = 0$ and $\alpha_1^m \in [0, \overline{\alpha}_1^m]$ the second period’s marginal utility is

$v(\alpha_1^m, \alpha_2^m, 0) > v(\alpha_1^m, \alpha_1^m, 0)$ if and only if $\lambda_i(k) > 0$ for all $\alpha_1^m \neq \alpha_2^m$. Thus we have

$V^1_b(\alpha_1^m, \alpha_2^m, 0) > 0$ if and only if $\lambda_i(k) > 0$ and also $b^m > 0$ if and only if $\lambda_i(k) > 0$.
Proposition 2:
A median voter with preferences $\alpha_1^m \in ]0, \bar{\alpha}_i^m[$ who knows that she will not remain the median voter in the second period chooses a budget deficit in case of a falling concavity index and a budget surplus in case of an increasing concavity index.

Another straightforward result contained in table 1 is that $\lambda_1(k) = 0$ implies $v_{\alpha_2^m}(\alpha_1^m, \alpha_2^m, b) = 0$.

Proposition 3:
If the concavity index is constant, a median voter with preferences $\alpha_1^m \in ]0, \bar{\alpha}_i^m[$ chooses a balanced budget.

It is worthwhile noting that although the budget is balanced in case of $\lambda_1(k) = 0$ all other variables differ in both periods if $\alpha_1^m \neq \alpha_2^m$. This can be verified by inspection of the equations (9) – (11) and (17) – (19). For example, the utility function $U(k) = \ln(k + 1)$ leads to the optimal values $b^m = 0, \tau_1^m = \frac{\alpha_1^m}{1-\alpha_1^m}$ and $\tau_2^m = \frac{\alpha_2^m}{1-\alpha_2^m}$. Hence the tax rates $\tau_1^m$ and $\tau_2^m$ are identical if and only if $\alpha_1^m = \alpha_2^m$.

Summing up, a nonzero budget balance does not depend on the preferences of the first period’s median voter but on the difference of the preference parameters of both median voters. It is irrelevant whether the median voter prefers a large or a small public sector.

The thesis of left-wing governments being more deficit prone than right-wing government is not supported by the results reported above.

Case (i, b): $\alpha_2^m \in ]0, \bar{\alpha}_2^m[$ and $\alpha_1^m = 0$

If $\alpha_1^m = 0$, (23) simplifies to $\max_b V^1(0, \alpha_2^m, b) = U[X^1(1+b)] + U[X^2(\alpha_2^m, b)]$. The first derivative of $V^1$ with respect to $b$ is
(31) \[ V_b^1(0, \alpha_z^m, b) = U_{x_1}(1+b) + U_{x_2} \left( \frac{1}{1+\tau_2} \right) X_b^2, \]

As \( \alpha_z^m > \alpha_i^m = 0 \) implies \( U_{x_2} \left( \frac{1}{1+\tau_2} \right) > U_{x_1}(1+b) \) and \( X_b^2 \in [-1, 0] \) holds (see (11)), the sign of (31) is ambiguous. Therefore the sign of \( b^m \) cannot be determined. With \( \alpha_i^m U_{g_2} \) being independent of \( \alpha_z^m \) the cross derivative \( V_{be_2}^1 \) satisfies

(32) \[ V_{be_2}^1(0, \alpha_z^m, b) = \begin{cases} > 0 & \text{if } \lambda_k(k) = 0 \end{cases} \]

The greater the value of \( \alpha_z^m \), the greater (smaller) is the marginal utility of a rising deficit if the concavity index is increasing (decreasing). Thus \( V_b^1 \) increases (decreases) when \( \alpha_z^m \) increases and \( b \) is fixed. If \( \lambda_k(k) = 0 \), \( V_b^1 \) remains constant and the first period’s median voter chooses her preferred allocation without regard of \( \alpha_z^m \).

We established the following result on the budget policy of a right-wing government with extreme preference for the private sector, that is in power in period 1 and that knows that its successor will increase the public and decrease the private sector. Whether that right-wing government runs a surplus, a deficit or a balanced budget depends on the properties of the utility function.

Case(i, c) : \( \alpha_z^m \in \left[0, \alpha_z^m\right] \) and \( \alpha_i^m \in \left[\alpha_i^m, 1\right] \)

If \( \alpha_i^m \in \left[\alpha_i^m, 1\right] \), the first derivative is \( V_b^1(\alpha_i^m, \alpha_z^m, b) = \alpha_i^m U_{g_2} - v(\alpha_i^m, \alpha_z^m, b) \). The sign of \( V_b^1 \) evaluated at \( b = 0 \) can be determined by consulting table 1 for \( \alpha_i^m \neq \alpha_z^m \). The optimal budget balance is \( b^m = 0 \) if and only if \( \lambda_k(k) = 0 \). As in the case \( \alpha_i^m \in \left[0, \alpha_i^m\right] \) the sign of \( b^m \) therefore depends on the properties of the concavity index only.
Hence we established the following result on the budget policy of a left-wing government, strongly in favour of the largest possible public sector and knowing that it will be replaced by a more moderate government: Depending on the properties of the concavity index such a government generates a surplus, a deficit or a balanced budget. Possible interpretations of this behaviour are as follows:

1) In case of a budget deficit the left-wing government seems to aim at increasing the public sector in the first period. At the same time it cuts its successors budget needed to boost the private sector.

2) Though a surplus puts pressure on the public sector in the first period it can be used as a kind of insurance against a larger cut-off in the second period. The inherited surplus enables the moderate government in the second period to enlarge the private sector without a complete loss of the public sector.

<table>
<thead>
<tr>
<th>$\alpha_i^m = 0$ (right-wing)</th>
<th>$\alpha_i^m \in ]0, \alpha_i^m \lbrack$ (moderate)</th>
<th>$\alpha_i^m \in \lbrack \alpha_i^m, 1 \rbrack$ (left-wing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$b^m = ?$</td>
<td>$b^m = 0$</td>
<td>$b^m = 0$ if $\lambda_\alpha (k) = 0$</td>
</tr>
<tr>
<td>$g_1^m = 0$</td>
<td>$g_1^m = \frac{\tau_1^m}{1 + \tau_1^m}$</td>
<td></td>
</tr>
<tr>
<td>$x_1^m = x_2^m = \frac{1}{1 + \tau_1^m}$</td>
<td>$x_1^m = x_2^m = \frac{1}{1 + \tau_1^m}$</td>
<td></td>
</tr>
<tr>
<td>$\text{sign} { \lambda_\alpha (k) }$</td>
<td>$\text{sign} { \lambda_\alpha (k) }$</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Possible allocations in case of $\alpha_i^m \in ]0, \alpha_i^m \lbrack$ (moderate)
Case (ii): \( \alpha_2^m \in [\bar{\alpha}_2^m, 1] \)

Case (ii, a): \( \alpha_2^m \in [\bar{\alpha}_2^m, 1] \) and \( \alpha_1^m \in [0, \bar{\alpha}_1^m] \)

The first order condition for a maximum is

\[
V_b^1 \left( \alpha_1^m, \alpha_2^m, b \right) = \alpha_1^m U_{g_s} - \alpha_2^m U_{g_s} \left( \frac{\tau_2}{1 + \tau_2} - b \right) = 0 .
\]

As the second derivative \( V_{bb}^1 \) is negative\(^5\), it characterizes an interior maximum of \( V^1 \). (33) implies \( G^1 \left( \alpha_1^m, b \right) = G^2 \left( 1, b \right) \) and \( b = \frac{1}{2} \left( \frac{\tau_2}{1 + \tau_2} - \frac{\tau_1}{1 + \tau_1} \right) \) because of (5) and (13). As \( \tau_1 < \bar{\tau}_1 = \tau_2 \) for all \( \alpha_i^m \in [0, \bar{\alpha}_i^m] \), \( b^m \) is positive. One also has \( \frac{db}{d\tau_1} < 0 \), which leads to

\[
\frac{db}{d\alpha_i^m} = \frac{db}{d\tau_1} \cdot \frac{d\tau_1}{d\alpha_i^m} < 0 .
\]

Taking (5) into account we obtain \( g_i^m = \frac{\tau_2}{1 + \tau_2} - b^m \) after some transformations. The size of the public sector is the same in both periods. The first period’s tax rate is \( \tau_1^m = \frac{\tau_2 - 2b^m (1 + \tau_2)}{1 + 2b^m (1 + \tau_2)} \) and the size of the private sector is \( x_i^m = \frac{1}{1 + \tau_2} + 2b^m \).

This result fits the following scenario: A left-wing government which favours an extremely large public sector will be in office in the second period. The moderate first period government will run a deficit, which is the larger the more right-wing the government is. As a consequence, the left wing government is forced to reduce its spending for the public sector and the moderate government succeeds in equalizing the size of the public sector in both periods and in boosting the private sector in the first period by reducing taxes.

---

\(^5\) \( V_{bb}^1 < 0 \) follows from \( X_b^1 = 1 - G_b^1 \) and \( G_{\alpha \alpha}^1 + X_b^1 = 0 \).
Case (ii, b): \( \alpha_2^m \in \left[ \bar{\alpha}_2^m, 1 \right] \) and \( \alpha_1^m = 0 \)

(33) reduces to \( V_b^1 \left( 0, \alpha_2^m, b \right) = U_{x_1} \left( 1 + b \right) > 0 \). Thus \( V^1 \) has no maximum with respect to \( b \).

The first periods median voter chooses \( b^m = \frac{-\tau_1^m}{1 + \tau_1^m} = \frac{-\tau_2}{1 + \tau_2} \) and \( \tau_1^m = -\frac{\tau_2}{1 + 2\tau_2} \). Her successor realises \( g_2^m = \frac{-\tau_2}{1 + \tau_2} - b = \frac{-\tau_2}{1 + \tau_2} - \frac{-\tau_2}{1 + \tau_2} = 0 \).

This is a case of extreme political polarization. An extremely right-wing government knows that it will be replaced by an extremely left-wing government. The debt financed, extreme size of the private sector transfers all available resources from the second to the first period.

Contrary to the popular theses that right-wing governments are less prone to budget deficits than left-wing governments, in the present scenario a right-wing government induces a deficit and the repayment forces its left-wing successor to forego all public expenditures. A similar interpretation was given by Persson and Svensson (1989) in the context of a similar two-period-model. Persson and Svensson (1989) developed a model which allowed public consumption in the second period only. The first period’s surplus was smallest under a conservative government which knew that it would be replaced by a more liberal one\(^6\).

Case (ii, c): \( \alpha_2^m \in \left[ \bar{\alpha}_2^m, 1 \right] \) and \( \alpha_1^m \in \left[ \bar{\alpha}_1^m, 1 \right] \)

If \( \alpha_1^m \in \left[ \bar{\alpha}_1^m, 1 \right] \) the median voters of both periods choose the allocation of private and public goods given by (13) and (21). Then the first order condition for a maximum is

\[
V_b^1 \left( \alpha_1^m, \alpha_2^m, b \right) = \alpha_1^m U_{x_1} \left( \frac{\tau_1}{1 + \tau_1} + b \right) - \alpha_2^m U_{x_2} \left( \frac{\tau_2}{1 + \tau_2} - b \right) = 0.
\]

It implies \( g_1^m = g_2^m \) and \( \frac{\tau_1}{1 + \tau_1} + b = \frac{\tau_2}{1 + \tau_2} - b \) which, in term, yields \( b^m = 0 \) owing to \( \tau_1 = \tau_2 \). Furthermore the private sector must be given by \( x_1^m = x_2^m = \frac{1}{1 + \tau_1} \).

\(^6\)Furthermore, Wagschal (1998) argues that conservative governments are more debt prone as they are more willing to reduce taxes.
In this case a left-wing government is in office in both periods. It has no incentive to generate an unbalanced budget for this would lead to an undesirable intertemporal distortion of consumption.

<table>
<thead>
<tr>
<th>$\alpha^m_1 = 0$ (right-wing)</th>
<th>$\alpha^m_1 \in [0, \bar{\alpha}^m_1]$ (moderate)</th>
<th>$\alpha^m_1 \in [\bar{\alpha}^m_1, 1]$ (left-wing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$b^m = \frac{\bar{\tau}_2}{1 + \bar{\tau}_2} &gt; 0$</td>
<td>$b^m &gt; 0$</td>
<td>$b^m = 0$</td>
</tr>
<tr>
<td>$\tau^m_1 = -\frac{\bar{\tau}_2}{1 + 2\bar{\tau}_2} &lt; 0, \tau^m_2 = \bar{\tau}_2$</td>
<td></td>
<td>$\tau^m_1 = \tau^m_2 = \bar{\tau}_1 = \bar{\tau}_2 \geq 0$</td>
</tr>
<tr>
<td>$g^m_1 = g^m_2 = 0$</td>
<td></td>
<td>$g^m_1 = g^m_2 = \frac{\bar{\tau}_1}{1 + \bar{\tau}_1}$</td>
</tr>
<tr>
<td>$x^m_1 = \frac{1 + 2\bar{\tau}_2}{1 + \bar{\tau}_2}, x^m_2 = \frac{1}{1 + \bar{\tau}_2}$</td>
<td></td>
<td>$x^m_1 = x^m_2 = \frac{1}{1 + \bar{\tau}_2}$</td>
</tr>
</tbody>
</table>

**Table 3:** Possible allocations in case of $\alpha^m_2 \in [\bar{\alpha}^m_2, 1]$ (left-wing)

**Case (iii):** $\alpha^m_2 = 0$

If $\alpha^m_2 = 0$, first period’s median voter solves

$$
(34) \quad \max_b V^1(\alpha^m_1, 0, b) = \alpha^m_1U[\tilde{G}^1(\alpha^m_1, b)] + (1-\alpha^m_1)U[X^1(\alpha^m_1, b)] + (1-\alpha^m_1)U(1-b).
$$

**Case (iii, a):** $\alpha^m_2 = 0$ and $\alpha^m_1 \in [0, \bar{\alpha}^m_1]$

If $\alpha^m_1 \in [0, \bar{\alpha}^m_1]$, $V^1$ from (34) is strictly concave in $b$ and therefore an interior maximum $b^m$ is fully determined by the first order condition

$$
(35) \quad V^1_\alpha(\alpha^m_1, 0, b) = \alpha^m_1U_{s_1} - (1-\alpha^m_1)U_{s_2} = 0.
$$
Combining (35) and (16) yields 
\[ (1-\alpha_i^m)U_{x_i} \left( \frac{1}{1+\tau_i} \right) = (1-\alpha_i^m)U_{x_i}(1-b), \]
which yields
\[ b^m = \frac{\tau_i^m}{1+\tau_i^m} \quad \text{and} \quad \tau_i^m = \frac{b^m}{1-b^m}. \]
(10) implies \( g_i^m > 0 \), and regarding (5) we get \( \tau_i^m > 0 \),
\[ g_i^m = \frac{2\tau_i^m}{1+\tau_i^m} = 2b^m, \quad b^m > 0 \quad \text{and} \quad x_i^m = 1-b^m. \]

In this scenario, the public sector in the first period is funded in equal share by taxes and by debt. The size of the private sector is the same in both periods. With the same tax rate being chosen in both periods, an intertemporal smoothing of taxes rates, described by Barro (1979), can be observed.

The right-wing government in office in the second period has a predecessor which is more left-wing. The predecessor has two incentives to generate a budget deficit. First, the right-wing government will not be able to promote the private sector through subsidies, because it needs to levy a tax for serving the debt. Second the first period’s government knows that the public sector will be completely shut down in the second period, regardless of the sign or size of the debt. It therefore creates a budget deficit to transfer resources from the second to the first period in order to enlarge the public sector in the first period.

This scenario supports the popular thesis that left-wing governments are more deficit prone. Martimort (2001) argues that left-wing governments prefer higher deficits in order to defend their redistributive goals against upcoming conservative governments.

**Case (iii, b):** \( \alpha_2^m = 0 \) and \( \alpha_i^m = 0 \)

Under these conditions (34) reduces to \( V_b^i(0,0,b)=U(1+b)+U(1-b) \). The associated first order condition is \( V_b^i(0,0,b)=U_{x_i}(1+b)-U_{x_i}(1-b)=0 \) which immediately yields \( b^m = 0 \). From
\[ \tau_i^m = \frac{-b_i^m}{1+b_i^m} \]
we infer \( \tau_i^m = 0, x_i^m = 1 \) and \( g_i^m = 0 \).

In this scenario the extreme right wing government being in office in the first period knows that it will also be in office in the second period. It therefore does not want to place a tax burden on the higher valued private sector.
Case (iii, c): $\alpha_i^m = 0$ and $\alpha_i^m \in [\bar{\alpha}_i^m, 1]

If $\alpha_i^m \in [\bar{\alpha}_i^m, 1]$, $g_2^m$ and $x_2^m$ are determined as in (13) and the first order condition (35) turns into

$$(36) \quad V_i^j(\alpha_i^m, 0, b) = \alpha_i^m U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} + b \right) - (1 - \alpha_i^m) U_{x_2} (1 - b) = 0,$$

and the second derivative is negative. Total differentiation of (36) with respect to $b$ and $\alpha_i^m$

leads to $\frac{db}{d\alpha_i^m} = - \frac{U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} + b \right) + U_{x_2} (1 - b)}{\alpha_i^m U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} + b \right) + U_{x_2} (1 - b)} > 0$.

Thus $b^m$ increases with $\alpha_i^m$. Next we maximize the right side of (36) for $b = 0$. $b^m$ satisfies

$$b^m \begin{cases} > 0 \quad \text{if and only if} \quad \alpha_i^m U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right) - (1 - \alpha_i^m) U_{x_2} (1) \begin{cases} > 0 \quad \text{if and only if} \quad \alpha_i^m U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right) - (1 - \alpha_i^m) U_{x_2} (1) \begin{cases} > 0 \quad \text{if and only if} \quad \alpha_i^m U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right) - (1 - \alpha_i^m) U_{x_2} (1) \end{cases} > 0 \end{cases} \end{cases}

(36) is equivalent to $\alpha_i^m > \frac{U_{x_2} (1)}{U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right) + U_{x_2} \left( \frac{\tau_2}{1 + \tau_2} \right)}$. From $\frac{\tau_1}{1 + \tau_1} < 1$ follows $\frac{U_{x_2} (1)}{U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right) + U_{x_2} \left( \frac{\tau_2}{1 + \tau_2} \right)} < 1$

and thus $\alpha_i^m > \frac{U_{x_2} (1)}{U_{x_2} (1) + U_{g_1} \left( \frac{\tau_1}{1 + \tau_1} \right)}$ holds for $\alpha_i^m \geq \frac{1}{2}$. As a consequence $b^m > 0$ if $\alpha_i^m \geq \frac{1}{2}$.

In the present scenario, the first period government prefers the largest possible public sector and its successor has extreme preferences for the private sector. The budget balance decreases with the first period’s government’s preferences for the private sector. The first period government opts for a resource transfer via a budget deficit from the second period into the first period’s public sector, provided that the first period’s government political position is left from the centre. If its position is right from the centre the sign of the budget balance depends on the exogenously given values of $\tau_1$ and $\alpha_i^m$ and on the properties of the utility function.
Table 4: Possible allocations in case of $\alpha_2^m = 0$ (right-wing)

4. Conclusions

The general result is that an unbalanced budget can occur when the median voters’ preferences in both periods diverge. These diverging preferences can also be interpreted as a political party system with two parties favouring a different size of the public sector and thus a different fiscal policy. According to their preferences for the size of the public sector we talk about a left-wing party or government and about a conservative / right-wing party or government. The government in office in the first period knows whether it will be in office in the second period or not.

Depending on the properties of the model several results were possible:

1) The parties favour a certain budget policy regardless of their ideological preference for the size of public sector. Then their policy aims at protecting their goals against their successor’s policy. The sign of the budget balance depends on the concavity properties of the utility function.
2) If at least one government has extreme preference for either the public or the private sector the sign of the budget balance is independent of the concavity properties of the utility function. Special cases occurred, which could be interpreted by the common assumptions of partisan theory:

i) Left-wing governments are more deficit prone because of their redistributive goals and their preference for a larger public sector.

ii) Right-wing governments can generate deficits in order to enforce more fiscal discipline to their left-wing successor. Furthermore deficit finance enables a right-wing government to reduce taxes imposed on the high-valued private sector.

Finally, table 5 sums up the results derived from the various cases.

<table>
<thead>
<tr>
<th>Government in period 1</th>
<th>Government in period 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Left-wing</strong></td>
<td><strong>Left-wing</strong></td>
</tr>
<tr>
<td>balanced budget</td>
<td>Deficit, balanced</td>
</tr>
<tr>
<td></td>
<td>budget and surplus</td>
</tr>
<tr>
<td></td>
<td>possible</td>
</tr>
<tr>
<td><strong>Moderate</strong></td>
<td><strong>Moderate</strong></td>
</tr>
<tr>
<td></td>
<td>balanced budget</td>
</tr>
<tr>
<td></td>
<td>and surplus possible</td>
</tr>
<tr>
<td><strong>Right-wing</strong></td>
<td><strong>Right-wing</strong></td>
</tr>
<tr>
<td></td>
<td>deficit</td>
</tr>
<tr>
<td></td>
<td>balanced budget</td>
</tr>
</tbody>
</table>

**Table 5:** Possible budget policies under various government sequences

The results presented here have all been generated under the assumption that the first period’s government acts under certainty. It would be interesting to expand this model to the case of uncertainty e. g. when the first period’s government does not know whether it will stay in office in the second period and what the policy of its successor will be.
References


List of Economics Discussion Papers released as of 1993

This list, the abstracts of all discussion papers and the full text of the papers since 1999 are available online under http://www.uni-siegen.de/~vwliv/Dateien/diskussionsbeitraege.htm. Starting with paper 60-97, this information can also be accessed at http://ideas.repec.org. Discussion Papers can be only ordered from the authors directly, in exceptional cases from Prof. Dr. R. Pethig, University of Siegen, D- 57068 Siegen, Germany.

38-93 Reiner Wolff, Saddle-Point Dynamics in Non-Autonomous Models of Multi-Sector Growth with Variable Returns to Scale
39-93 Reiner Wolff, Strategien der Investitionspolitik in einer Region: Der Fall des Wachstums mit konstanter Sektorstruktur
40-93 Axel A. Weber, Monetary Policy in Europe: Towards a European Central Bank and One European Currency
41-93 Axel A. Weber, Exchange Rates, Target Zones and International Trade: The Importance of the Policy Making Framework
42-93 Klaus Schöler und Matthias Schlemper, Oligopolistisches Marktverhalten der Banken
43-93 Andreas Pfingsten and Reiner Wolff, Specific Input in Competitive Equilibria with Decreasing Returns to Scale
44-93 Andreas Pfingsten and Reiner Wolff, Adverse Rybczynski Effects Generated from Scale Diseconomies
45-93 Rüdiger Pethig, TV-Monopoly, Advertising and Program Quality
46-93 Axel A. Weber, Testing Long-Run Neutrality: Empirical Evidence for G7-Countries with Special Emphasis on Germany
47-94 Rüdiger Pethig, Efficient Management of Water Quality
48-94 Klaus Fiedler, Naturwissenschaftliche Grundlagen natürlicher Selbsteinigungsvorgänge in Wasserressourcen
49-94 Rüdiger Pethig, Noncooperative National Environmental Policies and International Capital Mobility
51-95 Gerhard Brinkmann, Die Verwendung des Euler-Theorems zum Beweis des Adding-up-Theorems impliziert einen Widerspruch
52-95 Gerhard Brinkmann, Über öffentliche Güter und über Güter, um deren Gebrauch man nicht rivalisieren kann
53-95 Marlies Klemisch-Ahlert, International Environmental Negotiations with Compensation or Redistribution
54-95 Walter Buhr and Josef Wagner, Line Integrals In Applied Welfare Economics: A Summary Of Basic Theorems
55-95 Rüdiger Pethig, Information als Wirtschaftsgut
56-95 Marlies Klemisch-Ahlert, An Experimental Study on Bargaining Behavior in Economic and Ethical Environments
57-96 Rüdiger Pethig, Ecological Tax Reform and Efficiency of Taxation: A Public Good Perspective
58-96 Daniel Weinbrenner, Zur Realisierung einer doppelten Dividende einer ökologischen Steuerreform
59-96 Andreas Wagener, Corporate Finance, Capital Market Equilibrium, and International Tax Competition with Capital Income Taxes
60-97 Daniel Weinbrenner, A Comment on the Impact of the Initial Tax Mix on the Dividends of an Environmental Tax Reform
61-97 Rüdiger Pethig, Emission Tax Revenues in a Growing Economy
62-97 Andreas Wagener, Pay-as-you-go Pension Systems as Incomplete Social Contracts
63-97 Andreas Wagener, Strategic Business Taxation when Finance and Portfolio Decisions are Endogenous
64-97 Thomas Steger, Productive Consumption and Growth in Developing Countries
65-98 Marco Runkel, Alternative Allokationsmechanismen für ein Rundfunkprogramm bei endogener Programmqualität
66-98 Jürgen Ehlig, A Comparison of Solution Methods for Real Business Cycle Models
67-98 Peter Seethaler, Zum Einfluß von Devisentermingeschäften auf das Marktgleichgewicht bei asymmetrischer Information
68-98 Thomas Christiaans, A Note on Public Goods: Non-Excludability Implies Joint Consumability
69-98 Michael Gail, Stylized Facts and International Business Cycles - The German Case
70-98 Thomas Eichner, The state as social insurer: labour supply and investments in human capital
71-98 Thomas Steger, Aggregate Economic Growth with Subsistence Consumption
72-98 Andreas Wagener, Implementing Equal Living Conditions in a Federation
73-99 Thomas Eichner and Rüdiger Pethig, Product Design and Markets for Recycling, Waste Treatment and Disposal
74-99 Peter Seethaler, Zum Einfluß des Hedging auf das Kreditvergabeverhalten der Banken
75-99 Thomas Christiaans, Regional Competition for the Location of New Facilities
76-99 Thomas Eichner and Rüdiger Pethig, Product Design and Efficient Management of Recycling and Waste Treatment
77-99 Rüdiger Pethig, On the Future of Environmental Economics
78-99 Marco Runkel, Product Durability, Solid Waste Management, and Market Structure
79-99 Hagen Bobzin, Dualities in the Functional Representations of a Production Technology
80-99 Hagen Bobzin, Behandlung von Totzeitsystemen in der Ökonomik
81-99 Marco Runkel, First-Best and Second-Best Regulation of Solid Waste under Imperfect Competition in a Durable Good Industry
82-99 Marco Runkel, A Note on 'Emissions Taxation in Durable Goods Oligopoly'
83-99 Thomas Eichner and Rüdiger Pethig, Recycling, Producer Responsibility and Centralized Waste Management
84-00 Thomas Eichner und Rüdiger Pethig, Das Gebührenkonzept der Duales System Deutschland AG (DSD) auf dem ökonomischen Prüfstand
85-00 Thomas Eichner und Rüdiger Pethig, Gebührenstrategien in einem disaggregierten Modell der Abfallwirtschaft
86-00 Rüdiger Pethig and Sao-Wen Cheng, Cultural Goods Consumption and Cultural Capital
87-00 Michael Gail, Optimal Monetary Policy in an Optimizing Stochastic Dynamic Model with Sticky Prices
88-00 Thomas Eichner and Marco Runkel, Efficient and Sustainable Management of Product Durability and Recyclability
89-00 Walter Buhr and Thomas Christiaans, Economic Decisions by Approved Principles: Rules of Thumb as Behavioral Guidelines
90-00 Walter Buhr, A Macroeconomic Growth Model of Competing Regions
91-00 Hagen Bobzin, Computer Simulation of Reallocating Resources among Growing Regions
92-00 Sao-Wen Cheng and Andreas Wagener, Altruism and Donations
93-01 Jürgen Ehlig, Geldpolitische Strategien. Die Deutsche Bundesbank und die Europäische Zentralbank im Vergleich
94-01 Thomas Christiaans, Economic Growth, the Mathematical Pendulum, and a Golden Rule of Thumb
95-01 Thomas Christiaans, Economic Growth, a Golden Rule of Thumb, and Learning by Doing
96-01 Michael Gail, Persistency and Money Demand Distortions in a Stochastic DGE Model with Sticky Prices
97-01 Rüdiger Pethig, Agriculture, pesticides and the ecosystem
98-01 Hagen Bobzin, Das duale Programm der Erlösmaximierung in der Außenhandelstheorie
99-01 Thomas Eichner and Andreas Wagener, More on Parametric Characterizations of Risk Aversion and Prudence
100-01 Rüdiger Pethig, Massenmedien, Werbung und Märkte. Eine wirtschaftstheoretische Analyse
101-02 Karl-Josef Koch, Beyond Balanced Growth: On the Analysis of Growth Trajectories
102-02 Rüdiger Pethig, How to Internalize Pollution Externalities Through 'Excess Burdening' Taxes
103-02 Michael Gail, Persistency and Money Demand Distortions in a Stochastic DGE Model with Sticky Prices and Capital
104-02 Hagen Bobzin, Fundamentals of Production Theory in International Trade A Modern Approach Based on Theory of Duality
105-03 Rüdiger Pethig, The ‘materials balance approach’ to pollution: its origin, implications and acceptance
106-03 Rüdiger Pethig and Andreas Wagener, Profit Tax Competition and Formula Apportionment
107-03 Walter Buhr, What is infrastructure?
108-03 Thomas Eichner, Imperfect Competition in the Recycling Industry
109-03 Thomas Eichner and Rüdiger Pethig, The impact of scarcity and abundance in food chains on species population dynamics
110-03 Thomas Eichner and Rüdiger Pethig, A Microfoundation of Predator-Prey Dynamics
111-03 Michael Gail, Habit Persistence in Consumption in a Sticky Price Model of the Business Cycle
112-03 Thomas Christiaans, Aging in a Neoclassical Theory of Labor Demand
113-03 Thomas Christiaans, Non-Scale Growth, Endogenous Comparative Advantages, and Industrialization
114-04 Michael Gail, Sticky Wages in a Stochastic DGE Model of the Business Cycle
115-04 Thomas Eichner and Rüdiger Pethig, Efficient nonanthropocentric nature protection
116-04 Thomas Eichner and Rüdiger Pethig, Economic land use, ecosystem services and microfounded species dynamics
117-04 Thomas Eichner and Rüdiger Pethig, An analytical foundation of the ratio-dependent predator-prey model
118-04 Thomas Christiaans, Population Dynamics in a Microfounded Predator-Prey Model
119-05 Sao-Wen Cheng, Cultural Goods Production, Cultural Capital Formation and the Provision of Cultural Services
120-05 Jens Siebel, Budget deficit, size of the public sector and majority voting