Federal Subsidization of State Expenditure to Reduce Political Budget Cycles[1]

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Abstract

In this note we analyze whether a federal transfer system can be designed to increase welfare when state governments create political budget cycles. The results show how the federal government can counteract the welfare costs of these cycles, without hindering politicians from signaling their type, by announcing a transfer scheme to subsidize expenditures that voters do not consider when voting.

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1. Introduction

Research indicates that politicians at all levels of government use election year budgets to increase the possibility of reelection.[2] Rogoff (1990) provides one possible explanation for this pattern: competent politicians lower taxes and increase visible public expenditures in election years to signal their competence. Rogoff also discusses different approaches to mitigate the budget cycles: restraining incumbents to take new fiscal incentives during election years; forcing incumbents who wants to run for reelection to pay a fee; and allowing incumbents to call for an early election. All these policies are associated with potentially large social costs.

No study that we are aware of has examined the policies that higher levels of government can use to reduce the costs of political budget cycles at the lower levels. The purpose of the present note is to fill this gap by analyzing how an intergovernmental transfer scheme can be designed to increase welfare in the presence of political budget cycles without hindering politicians to signal their competence or leading to undesired redistribution. The purpose is thus normative rather than positive, in the sense that we focus on how the higher level of government *should* behave if it aims at increasing the social welfare. Still, we would like to note that higher levels of government are likely interested in curbing lower level political budget cycles, since such budget cycles are associated with welfare costs without necessarily increasing the chances of reelection at the higher level. This would be the case if voters can evaluate the actions of the different levels of governments separately, so that political budget cycles at the lower level have no effect on the chances of reelection at the higher level. Another example is when the voters cannot perfectly judge which politicians that should be praised or blamed for certain outcomes, and elections take place at different times. In this case, political budget cycles at the lower level might mean that expenditures on, e.g., public schools are increased preceding the local election and then cut-back. If elections to the federal level are held when these cut-backs start to become visible, the local budget cycles might in fact reduce the reelection probabilities for incumbents at the federal level.

[2] For example, Gonzalez (2002) and Shi and Svensson (2006) have found that politicians at the highest level of government use the budget to increase reelection chances. Similar results have been found for state governments (Schneider, 2010; Mechtel and Potrafke, 2013), regional governments (Blais and Nadeau, 1992; Sjahrir, Kis-Katos and Schulze, 2013) and municipal governments (Veiga and Veiga, 2007; Sakurai and Menezes-Filho, 2011).

Our study is based on the model by Rogoff (1990). It also relates to a few other earlier studies, including Wrede (2002), Dalgic and Long (2006), Granlund (2011), and Esteller-Moré, Galmarini, and Rizzo (2012), dealing with governments motivated by selfish interests in economic federations. Dalgic and Long set up a model where a central government decides on the tax rate as well as its share of the total revenue, and examine how selfish local politicians respond to, e.g., the share of the revenue they receive. Wrede, Granlund, and Esteller-Moré, Galmarini, and Rizzo all analyze models where politicians at both levels are motivated by selfish interests. The latter study examines the consequence of lobbying and shows that tax-base sharing with two layers of government under some circumstances can be more efficient than taxation by a single layer. Wrede shows that voters' ability to discipline the incumbents is weakened when a second independent level of government is added, but that voters can partially reinforce their power by making politicians liable also for policies carried out at the other level of government. Finally, Granlund shows that the total tax rate is higher with two levels of government (compared to a single level), and that it is more beneficial to hold politicians liable also for policies carried out at the other level if one level of government is strategic leader vis-à-vis the other. However, none of these studies considers signaling, adverse selection, or political budget cycles, and only Wrede and Granlund model elections.

In section 2 we first briefly describe the key characteristics of the model by Rogoff (1990), though we refer to Rogoff's paper for proofs and details. Then, we analyze how three related intergovernmental transfer policies affect the political budget cycles and social welfare. Section 3 concludes the paper.

2. Model

The representative voter in each state maximizes the expected utility, $E_t^P(W_t)$, where E^P denotes the expectations operator given the general public's information set p, and where

$$W_t = \sum_{s=t}^{T} [U(c_s, g_s) + V(k_s)]\beta^{s-t} \tag{1}$$

is the present value of future utility. In equation (1), c denotes private consumption, g a public consumption good, k a public "investment" good, and β the discount factor. Both g and k are

expressed per capita. The functions *U* and *V* are increasing in their respective arguments and strictly concave, and all goods are normal.

Each voter has an exogenous income *y* and pays a head tax τ_t in period *t*, resulting in the budget constraint:

$$c_t = y - \tau_t. \tag{2}$$

The state government is led by a single agent whose competence is indexed by ε, which evolves according to $\varepsilon_t = \alpha_t + \alpha_{t-1}$, where each α is an independent drawing from a Bernoulli distribution with $\rho \equiv prob(\alpha = \alpha^H)$ and $1 - \rho \equiv prob(\alpha = \alpha^L)$, $\alpha^H > \alpha^L > 0$. Elections are held every second period, and the competence process therefore implies that the incumbent leader's competence in the period preceding the election is positively correlated with his/her competence the first period after the election.

The more competent the incumbent, the more public goods he/she can produce for a given tax, which is seen from the state government's budget constraint

$$g_t + \kappa_t = \tau_t + \varepsilon_t. \tag{3}$$

The variable κ_t represents the investment in *k* such that $\kappa_t = k_{t+1}$. Voters can calculate α_t after observing k_{t+1}. The variable *k* should not necessarily be interpreted as a good that takes a period to produce. It might more broadly represent goods whose effects are only observed by the representative voter with a lag; for example, depositions to public pension funds.

The incumbent's objective function is

$$E_t^I(W_t) + \sum_{s=t}^{T} \beta^{s-t} X \pi_{s,t}, \tag{4}$$

where *I* denotes the incumbent, *X* is ego rents per period in office, and $\pi_{s,t}$ is the incumbent's estimate in period *t* of his/her probability of being in office in period *s*. In period *t*, the incumbent (who knows α_t) chooses the levels of τ_t, g_t, and κ_t. The opposition candidate is a random draw from the constituency and voters have no information about his/her competence. Voters observe

τ_t, g_t, k_t, and α_{t-1}^I, but not κ_t, and form expectations about α_t^I before voting. The probability weight voters attach to the possibility that $\alpha_t^I = \alpha^H$ is written $\hat{\rho}(\alpha_{t-1}^I, g_t - \tau_t)$. The delayed visibility of the investment good gives politicians an incentive to reduce investments in election years in order to appear more competent and thus increase their reelection probabilities.

Below, we focus on the final election period, $t = T - 2$. The incumbent knows that voters' beliefs are Bayes-consistent and can calculate $\pi_{t+1,t}$ as a function of $\hat{\rho}(\alpha_{t-1}^I, g_t - \tau_t)$.[3] Given this information, the incumbent sets τ_t, g_t, and κ_t to maximize equation (4), subject to equations (2) and (3). For a given α_{t-1}^I, incumbents with $\alpha_t^I = \alpha^H$ (hereafter called *H*) are prepared to choose a higher value of $g_t - \tau_t$ than incumbents with $\alpha_t^I = \alpha^L$ (hereafter called *L*) to increase their reelection chances. The first reason is that for any value of $g_t - \tau_t$, *H* can spend $\alpha_t^H - \alpha_t^L$ more on κ_t than *L*. Secondly, *H* has more to gain from being reelected, since the outcome of the representative voter, which the incumbent also cares about, will be higher the more skilled the elected leader is. Therefore, we get a separating equilibrium with $\hat{\rho}(\alpha_{t-1}^I, g_t - \tau_t) = 1$ when $\alpha_t^I = \alpha^H$ and $\hat{\rho}(\alpha_{t-1}^I, g_t - \tau_t) = 0$ otherwise.

Now, *L* has nothing to gain by deviating from the first best policy if such deviations do not prevent voters from deducing his/her type. This means that *L* implements a first best policy, i.e., behaves <u>as if</u> his/her objective at any time *t* is given by W_t. For *H*, on the other hand, there are two possible outcomes: either that *H* is competent enough to separate himself/herself from *L* through a first best policy (in which case *H* also behaves as if the objective is given by W_t), or that *H* must increase $g_t - \tau_t$ relative to the first best policy to signal his/her competence. We consider the latter case below.

[3] There is also a source of external uncertainty in the election outcome, which both politicians and voters observe just before the election. This can, for example, capture uncertainty in the candidates' performance during the end of the election campaign. The external uncertainty means that the probability to become reelected will be in the interval (0,1) for all incumbents, which allows the pooling equilibrium to be ruled out using the intuitive criterion by Cho and Kreps (1987). The equilibrium described below remains an equilibrium also with multiple elections, with the difference that the expected future benefits from being reelected become larger, since reelection opens the possibility of being reelected once more, etc. This tends to aggravate the political budget cycle. With repeated elections, there could also be a reputational equilibrium with little or no political budget cycle if β is close to one, the external uncertainty is sufficiently small, and the time between elections are short. We share Rogoff's judgment that such an equilibrium is unlikely in reality.

Let us now examine whether or not a federal government can increase the social welfare, defined as the sum of voters' utilities, by announcing in advance that it will pay a proportion *r* of κ_t in the post-election year when k_{t+1} is observed.[4] The transfer is funded through taxation of the voters in each state.[5]

In Proposition 1, we consider a benchmark case where the refund is financed by four separate head taxes in period *t*+1, Γ_{t+1}^{ij}, which are conditioned on the competence history of the politicians. Here, we assume that $\Gamma_{t+1}^{ij} = r\kappa_t^{ij}$ in equilibrium where *i*=*L*, *H* and *j*=*L*, *H* indicate that κ_t is chosen by an incumbent with $\alpha_t^I = \alpha^i$ and $\alpha_{t-1}^I = \alpha^j$. The tax payment from each state in period *t+1* thus depends on the competence of the incumbent in periods *t* and *t-1*, and the transfer scheme does not lead to any redistribution between the states in equilibrium. We also assume that the number of states is large enough to imply that the incumbent treats Γ_{t+1}^{ij} (as well as *r*) as exogenous.

Proposition 1. *An infinitesimal refund, which is proportional to κ_t and financed through four separate head taxes, weakly increases welfare in all states.*

Note first that irrespective of α_{t-1}^I, the refund will increase the level of investment, κ_t, chosen by both *L* and *H*. For type *L*, who absent the refund chooses the first-best policy satisfying

$$\frac{\partial U_t}{\partial g_t} = \beta \frac{\partial V_{t+1}}{\partial k_{t+1}},$$

the first order welfare effect of an infinitesimal increase in r will be zero (since the welfare change is evaluated in the pre-transfer equilibrium where $r = 0$). Notice also that this reform makes it even less attractive for type *L* to mimic type *H*: if an incumbent of type *L* were to deviate from the pre-transfer equilibrium by mimicking *H*'s choice of τ_t and g_t, the reform would make his/her state a net payer to the federal government. Such a mimicker would invest less than the true type *L* to mimic *H*'s choice of τ_t and g_t. Therefore, although paying the same lump-sum tax, the states with a mimicker receive a smaller subsidy from the federal government

[4] In models with vertical fiscal externalities and benevolent policy makers, Aronsson and Wikström (2001, 2003) show that intergovernmental transfer schemes can, in certain situations, be designed to induce correct incentives for the lower level governments.

[5] In the present model, the federal government only decides on this transfer policy and associated revenue collection, i.e., we abstract from public consumption and investment directly decided on at the federal level. This simplification is not important for the social welfare consequences of curbing the political budget cycles at the lower level.

than states with a type *L* incumbent. This makes the representative voter in a state with a mimicker worse off since the voters bear the cost of the transfer. In turn, *L*'s gain from being reelected would be reduced by mimicking *H*, since the incumbents' objective function includes the representative voter's utility. The transfer thus makes mimicking less attractive and increases the value of the lowest κ_t that *L* would be prepared to choose, hereafter denoted $min\_\kappa_t^{Lj}$. *H* sets $\kappa_t^{Hj} = \min\_\kappa_t^{Lj} + \alpha_t^H - \alpha_t^L$, which is the minimum distortion that allows *H* to separate himself/herself from *L* in terms of τ_t and g_t. Since κ_t^{Hj} satisfies

$$\frac{\partial U_t}{\partial g_t} < \beta \frac{\partial V_{t+1}}{\partial k_{t+1}},$$

and the intergovernmental grant increases the investment made by type *H*, this constitutes a welfare improvement of the first-order.

Let us next consider the case where the refund is financed by two separate head taxes in period t+1, $\Gamma_{t+1}^j = r\left[\rho\kappa_t^{Hj} + (1-p)\kappa_t^{Lj}\right]$, *j*=*L*, *H*, based on the information the federal government has when announcing the policy in period *t*.[6]

Proposition 2. *An infinitesimal refund, which is proportional to κ_t and financed through two separate head taxes, weakly reduces the existing political budget cycles in the sense of reducing the deviation between the local policy outcome and the corresponding first best allocation.*

In order to show that $min\_\kappa_t^{Lj}$ and hence κ_t^{Hj} are increased also in this case, we show that if *L* were to mimic *H*, such states would not become net recipients in the transfer system. Using the following inequalities:

$$min\_\kappa_t^{Lj} \leq \kappa_t^{Lj}; \qquad j = L, H, \tag{5}$$

$$min\_\kappa_t^{Lj} < min\_\kappa_t^{Lj} + \alpha^H - \alpha^L = \kappa_t^{Hj}; \qquad j = L, H, \tag{6}$$

we see that

$$r\, min\_\kappa_t^{Lj} < r\left(p\kappa_t^{Hj} + (1-\rho)\kappa_t^{Lj}\right) = \Gamma_{t+1}^j \qquad j = L, H. \tag{7}$$

[6] We thank an anonymous reviewer for suggesting us to consider this case.

Equation (7) shows that a state with a mimicker would be a net contributor to the transfer system. This reduces *L*'s gain from being reelected after mimicking *H*, which increases *min_*κ_t^{Lj} and hence κ_t^{Hj}. The increase in κ_t^{Hj} constitutes a welfare improvement.

As noted above, *r* will also create a deviation between the local policy outcome and the corresponding first best allocation in states where the incumbent is of type *L*, but the first order welfare effect of this will be zero. Still, without imposing further assumptions, we cannot be certain that the policy described in Proposition 2 also increases welfare in the federation as a whole. The reason is that with two head taxes, the transfer scheme will lead to redistribution between states in equilibrium. If $\kappa_t^{Lj}<\kappa_t^{Hj}$ – which is the case when the effect of *H*'s incentive to reduce κ_t to signal his/her type is dominated by the effect of additional resources ($\alpha_t^H - \alpha_t^L$) on κ_t – states where incumbents is of type *L* will be net contributors to the transfer system. This would increase the inequality across states and reduce welfare due to the concavity of the utility function. Hence, if $\kappa_t^{Lj}<\kappa_t^{Hj}$ financing an infinitesimal *r* with two separate head taxes will lead to both a positive and a negative welfare effect with an inconclusive outcome for the federation, but if $\kappa_t^{Lj}>\kappa_t^{Hj}$ the policy described in Proposition 2 will be welfare improving in the federation as a whole.

We finally turn to the case where the refund is financed by a uniform head tax

$$\Gamma_{t+1} = r[\rho^2\kappa_t^{HH} + \rho(1-p)[\kappa_t^{HL} + \kappa_t^{LH}] + (1-\rho)^2\kappa_t^{LL}]. \quad (8)$$

Proposition 3. *An infinitesimal refund, which is proportional to* κ_t *and financed through a uniform head tax throughout the federation, will reduce the mean and median political budget cycle, in the sense of reducing the mean and median deviation between the local policy outcome and the corresponding first best allocation.*

The uniform head tax affects the equilibrium income distribution between the states. In the appendix, we show that if *L* were to mimic *H*, such states would become net payers in the transfer system on average, which increases the mean value of *min_*κ_t^L. Since $\kappa_t^{Hj} = \text{min\_}\kappa_t^{Lj} + \alpha_t^H - \alpha_t^L$, this shows that the mean political budget cycle is reduced. We also show that a sufficient

condition for the political budget cycle to be reduced in all states is that $\rho \geq 1/2$ and that the political budget cycle is reduced in, at least, the proportion $(1-\rho)$ of the states where $\alpha_{t-1}^{I} = \alpha^{L}$ if $\rho < 1/2$. This shows that the median political budget cycle is reduced by the intergovernmental transfer. The reason why the cycles not necessarily are reduced in states with $\alpha_{t-1}^{I} = \alpha^{H}$ is that, if *L* were to mimic *H*, these states might get positive net transfers.

Corollary 1. *A sufficient conditions for the policies described in Propositions 2 and 3 to be welfare improving in the federation as a whole is that the utility function is quasi-linear, i.e.,* $U(c_s, g_s) = u(g_s) + c_s$.

Corollary 1 follows directly from Propositions 2 and 3, since a quasi-linear utility function implies that the net transfer between states does not affect the sum of utilities. In case of a uniform head tax, it also rules out the possibility that the transfer, by affecting *L*'s gain from being reelected, increases the budget cycle in a minority of states.

Taken together, Propositions 1, 2, and 3 can be interpreted as follows: Proposition 1 shows that a subsidy financed through a head tax conditioned on the incumbents' types, or equivalent on their tax and expenditure decisions, will reduce the political budget cycle and increase welfare. Proposition 2 shows that the political budget cycle can also be reduced if the subsidy is financed through two head taxes, the levels of which can be decided already in the pre-election year when the transfer scheme is announced. Finally, the political budget cycle can be reduced, at least for the majority of states, by using a uniform head tax, which requires no knowledge of state politicians' types and policies.

3. Conclusion

This is the first paper examining how a federal government can use an intergovernmental transfer scheme to counteract the welfare costs of political budget cycles caused by the incentives facing politicians at the state level (the lower level of government). Our study is based on a model developed by Rogoff (1990) where politicians may lower taxes and increase visible public consumption expenditure in election years to signal their competence. In turn, this comes at the expense of public investment, which is observable with a one-year time-lag and thus not observed at the time of the election. The transfer policy means that the federal government pays a small

proportion of this investment through an ad-valorem subsidy in the post-election year, and announces this policy in advance (meaning that it is known to the local politicians during the election year). It is funded through a head tax paid by the voters in each state.

Our study is normative in the sense of addressing how the federal government should behave if it aims at increasing the social welfare as represented by a utilitarian social welfare function. We first examined a convenient reference case, where the transfer is financed through a head tax conditioned on the competence history of the incumbents, i.e., a measure of their accumulated ability to produce public goods for a given tax revenue. This transfer scheme leads to (weakly) higher welfare in all states. Yet, it also requires the head tax to be based on information not revealed when the transfer is announced. Therefore, we also examined scenarios where the head tax is based on more limited information on the competence history of state incumbents or no information at all (in which the head tax will be uniform across states). Such schemes still allow the federal government to counteract the political budget cycles, although without necessarily increasing the social welfare since these policies also imply redistribution of resources across states. However, if the voters' utility functions are quasi-linear in private consumption - in which case redistribution does not affect the utility sum in the economy as a whole - the latter tax-transfer systems are also welfare improving.

One possible extension of our paper would be to analyze an optimal tax-transfer system from the perspective of the federal government. Another would be to study allocation problems where the federal revenue to fund the transfer payment, as well as the revenue raised by the state governments, are based on instruments other than lump-sum taxes. We hope to address these issues in future research.

Appendix

Proof of Proposition 3

Using equations (5) and (6) we see that

$$\rho min\_\kappa_t^{LH} < \rho(p\kappa_t^{HH} + (1-\rho)\kappa_t^{LH}), \tag{A1}$$

$$(1-\rho) min\_\kappa_t^{LL} < (1-\rho)(p\kappa_t^{HL} + (1-\rho)\kappa_t^{LL}). \tag{A2}$$

Adding (A1) and (A2) gives

$$\rho min\_\kappa_t^{LH} + (1-\rho) min\_\kappa_t^{LL} < \rho^2\kappa_t^{HH} + \rho(1-\rho)[\kappa_t^{HL} + \kappa_t^{LH}] + (1-\rho)^2\kappa_t^{LL} = \Gamma_{t+1}/r, \tag{A3}$$

which is the condition for that states where *L* mimics *H* would be net payer in the transfer system on average.

Since the utility function in equation (1) is concave, and *L* needs $\alpha^H - \alpha^L$ more in net transfers to obtain the same utility as *H*, the expected utility difference of electing the opposition candidate, for whom $\alpha_t^I = \alpha^H$ with probability ρ, instead or reelecting *L* is a convex function of the net transfer.[7] This, and that states where *L* mimics *H* would be net payer in the transfer system on average, imply that the transfer system will increase the average loss in expected utility for voters of reelecting *L*. Therefore, the transfer increases the average value of $min\_\kappa_t^L$.

To show that the median political budget cycle is reduced, we show that among states with $\alpha_t^I = \alpha^L$, the majority will get negative net transfers if the incumbent mimics *H*. Note that $r\, min\_\kappa_t^{LL} - \Gamma_{t+1} < 0$ if $min\_\kappa_t^{LL} < \rho^2\kappa_t^{HH} + \rho(1-\rho)[\kappa_t^{HL} + \kappa_t^{LH}] + (1-\rho)^2\kappa_t^{LL}$. The following inequality

$$min\_\kappa_t^{LL} < min\_\kappa_t^{LH}, \tag{A4}$$

which is due to the assumption that *k* is a normal good, together with equations (5) and (6), show that this is the case.

[7] That is, since W is concave and $E_t W_t^O(N) = E_t W_t^L\big(N + \rho(\alpha^H - \alpha^L)\big)$, where *O* denotes the opposition candidate and *N* denotes net transfers, $D(N) \equiv E_t W_t^O(N) - E_t W_t^L(N)$ is convex.

Note that $r\ min\_\kappa_t^{LH} - \Gamma_{t+1} < 0$ if

$$min\_\kappa_t^{LH} < \rho^2\kappa_t^{HH} + \rho(1-\rho)[\kappa_t^{HL} + \kappa_t^{LH}] + (1-\rho)^2\kappa_t^{LL}. \tag{A5}$$

Since all goods are normal,

$$min\_\kappa_t^{LH} - min\_\kappa_t^{LL} < \alpha^H - \alpha^L. \tag{A6}$$

Inequalities (6) and (A6) together imply $min\_\kappa_t^{LH} < \kappa_t^{HL}$. Therefore, a sufficient condition for inequality (A5) to hold is that $min\_\kappa_t^{LH} < \kappa_t^{LL}$. Note that – since $\kappa_t^{LH} - \kappa_t^{LL} < \alpha^H - \alpha^L$ – this condition holds if

$$min\_\kappa_t^{Lj} + \alpha^H - \alpha^L = \kappa_t^{Hj} < \kappa_t^{Lj}; \qquad \text{j} = \text{L, H.} \tag{A7}$$

Another sufficient condition for inequality (A5) to hold is that

$$\big(1 - 2\rho(1-\rho)\big)min\_\kappa_t^{LH} \leq \rho^2\kappa_t^{HH} + (1-\rho)^2\kappa_t^{LL}. \tag{A8}$$

This can be written as

$$(1-\rho)^2(min\_\kappa_t^{LH} - \kappa_t^{LL}) \leq \rho^2(\kappa_t^{HH} - min\_\kappa_t^{LH}). \tag{A9}$$

Since $min\_\kappa_t^{LH} - \kappa_t^{LL} < \kappa_t^{LH} - \kappa_t^{LL} < \alpha^H - \alpha^L$ and $\kappa_t^{HH} - min\_\kappa_t^{LH} = \alpha^H - \alpha^L$, a sufficient condition for this sufficient condition to hold is that $(1-\rho)^2 \leq \rho^2$, i.e. that $\rho \geq 1/2$. This means that $r\ min\_\kappa_t^{LH} - \Gamma_{t+1}$, which is relevant for the fraction ρ of the states, only can be positive if $\rho < 1/2$.

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