Policy Myopia

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Abstract

This paper develops a theory of policy myopia. Policy myopia arises when rational voters set performance standards that allow elected politicians to distort the portfolio of public investments towards short-term investments. We show that the fact that voters cannot observe immediately how much politicians invested in certain types of public goods is not in itself sufficient to generate policy myopia. Policy myopia, then, arises in societies where electoral control is imperfect or in society where tax revenues cannot be committed in advance. The analysis is motivated by a number of stylized facts about public spending patterns across time and space.

Keywords: Myopia; public goods; electoral accountability.
JEL Classification: D72; D82.

I. Introduction

Are democratic governments likely to be short-termist in their policies? Should rational voters tolerate, or even expect their elected representatives to behave myopically? In this paper, we evaluate these questions, taking on board some stylized facts of patterns of public expenditure over time and across countries that differ in the degree of democratic voice.

Myopic policies can take many forms. Some induce "short horizons" for the private sector, because of profits taxation, or industrial regulation that increases the cost of entry for new firms (Parente and Prescott, 2000). Governments may borrow "too much", especially when they are likely to lose elections for other reasons and want to change the constraint set of future politicians (Persson and Svensson, 1989, Alesina and Tabellini, 1990). Policies may "overreact" to current events, and become costly to reverse when the environment changes, as in reforming funding patterns of social security during a stock-market boom, or introducing capital controls in the wake of currency crises, and inefficient policies may be allowed to persist (Coate and Morris, 1999). A short-term bias can also arise when governments try to please voters before elections (Nordhaus, 1975). Although rational voters should be able to see through such strategies, imperfect information about the policy environment or the intentions of politicians can lead to similar inefficiencies (Rogoff, 1990; Coate and Morris, 1995). Finally, rational voters may find it difficult to motivate their politicians to implement policies that entail short-term costs but generate long-term benefits simply because the politician that bears the costs may not be in office when the benefits are enjoyed (Gersback, 1998).

In this paper, we evaluate a direct consequence of myopia: governments under-invest in long-term public goods. This is, of course, under-investment relative to some

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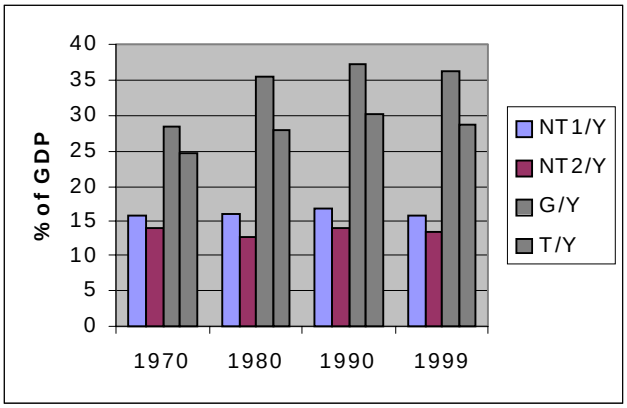
norm. In the analysis, we compare investment patterns of democratic governments to dynamically efficient paths chosen by a benevolent planner. For a positive theory of public expenditures, the benevolent planner is a myth. Nevertheless, any such positive theory should explain systematic departures from efficiency. In democratic societies, one might ask why would the electorate elect, and re-elect governments pursuing myopic policies? To rephrase the question, are there circumstances where voters cannot do better than to accept some amount of short-termism, that is, can political myopia be constrained efficient? Do we expect to observe changes in second-best myopia across countries or over time?

It is useful to look at some facts first. An early, and eloquent argument that systematic under-investment led to "public squalor" in the midst of private prosperity was made by Galbraith (1969). Since then, the growth of government expenditures has been a striking feature of most industrial democracies. As Tanzi and Schuknecht (2000: Table I.1) document, general government expenditure as a percentage of GDP grew from 28% in 1960, to over 45% in 1996, in 17 industrial countries with comparable expenditure data. It would seem, at first pass, that the rumors of public squalor were grossly exaggerated. The fact that governments grew rapidly does not say very much about whether they are too large or too small, however. One might nevertheless be tempted to deduce that the extent of under-investment has fallen in the four decades following 1960. That deduction would be false; the rapid growth of government since 1960 is due almost entirely to increases in transfer payments, including unemployment benefits, pensions, and producers' subsidies. These transfers can be thought of as taxes paid back to the private sector; the remaining tax revenue is available for the production of public goods, possibly spread over time by borrowing. The implication is that the *net* size of government, measured as tax revenues minus transfers and subsidies to the private sector, has been virtually constant during the past 30 years. To illustrate, Figure 1 shows two measures of the net size of (central) government in a group of 23 OECD countries from 1970-99 along with the two standard measures of the *gross* size of government (total tax revenues (T/Y) and total expenditure (G/T), both out of GDP). The first net size measure ($NT1/Y$) is the difference between tax revenues and central government spending on social security and welfare, while the second ($NT2/Y$) is the difference between tax revenues and central government spending on subsidies and transfers to the private sector.[2] The picture is fairly clear: while the gross size of government, on average, increased substantially between 1970 and 1999, its net size was virtually constant, around 15% of GDP. Of course, there is variations across countries, with some experiencing a falling and some experiencing an increasing net size (see Table 1), but the fact remains that the lion's share of the expansion of government in the industrial world over the last 30 years is accounted for by growth in transfer and welfare programs.

The fact that transfers increased rapidly even as spending on public goods remained stagnant is important for two reasons. First, cuts in public expenditure cannot be attributed to revenue constraints. Second, transfers are one of several methods of redistribution; earlier in the century, governments of these countries typically invested in health, education, and housing for redistribution purposes (Lindert,

[2] That is, we adjust for transfers that go to local (or state) government and abroad.



Source: IMF (2001a)

Figure 1: The Size of Net and Gross (central) Government in 23 OECD countries, 1970-1999.

country	$\frac{T}{Y}$	$\frac{NT1}{Y}$	$\frac{NT2}{Y}$	$\frac{T}{Y}$	$\frac{NT1}{Y}$	$\frac{NT2}{Y}$
		1970			1999	
Australia	19.2	15.3	13.5	21.4	13.6	12.5
Austria	27.1	12.8	12.4	32.5	14.3	12.6
Belgium	33.5	18.9	16.1	42.1	..	..
Canada	14.7	10.7	9.6	18.0	10.1	9.3
Denmark	32.7	20.3	28.7	33.8	18.0	23.9
Finland	24.3	18.3	14.2	26.9	14.1	9.4
France	31.8	18.7	12.8	37.6	18.1	12.8
Gernamy	23.6	12.8	12.9	29.5	12.6	12.7
Grece	23.6	15.7	20.7	19.2	14.8	15.7
Ireland, the Rep. of	27.7	..	..	30.7	21.9	11.2
Iceland	25.5	20.9	13.8	25.4	19.1	17.8
Italy	23.1	11.8	5.7	37.9	..	..
Korea, the Rep. of	13.5	12.0	11.4	16.5	15.4	13.9
Luxembourg	29.1	16.2	14.5	39.5	19.1	17.3
Mexico	9.6	..	..	12.8	9.21	4.6
Netherlands	41.6	25.6	22.5	41.0	23.4	18.6
Norway	34.2	22.9	13.8	32.5	19.7	15.8
Portugal	23.3	14.5	9.4	30.6	..	..
Spain	16.0	7.9	10.5	28.3	14.3	12.5
Sweden	26.6	16.9	16.4	32.3	15.8	12.2
Switzerland	13.8	8.0	7.7	21.6	8.8	10.7
United Kingdom	33.3	21.4	17.9	32.3	20.7	20.3
Unitied States	16.7	10.7	9.9	17.8	13.9	10.3
Average	24.6	15.8	14.0	28.7	15.8	13.7

Source: IMF, Governmant Finance Statistics Yearbook, various years.
Note: T = tax revenues; NT1 = T - spending on social security and welfare; NT2 = T - subsidies and transfers to the private sector; Y = GDP.

Table 1: The Net and Gross Size of Government in 23 OECD Countries, 1970 and 1999.

Dep. variable	$\log(\frac{TR}{Y})$	$\log(\frac{PG}{Y})$	$\log(\frac{LPG}{Y})$
voice	1.40$^{\#}$ (.81)	-1.00** (.37)	-1.70** (.55)
$\log(\frac{GDP}{CAP})$	.17 (.16)	-.04 (.06)	-.19* (0.08)
old	4.80** (1.54)	-1.33 (.85)	-.54 (1.43)
$\log(pop)$	-0.06 (0.06)	-.14** (.03)	-.09$^{\#}$ (.05)
$\log(\frac{T}{Y})$	1.65** (.28)	.99** (.17)	.28 (.23)
$\log(open)$	-.34* (.16)	-.10 (.11)	.18 (.14)
R^2	.75	.59	.42
N	68	81	80
Note: ** = significant at the 1% level; * = significant at the 5% level; # = significant at the 10% level. Robust standard erros in parenthesis. All regressions estimated with OLS and constant term. See Appendix for data sources.			

Table 2: Regression Results

1994; Aidt et al., 2002). These require long-term investment, so that the move to transfers starting in the 1930s and accelerating in 1960s can itself be a sign of myopia. The absence of direct transfers from the government to the private sector before World War I also suggests that there has been some growth in the net size (as well as in the gross size) of government in industrial societies over the longer term, from below 8% of GDP at the turn of the 19th century to the current 15% (Aidt et al., 2002: Table 6).

A second piece of evidence comes from comparing patterns of public expenditure across the world today. In a recent study, Lassen (2000) reports that the size of government can be explained well by an indicator of democratic accountability that we shall call *voice*. The indicator is constructed by a research team at the World Bank and documented in Kaufman et al. (1999a, 1999b). More specifically, Lassen (2000) finds that societies with more (or better) democratic voice tend to have larger governments as measured by total tax revenues raised by general government (as a proportion of GDP). He argues that this may be so because rational voters are willing to trust their politicians with more funds in societies where elections provide a more effective accountable mechanism.

In Table 2, we report the results of cross-country regressions for a sample of about 80 countries in 1996, looking for the impact of *voice* on different types of central government expenditures.[3] We distinguish between transfer payments ($\frac{TR}{Y}$) measured as spending on social security and welfare; expenditures on public goods ($\frac{PG}{Y}$) measured as spending on goods and services; and spending on long-term public goods ($\frac{LPG}{Y}$) measured as capital expenditures, all relative to GDP (Y). We control for the fact that countries that run a large government overall are likely to spend

[3] The Data Appendix contains detailed information on i) the measure of democratic control (voice); ii) the other variables used in the regression analysis; and iii) the robustness of the regression results to changes in specification and to the choice of sample size.

more on all categories by including a "size of government variable" (tax revenues out of GDP, $\frac{T}{Y}$). We also include a number of other likely determinants of government expenditure: real GDP per capita at international prices ($\frac{GDP}{CAP}$); the proportion of the population aged above 65 (*old*); the size of the total population (*pop*); and a measure of openness to trade (*open*), suggested by Rodrik (1998). We find that *voice* increases spending on transfers, but more surprisingly that it reduces expenditures on public goods, both short-term and long-term public goods. The first result is to be expected, as pressures to redistribute are more likely to be effective if governments are more responsive to their constituents (Meltzer and Richard, 1981). The second – that more democratic societies spend *less* on public goods – is more of a puzzle, and is one of the facts we seek to explain.[4] This is surely a pointer to policy myopia.

In our theory, politicians in power can divert tax revenues towards spending that is only or mostly of value to themselves. The fact that funds can be diverted generates "rents" from holding public office and creates a conflict of interest between the electorate at large and their elected politicians (Persson et. al., 1997). This alone does not induce myopic behavior because politicians can divert funds from all forms of public spending. In a democracy, the electorate can limit wasteful public spending by setting performance standards for what is required to gain reelection (Ferejohn, 1986). The problem, however, is that the electorate can only observe the level of actual output. By comparing this with reported inputs, they can deduce the extent of waste, and dismiss politicians who have diverted too many funds. For this reason, politicians are careful where they "steal" from; they are more likely to be caught diverting funds from short-term projects, as outcomes are observed more or less at the same time as expenditures. Longer term projects – that take 5 or 10 years to mature – are safer to "steal" from, as the politician may be able to convince voters to reelect him in intermediate elections. Voters, of course, realize this, and we might expect them *deliberately* to ask politicians to be myopic in the sense of providing a portfolio of public goods with an over-emphasis on short-term public project. We use the term *policy myopia* to refer to situations in which this happen.

We make two fundamental assumptions regarding the provision of public goods. First, voters cannot observe the investments in public goods made by politicians directly, but have to infer how much was invested by observing actual provision levels. Second, as alluded to above, we make a distinction between two types of public goods. Investments in *short-term* public goods lead to immediate provision of services, while investments in *long-term* public goods lead to provision only with a time lag. This implies that voters cannot observe immediately how much is invested in the long-term good. In reality, not all public services fall neatly into these two categories and in many cases, classification is a matter of degree. Nevertheless, public spending on transfers and social security mostly falls into the category "short-term public goods", while spending on education, health, and public capital would mostly be spending on long-term public goods.

We show in Proposition 1 that the distinction between short-term and long-term public goods is not in itself sufficient to generate policy myopia. Despite the fact that voters cannot observe immediately how much the politician "steals" from

[4] The data on spending on public services and on capital investments includes military spending. The negative correlation is, however, not driven by differences in spending on this category. Using spending on education, health, housing, and general public services, but excluding spending on public order, as the measure of investments in public services gives rise to similar results. It is, however, true that societies with low democratic voice tend to spend relatively large amounts on public order, including the military.

investments in long-term public goods, they are still able to get the efficient portfolio of public goods. This is a surprising result and shows that policy myopia requires more than just the presence of long-term public goods. The empirical evidence discussed above suggests that the effectiveness by which the electorate in different societies can motivate and control their politicians plays a role in generating policy myopia. Formally, we introduce the probability p to capture this. This probability, assumed constant over time, represents democratic "voice" and can be interpreted as an index of the quality of democracy, with $p = 1$ representing "perfect" democracy and $p = 0$ representing situations in which citizens cannot use elections to replace their leaders. In Proposition 2, we show that imperfect voice generates policy myopia in economies with long-term public goods.

All these results are based on the assumption that voters can commit tax revenues one period ahead and, in effect, reward the politician retrospectively for his investments in long-term public goods. Without the capacity to do so, voters cannot ever get politicians to provide any long-term public goods (Proposition 3). This demonstrates that the power to commit tax revenues is necessary, but not sufficient to get the efficient portfolio of public goods supplied.

The rest of the paper is organized as follows. In section II, we present the theoretical model. In section 3, we derive the main results and discuss the sources of policy myopia operating in our theory. In section 4, we discuss how our theory might be able to reconcile the facts discussed above. In particular, we show that the theory can explain why voice is negatively correlated with spending on public goods in cross-country data and, by appealing to the effects of productivity growth, in addition explain the evolution of (net) government spending as observed in the time series evidence. In section 5, we provide some concluding remarks. All proofs and derivations are contained in the Appendix.

II. The Model

The model has a continuum of infinitely lived and identical individuals with measure 1. Individuals work, pay taxes, consume private and public goods, and vote in elections. Their preferences are

$$\sum_{t=0}^{\infty} \beta^t (c_t + y_{1,t} + y_{2,t}) \tag{1}$$

where c_t is consumption of private goods, $y_{1,t}$ and $y_{2,t}$ are provision levels of two public goods, and $\beta \in (0, 1]$ is the discount rate. Every period individuals can decide to work either in the market or in the home production sector. In the market sector, individuals earn the wage rate $w_t = a_t$, where a_t is productivity. The wage income is taxed at the rate τ_t, so net income is $a_t - \tau_t$. In the home production sector, productivity is lower than in the market sector, but earnings can be hidden from tax collectors. The gross (and net) earnings are θa_t with $\theta < 1$. All income, net of taxes, is spent on private consumption:

$$c_t = \max[a_t - \tau_t, \theta a_t]. \tag{2}$$

Individuals decide to work in the market sector if, and only if $a_t - \tau_t \geq \theta a_t$. An implication then is that taxes are paid only if $\tau_t \leq a_t(1 - \theta) \equiv \mathcal{T}_t$. Productivity

grows over time, due to technological progress:

$$a_t = a_0(1+g)^t \tag{3}$$

with $g \geq 0$ and $a_0 > 0$.[5] We notice that $\mathcal{T}_t$ increases over time, in line with productivity, as does national income, $Y_t = w_t$.

Individuals elect a politician each period to run the government. The official task of the elected politician is to collect taxes, $\tau_t \leq \mathcal{T}_t$, and to produce public goods, $y_{1,t}$ and $y_{2,t}$. These goods are non-rival, and the entire population consumes $y_{1,t}$ and $y_{2,t}$ as available. The expenditures on public goods are financed out of current tax revenue.[6] The two public goods are produced by the following production technologies

$$y_{1,t} = b_t x_{1,t}^{\alpha}, \tag{4}$$

and

$$y_{2,t} = b_t x_{2,t-1}^{\alpha}, \tag{5}$$

where $x_{1,t}$ and $x_{2,t-1}$ are public investments and $\alpha \in (0,1)$.[7] Productivity growth in the public sector evolves according to

$$b_t = a_t^{\pi} \tag{6}$$

where $\pi \geq 0$ determines the relative speed by which improvements take place in the public relative to the private sector. If π is less than one, productivity growth in the public sector lags behind that of the private sector and vice versa.

We make two fundamental assumptions about the production of public goods. First, individuals cannot observe the investments made by the politician directly, but they will eventually be able to infer how much was invested in each good from observed provision levels. Second, it takes time for investments to mature and turn into actual provision, but the lag is not equally long for all public services. We make a distinction between good 1 (y_1) which is a *short-term* public good and good 2 (y_2) which is a *long-term* public good. Investments in the short-term public good leads to immediate provision of services. Individuals can therefore infer from $y_{1,t}$ how much was invested in this good in period t. Investments in the long-term public good, on the other hand, leads to provision only with a time lag. As a consequence, individuals cannot infer how much was invested in this good until later when they observe the provision levels generated by past investments.[8] Specifically, we assume that it takes one period for the investment to mature, and the provision of y_2 at time t is then determined by the investment made at time $t-1$.[9]

[5] To insure that discounted utility is bounded, we need to assume that $\beta(1+g) \leq 1$.

[6] We do not allow politicians to issue debt to finance current spending. To the extent that politicians realize that they can externalize the cost of paying back the debt to future generations or can affect – by creating "facts" – the policy decisions of future politicians, public debt can in itself be a source of policy myopia (Persson and Svensson, 1989; Alesina and Tabellini, 1990).

[7] The functional forms are introduced to simplify the calculations. The simplification is not critical for our main results. What is important is that production of public goods displays decreasing returns.

[8] A related problem, discussed by Ferejohn (1999), arises when the task undertaken by the politician can only be observed via a noisy signal. What we have in mind is something different, namely that voters can eventually observe perfectly the consequences of past policy decisions, but only after some time have passed.

[9] The one-period lag is introduced for convenience. What really matters is that the output of long-term public goods is observed less often than elections.

Once elected, the politician has an incentive to exploit public office to divert public funds away from spending on public goods, either because doing so benefits him personally or because it benefits a very narrow constituency of his.[10] The "rent" generated by diverting public funds is called z_t and corresponds to the difference between current revenues and expenditures:

$$z_t = \tau_t - x_{1,t} - x_{2,t}. \tag{7}$$

We assume that politicians care only about their "consumption" of z_t. A politician, who is voted out of office, receives a fixed level of utility, normalized to 0.[11]

Elections are held every period. In each election, the incumbent politician runs against a challenger and the candidate who wins the majority takes office in the next period. Politicians cannot commit to fiscal policies when running for office, but they do face the electorate when seeking re-election, and can be held accountable after the fact, as in the performance voting model developed by Ferejohn (1986). At the beginning of each election period, voters announce a performance standard that they require the incumbent to satisfy in order to qualify for reelection. Democratic control is, however, often imperfect because of factors related to turnout uncertainty, voter apathy and electoral fraud. To allow for such imperfections, we assume that the promise to reelect a politician who meets the performance standard is imperfect: the electorate can deliver reelection only with probability p at any time. With probability $1-p$, the incumbent loses the election and is replaced by a challenger, even if he preforms well. This probability, assumed constant over time, represents democratic "voice" and can be interpreted as an index of the quality of democracy. Formally, our model describes a dynamic principal-agent relationship where the only reward that the principal (the voters) can offer to the agent (the politician) is reelection. Insofar as voice is imperfect, the reward become uncertain from the point of view of the agent and it becomes harder for voters to provide incentives. We study sequences of incentive compatible performance standards based on observable policy implementations and focus on those which maximize voters lifetime utility. We restrict attention to performance standards that are anonymous in the sense that they do not depend on the identity of the politician in office. This implies that voters reward the current office holder with reelection if the policy implementations made by him or by his predecessors satisfy the performance standard.

To evaluate if voters want to set myopic performance standards, we need a benchmark to which we can compare. Our benchmark is the dynamically efficient path of taxes and public investments chosen by a benevolent planner whose objective it is to maximize the lifetime utility of a representative citizen (equation (1)) subject to the public budget constraint ($x_{1,t} + x_{2,t} \leq \tau_t$) and to the revenue constraint ($\tau_t \leq \mathcal{T}_t$). The efficient portfolio of public goods, $\frac{x^*_{2,t}}{x^*_{1,t}}$, is shown in Lemma 1.

[10] This formulation of the conflict of interest between voters and politicians is due to Persson et al. (1997) and used extensively in Persson and Tabellini (2000). An alternative that would lead to very similar results in our setting is to assume that effort is required to produce public goods. Politicians incur the cost of effort and so would like to reduce effort below the level desired by voters (Ferejohn, 1986).

[11] More generally, politicians could also care about public goods. The introduction of citizen-politicians – that is, politicians who care about public goods and tax payments and who expect to return to the private sector if voted out of office – complicates the analysis but does not remove the forces of myopia that we identify below. It does, however, introduce some new "anti-myopia" forces because the politician as a citizen would like to see the efficient portfolio adopted every period.

Lemma 1 *The efficient portfolio of public goods that would be chosen by a benevolent planner is*

$$\frac{x_2^*}{x_1^*} = (\beta(1+g)^{\pi})^{\frac{1}{1-\alpha}} \text{ for all } t = 0, 1, ... \tag{8}$$

Proof. *See Appendix* ■

A low discount rate shifts the efficient portfolio towards the short-term good because the rewards of investing in the long-term good are not enjoyed immediately. High productivity growth in the public sector ($(1+g)^{\pi}$) has the opposite effect and shifts the portfolio towards the long-term good. This is because the rewards of investments in the long-term good are augmented by the increase in productivity that takes place between the time the investment is sunk and the provision actually takes place.[12]

Equilibrium Analysis

Recall that voters cannot observe actual investments $x_{i,t}$ or the amount diverted z_t, but that they do observe outputs in the public sector and the amount of revenue raised. Thus, at time $t = 1, 2...$, voters observe τ_t, $y_{1,t}$ and $y_{2,t}$. From this, and from their memory of earlier observations, they can deduce $x_{1,t}$, $x_{2,t-1}$, and z_{t-1}. At time $t = 0$, they observe only τ_0 and $y_{1,0}$ as no investment in the long-term public good could have been made. Voters can therefore base their plans to reelect the incumbent politician on *current* investments in short-term public goods, x_1, and *retrospectively* on investments in the long-term good, x_2 and inferred diversion z. Voters announce a sequence of performance standards $\widehat{s}_t = \{\widehat{\tau}_t, \widehat{x}_{1,t}, \widehat{x}_{2,t}\}$ of the following type: if $x_{1,t} \geq \widehat{x}_{1,t}$ and $\tau_t \leq \widehat{\tau}_t$ is observed after period 0, then the incumbent politician is reelected for a second term; if $x_{1,t} \geq \widehat{x}_{1,t}$, $x_{2,t-1} \geq \widehat{x}_{2,t-1}$ and $\tau_t \leq \widehat{\tau}_t$ is observed after the second, or any subsequent term, the incumbent politician is reelected. If any of these conditions fail, the politician is not reelected and a challenger takes office. In societies with perfect voice ($p = 1$), this performance standard is sufficient to avoid myopic policy choices. Policy myopia then arises when democratic voice is imperfect ($p < 1$).

To derive formally these results, we first characterize the sequence of incentive compatible performance standards of the type defined above. Suppose that voters announce a sequence of standards $\widehat{s}_{t+k} = \{\widehat{\tau}_{t+k}, \widehat{x}_{1,t+k}, \widehat{x}_{2,t+k}\}$ for $k = 0, 1, 2, ...$ Define $\widehat{z}_t = \widehat{\tau}_t - \widehat{x}_{1,t} - \widehat{x}_{2,t}$ as the rent allowed by the standard in period t. A politician who complies (C) with the standard at time t expects to get the following payoff:

$$V_t(C) = \widehat{z}_t + p\beta V_{t+1}^* \tag{9}$$

where V_{t+1}^* is the continuation value of holding office and $p \in (0, 1]$. We notice that future payoffs are discounted by β, as politicians have the same discount rate as citizens. More importantly, for $p < 1$ voters cannot promise to reelect a performing politician with certainty, and so with probability $1 - p$, he might not get reelected

[12] If we assume that $y_{2,t} = b_{t-1}x_{2,t-1}^{\alpha}$, then the efficient portfolio would not depend on g. The precise specification of the production technology for the long-term public good does, however, not matter for any of our results about policy myopia.

and is forced to retire from political office.[13] This reduces his effective discount rate to βp. Thus, lack of voice forces the discount rate of politicians below that of their constituents.

The politician can deviate from the standard in period t by under-providing both goods and divert the maximum possible revenue. This would, of course, be discovered immediately by voters, and at the next election at time $t+1$, his tenure would be terminated. The payoff associated with this deviation strategy, called $D0$, is

$$V_t(D0) = \mathcal{T}_t. \tag{10}$$

Alternatively, the politician could decide to comply partially and deliver $x_{1,t} = \widehat{x}_{1,t}$ and raise $\tau_t = \widehat{\tau}_t$ but under-provide the long-term good in his first term. This would not be discovered by voters until period $t+1$, and they would not terminate his tenure until the election held at time $t+2$. In the meantime, the politician is reelected at the election held at time $t+1$. Knowing, however, that he is going to be terminated after his second term, the politician would under-provide both goods in his second (and final) term and divert the maximum possible tax revenue. The expected payoff, discounted to time t, of partial compliance, called $D1$, is

$$V_t(D1) = \widehat{z}_t + \widehat{x}_{2,t} + \beta p \mathcal{T}_{t+1}. \tag{11}$$

Again, if voters cannot promise to reelect for sure, the rent, $\mathcal{T}_{t+1}$, generated by his second term is discounted by βp rather than β.

We can now write the value of political office, V_t^*, as

$$V_t^* = \max\{V_t(C), V_t(D0), V_t(D1)\} \tag{12}$$

and note that a sequence of performance standards $\{\widehat{s}_t\}_{t=0}^{\infty}$ is incentive compatible if, and only if

$$V_t(C) \geq \max\{V_t(D0), V_t(D1)\} \text{ for } t = 0, 1, 2, ... \tag{13}$$

We can now establish a fundamental result about the sequence of incentive compatible performance standards.

Lemma 2 *A sequence of performance standards $\{\widehat{s}_t\}_{t=0}^{\infty}$ is incentive compatible if, and only if*

$$V_0(C) \geq V_0(D0) \text{ and } V_t(C) \geq V_t(D1) \qquad t = 0, 1, 2, ... \tag{14}$$

Proof. See Appendix ■

Lemma 2 states that the sequence of incentive compatible performance standards must satisfy two conditions. First, the very first politician elected by the society has an incentive to defect to $D0$ as well as an incentive to go for partial compliance ($D1$), and so to insure full compliance, $V_0(C)$ must be (weakly) greater than both $V_0(D0)$ and $V_0(D1)$. Second, for any subsequent period, incentive compatibility only requires that $V_t(C)$ is (weakly) greater than $V_t(D1)$. This is because $V_{t-1}(C) \geq V_{t-1}(D1)$ $\Rightarrow V_t(C) \geq V_t(D0)$. The intuition is that the politician is tempted to pretend to be complying by only complying partially and then reveal himself in his second term. This temptation is larger than the temptation to defect and be discovered immediately. Consequently the relevant incentive constraints are $V_0(C) \geq V_0(D0)$ and $V_t(C) \geq V_t(D1)$ for $t = 0, 1, 2, ...$ From this it follows that:

[13] We assume that a politician once retired never runs for office again.

Corollary 1 *Incentive compatible performance standards must satisfy the following condition:*

$$\widehat{z}_t \geq \frac{\widehat{x}_{2,t-1}}{\beta p} - \widehat{x}_{2,t} + \mathcal{T}_t - \beta p \mathcal{T}_{t+1} \tag{15}$$

for each $t = 0, 1, 2, ...$ *with* $x_{2,-1} = 0$.

Proof. See Appendix ■

The politician must each period be allowed to collect at least the rent defined by the right-hand side of equation (15) to guarantee that he is willing to comply with the performance standards. Importantly, we note that this "reelection reward" depends positively on the investment in the long-term public good made in period $t-1$ but negatively on the investment made in period t.[14] This is the sense in which the politician is rewarded retrospectively for investments in long-term public goods.

We can characterize the sequence of second best policy implementations by solving the electorate's maximization problem:

$$\max \sum_{t=0}^{\infty} \beta^t \left[w_t - \tau_t + a_t^{\pi} x_{1,t}^{\alpha} + \beta \left[a_t (1+g) \right]^{\pi} x_{2,t}^{\alpha} \right] + a_0^{\pi} x_{2,-1}^{a} \tag{16}$$

subject to the sequence of incentive compatibility constraints defined by equation (15), the revenue constraints

$$\tau_t \leq \mathcal{T}_t, \text{ for } t = 0, 1, 2, ... \tag{17}$$

and non-negativity constraints, $x_{i,t} \geq 0$ and $\tau_t \geq 0$ for $t = 0, 1, 2...$ Below, we shall discuss the main properties of the solution to this problem focusing on the case where the revenue constraint is not binding.[15] This simplifies the analysis but is not essential for the results. The full solution is derived in the Appendix.

Our first main result is a positive one, stating the circumstances under which the public sector portfolio is efficient despite the agency problem that arises when decisions are delegated to politicians.

Proposition 1 *(Efficiency). Suppose that* $p = 1$. *The public sector portfolio is stationary and efficient, i.e.,*

$$\frac{\widehat{x}_2}{\widehat{x}_1} = \frac{x_2^*}{x_1^*}, \tag{18}$$

where $\frac{x_2^*}{x_1^*}$ *is the efficient portfolio defined in Lemma 1.*

Proof. See Appendix ■

The Proposition demonstrates that rational voters ask their politicians to provide the efficient portfolio if democratic voice is perfect ($p = 1$). Importantly, the fact that some government activities can be observed more frequently than others is not in

[14] Notice that the assumption of anonymous performance standards implies that voters allow the politician in office in period t to collect $\widehat{z}_t$ whether he made the investment $\widehat{x}_{2,t-1}$ himself or it was made by some other politician (who lost office because of imperfect voice).

[15] This requires that the constraint does not bind in period 0 and that $\pi \leq 1 - a$. A sufficient condition that covers all the cases analyzed in the text is that

$1 - \theta > a_0^{\frac{\pi+\alpha-1}{1-\alpha}} \alpha^{\frac{1}{1-\alpha}} \max\{ \frac{1+(\beta p)^{\frac{\alpha}{1-\alpha}}}{\beta p(1+g)}, 1 + (\beta(1+g)^{\pi})^{\frac{1}{1-\alpha}} \}$.

itself a source of short-termism; voters can still use elections to motivate politicians to invest in the efficient portfolio. The intuition can be seen from equation (15). A politician that decides to make the required investment in the long-term public good incurs the cost of doing so immediately but has to wait one period to get his reward. Thus, the reward is discounted. If voice is perfect, he is guaranteed reelection and discounts the reward by β. This is the same discount rate used by voters when they discount the benefit from investments in the long-term public good. As a consequence, there is no reason for voters to bias the portfolio towards the short-term good: voters and politicians face the same intertemporal trade-off.[16]

The next proposition shows that imperfect voice generates policy myopia.

Proposition 2 *(Imperfect voice). Suppose that $p < 1$. The public sector portfolio is stationary and myopic, i.e.,*

$$\frac{\widehat{x}_2}{\widehat{x}_1} = p^{\frac{1}{1-\alpha}} \frac{x_2^*}{x_1^*}, \tag{19}$$

where $\frac{x_2^*}{x_1^*}$ is the efficient portfolio defined in Lemma 1.

Proof. See Appendix ■

Imperfect voice induces policy myopia because it reduces the effective discount rate of elected politicians ($p\beta$) below that of the electorate (β). As a consequence, it becomes too expensive for voters to reward politician retrospectively for investments in the long-term public good, and they find it beneficial to bias the portfolio toward short-term goods. In a sense, imperfect voice forces politicians to be short-sighted and, by implication, voters to set more myopic performance standards. It follows that rational voters set myopic performance standards when they realize that their politicians are more myopic than they are themselves. It is, however, important to recall that policy myopia is *constrained* efficient: whenever it occurs it is because voters cannot do better than allowing politicians to divert funds, and allowing them to divert relatively more funds from long-term investments.

This performance standard analyzed above requires voters to reward the incumbent politician in period t for the investment made in long-term public goods in period $t-1$. This is done by committing taxes one period ahead. The politician in office in period t then realize that he will be allowed to collect enough taxes in period $t+1$ to enable him to be compensated – fully or partly – for the investment in the long-term public good made in period t. In societies where voters cannot make this commitment, the capacity to prevent short-termism is substantially reduced, irrespectively of the quality of democratic voice. To see why, suppose that voters are can only base their performance standard on current utility levels. At the beginning of each period, they announce that they are only willing to reelect the incumbent politician (with probability p) if he implements a spending and tax package that generates at least the utility level u_t^*; if not, he is replaced by the challenger. Faced with this performance standard, a politician who seeks reelection would implement policies, $\{\tau_t, x_{1,t}, x_{2,t}\}$, to maximize his rent, $z_t = \tau_t - x_{1,t} - x_{2,t}$, subject to the incentive compatibility constraint $u_t \geq u_t^*$. The utility cut-off (u_t^*) is set to make the politician indifferent between complying and not complying (see the Appendix for the details). The resulting public portfolio is characterized in the next proposition.

[16] The fact that some government activities cannot be observed as well as others does not, as in Holmstrom and Milgrom (1991), force voters (the principal) to provide low-powered incentives. The reason is that investments in long-term public goods can eventually be observed and that allows voters to reward this activity explicitly.

Proposition 3 *(Lack of commitment) Suppose that voters cannot commit tax revenues. The public sector portfolio is stationary and myopic*

$$\frac{\widetilde{x}_2}{\widetilde{x}_1} = \frac{0}{x_1^*} = 0 \tag{20}$$

for all p.

Proof. See Appendix ■

The proposition shows that politicians never provide any long-term public goods if voters cannot commit tax revenues. This is simply because the investment in the long-term public good made today reduces their rent without adding in any way to the *contemporaneous* utility of voters. A politician, who seeks reelected, employs a combination of tax exemptions ($\tau_t < \mathcal{T}_t$) and short-run public goods to meet the utility standard set by voters each period. The result is that the portfolio of public goods becomes extremely myopic.

III. Some Implications

Our analysis offers some additional insights into the forces that drive the expansion of government spending over time and the relationship between democratic voice – the quality of democracy – and the size of government across space. In the discussion, we focus on the situation where voters can commit tax revenues.

Growth in Government In our model, $\widehat{\tau}_t$ should be interpreted as the politically acceptable level of taxation for the purpose of providing public services. To see what determines the evolution of $\frac{\widehat{\tau}_t}{Y_t}$ over time, let us imagine an economy in which the revenue constraint is not initially binding, i.e., $\widehat{\tau}_0 < \mathcal{T}_0$. For any subsequent t such that the revenue constraint remains non-binding, recorded spending on public goods (or the net size of government) is given by (see Appendix)

$$\frac{\widehat{\tau}_t}{Y_t} = \alpha^{\frac{1}{1-\alpha}} \left[1 + (\beta p)^{\frac{\alpha}{1-\alpha}}\right] a_t^{\frac{\pi+\alpha-1}{1-\alpha}} + (1-\theta)\left[1 - \beta p(1+g)\right]. \tag{21}$$

It is clear that growth in government depends crucially on the relative pace at which productivity progresses in the public relative to the private sector (as captured by π). The net size of government is constant, as observed, on average, in the OECD countries during the past 30 years, if $\pi = 1 - \alpha$. This corresponds to the case in which productivity growth in the public sector exactly off-sets the diminishing marginal product associated with production of public goods. The net size grows, as was the case in most developed countries up until around 1960, if $\pi > 1 - \alpha$. In this case, voters are willing to trust their governments with an increasing share of GDP because productivity improvements in the public sector happen at a sufficiently high pace. Even in this case, however, growth must come to an end when the tax potential is reached: attempts to raise more than $1 - \theta$ in taxes cause an exodus to the home production sector and a collapse in the provision of public services. Finally, the net size of government declines over time if productivity growth in the public sector lags sufficiently behind that in the private sector, i.e., if $\pi < 1 - \alpha$. In this case, the net size of government eventually converges to $(1 - \theta)\left[1 - \beta p(1 + g)\right]$. The three scenarios are illustrated in Figure 2.

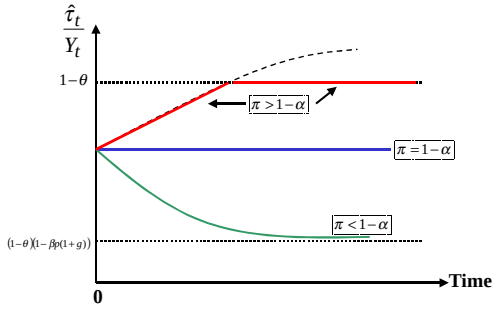


Figure 2: The Evolution of the Size of Government Over Time.

Differential productivity growth is an important determinant of growth in government in our model. The same is true in the seminal study by Baumol (1967). He argues that growth in government can be attributed to relatively low productivity growth in the public sector. In our model, this phenomenon can cause growth in government, as long as the productivity difference is not too large ($\pi \in (1-\alpha, 1)$). This is because the public sector, despite lagging behind the private sector, *does* become more efficient as time unfolds and, as a consequence, the electorate is willing to trust their politicians with a larger share of GDP. This mechanism is, of course, very different from the one envisaged by Baumol.[17] By the same token, our model predicts a positive relation between the size of government and economic development (as measured by GDP) whenever $\pi > 1-\alpha$. This provides an alternative explanation of Wagner's Law (Wagner, 1883) – the phenomenon that the size of government grows as societies develop. The driving force in our model is, however, productivity growth, rather than, as argued by Wagner (1883), a high income elasticity in the demand for public goods. Importantly, Wagner's law is not inevitable. Sufficiently low productivity growth in the public sector can, in fact, reverse it. This might be part of the explanation why Wagner's Law has received mixed empirical support (Holsey and Borcherding, 1997).

Voice and Spending on Public Goods The quality of democratic voice, as captured by p, is important, not only as a determinant of policy myopia, but also as a determinant of the recorded spending on public goods (or the net size of government). A simple calculation (using equation (21)) shows that

$$\frac{\partial\left(\frac{\hat{\tau}_t}{Y_t}\right)}{\partial p} = \frac{\alpha}{1-\alpha}\left[a_t^{\frac{\pi+\alpha-1}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}\beta^{\frac{\alpha}{1-\alpha}}p^{\frac{2\alpha-1}{1-\alpha}}\right] - (1-\theta)\beta(1+g). \tag{22}$$

Voice has two conflicting effects on the net size of government.[18] The first effect captures the fact that more effective voice makes it more attractive for elected politi-

[17] Baumol (1967) argued that production of public goods is more labor intensive than production of private goods. As a consequence, productivity growth is likely to be slower in the public than in the private sector. If wages increase at the same rate in the two sectors, unit costs in the public sector would go up. Provided that the demand for public goods is sufficiently price inelastic, this would lead to growth in the size of government.

[18] When the revenue constraint is binding and $\frac{\hat{\tau}_t}{Y_t} = 1-\theta$, voice can obviously not affect spending on public services. Moreover, when tax revenues cannot be committed (and Proposition 3 applies), an increase in voice unambiguously reduces spending on public goods.

cians to perform well. Voters exploit that by requiring them to invest more in the long-term public good. This portfolio adjustment requires more funds and recorded spending on public goods increases. The second effect works in the opposite direction. It captures that more effective voice reduces the rent that politicians can extract from the electorate. This, in turn, reduces the cost of providing public goods and with it, recording spending. A sufficient condition for voice to decrease recorded spending on public goods is that $\alpha \leq \frac{1}{2}$.[19] Empirical estimates of the elasticity output with respect to public capital suggest that α is in the range of $0.1 - 0.48$ for the US (Gramlich, 1994). Thus, the model provides an explanation of the negative relationship between voice and *recorded* spending on public goods discussed in the section I. Notice, however, that *actual* spending on public services $(x_{1,t} + x_{2,t})$ is always non-decreasing in voice.

IV. Conclusion

This paper presents a theory of policy myopia understood as a bias towards investments in short-term public goods. We show that policy myopia is not an inevitable consequences of long-term public goods. Policy myopia arises in societies with imperfect voice or in societies which lack the capacity to commit tax revenues for the future. Our theory predicts that cross-country differences in second-best myopia is systematically related to the quality of democratic institutions, as suggested by the empirical evidence presented in section I, and that policy myopia is mainly a problem in societies in which the electorate lacks effective democratic voice.

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[19] See the Appendix for a proof.

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V. Appendix

Proof of Lemma 1. The planner's maximization problem can be stated as follows:

$$\max_{\{\tau_t, x_{1,t}, x_{2,t}\}} \sum_{t=0}^{\infty} \beta^t \left[w_t - \tau_t + a_t^{\pi} x_{1,t}^{\alpha} + \beta a_t^{\pi} (1+g) x_{2,t}^{\alpha} \right]$$

subject to

$$x_{1,t} + x_{2,t} - \tau_t \leq 0 \quad \text{for} \quad t = 0, 1, 2...$$

$$\tau_t \leq a_t(1-\theta) \equiv \mathcal{T}_t \quad \text{for} \quad t = 0, 1, 2...$$

$$x_{1,t} \geq 0, \quad x_{2,t} \geq 0, \, \tau_t \geq 0 \text{ for } \quad t = 0, 1, 2...$$

$$x_{2,-1} = 0.$$

The Lagrangian function is

$$\begin{aligned} L = & \sum_{t=0}^{\infty} \beta^t \left[w_t - \tau_t + a_t^{\pi} x_{1,t}^{\alpha} + \beta a_t^{\pi} (1+g) x_{2,t}^{\alpha} \right] \\ & + \sum_{t=0}^{\infty} \lambda_{1,t} \left[\tau_t - x_{1,t} - x_{2,t} \right] + \sum_{t=0}^{\infty} \lambda_{2,t} \left[a_t(1-\theta) - \tau_t \right] \end{aligned}$$

where $\lambda_{1,t} \geq 0$ and $\lambda_{2,t} \geq 0$ are the multipliers. The Kuhn-Tucker conditions for $t = 0, 1, 2...$ are

$$\beta^t a_t^{\pi} \alpha x_{1,t}^{\alpha - 1} - \lambda_{1,t} \leq 0, \quad x_{1,t} \geq 0 \quad \text{w.c.s.}$$

$$\beta^t \left[a_t(1+g) \right]^{\pi} \beta \alpha x_{2,t}^{a-1} - \lambda_{1,t} \leq 0, \quad x_{2,t} \geq 0 \quad \text{w.c.s.}$$

$$\lambda_{1,t} - \beta^t - \lambda_{2,t} \leq 0, \quad \tau_t \geq 0 \quad \text{w.c.s.}$$

$$\tau_t - x_{1,t} - x_{2,t} \geq 0, \quad \lambda_{1,t} \geq 0 \quad \text{w.c.s.}$$

$$a_t(1-\theta) - \tau_t \geq 0, \quad \lambda_{2,t} \geq 0 \quad \text{w.c.s.},$$

where "w.c.s." means "with complementary slack". The Inada conditions imply that $x_{1,t} > 0$, $x_{2,t} > 0$ and $\tau_t > 0$ at the optimum, and so, $\lambda_{1,t} > 0$. The precise solution depends on whether or not the revenue constraint is binding. Consider first the case with $a_t(1-\theta) - \tau_t > 0 \Rightarrow \lambda_{2,t} = 0$. Here, we find that

$$x_{1,t}^* = (a_t^{\pi} \alpha)^{\frac{1}{1-\alpha}}$$

$$x_{2,t}^* = \left(\left[a_t(1+g) \right]^{\pi} \beta \alpha \right)^{\frac{1}{1-\alpha}}$$

$$\tau_t^* = (a_t^\pi \alpha)^{\frac{1}{1-\alpha}} \left[1 + (\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}\right].$$

Next, consider the case with $a_t(1-\theta) - \tau_t < 0$. Here $\tau_t^* = a_t(1-\theta)$ and $\lambda_{2,t} > 0$. We find, using the fact that $\lambda_{1,t} = \beta^t + \lambda_{2,t}$, that

$$a_t^\pi \alpha x_{1,t}^{\alpha-1} = 1 + \frac{\lambda_{2,t}}{\beta^t}$$

$$[a_t(1+g)]^\pi \beta\alpha x_{2,t}^{a-1} = 1 + \frac{\lambda_{2,t}}{\beta^t}$$

$$a_t(1-\theta) - x_{1,t} - x_{2,t} = 0.$$

Solving these equations, we find the optimal provision levels as

$$x_{1,t}^* = \frac{\mathcal{T}_t}{1 + (\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}}$$

$$x_{2,t}^* = \frac{\mathcal{T}_t(\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}}{1 + (\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}}.$$

Notice that the efficient portfolio is the same in the two cases, namely

$$\frac{x_{2,t}^*}{x_{1,t}^*} = (\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}$$

and that it is stationary. Furthermore,

$$\frac{\tau_t^*}{Y_t} = a_t^{\frac{\pi+\alpha-1}{1-\alpha}} \alpha^{\frac{1}{1-\alpha}} \left[1 + (\beta(1+g)^\pi)^{\frac{1}{1-\alpha}}\right]$$

as long as the revenue constraint is not binding and that $\frac{\tau_t^*}{Y_t} = 1-\theta$ if the constraint is binding.

Proof of Lemma 2 and Corollary 1. Let $\hat{s}_t = \{\hat{x}_{1,t}, \hat{x}_{2,t}, \hat{\tau}_t\}$ be the standards set by the electorate at time t and define $\hat{z}_t = \hat{\tau}_t - \hat{x}_{1,t} - \hat{x}_{2,t}$ as the office rent allowed by standard $\hat{s}_t$. Consider a politician in office at time t. He chooses between three strategies:

1. **Full compliance:** Meet the standard and be re-elected with probability p. We call this strategy C, with

$$x_{1,t}(C) \geq \hat{x}_{1,t}, \quad x_{2,t}(C) \geq \hat{x}_{2,t}; \quad z_t(C) \leq \hat{z}_t$$

2. **Partial compliance:** Meet just enough of the standard to be re-elected, again with probability p, but be defeated next period. We call this strategy $D1$, with

$$x_{1,t}(D1) \geq \hat{x}_{1,t}, \quad 0 \leq x_{2,t}(D1) < \hat{x}_{2,t}, \quad \hat{z}_t + \hat{x}_{2,t} \geq z_t(D1) > \hat{z}_t.$$

3. **Defection:** Not meet the standard at all and be defeated in the up-coming election. We call this strategy $D0$, with

$$0 \leq x_{1,t}(D0) < \hat{x}_{1,t}, \quad 0 \leq x_{2,t}(D0) < \hat{x}_{2,t}, \quad \mathcal{T}_t \geq z_t(D0) > \hat{z}_t.$$

These are the only strategies relevant at time t; a strategy (Dk), where the politician complies for $k-1$ periods and then defects, is individually rational only if $(D0)$ is rational at $t+k$, or $(D1)$ at $t+k-1$.

The politician's payoff is

$$V_t = \sum_{k=0}^{\infty} \beta^k \varphi_{t+k} z_{t+k}$$

where $\varphi_t = 1$ if he is in office, and $\varphi_t = 0$ otherwise. We observe from this, and the fact that $z_t = \tau_t - x_{1,t} - x_{2,t}$ and $\tau_t \leq \mathcal{T}_t$ that

$$x_{1,t}(C) = x_{1,t}(D1) = \hat{x}_{1,t}; \quad x_{1,t}(D0) = 0;$$

$$x_{2,t}(C) = \hat{x}_{2,t}; \quad x_{2,t}(D1) = x_{2,t}(D0) = 0;$$

$$z_t(C) = \widehat{z}_t; \quad z_t(D1) = \hat{z}_t + \hat{x}_{2,t}; \quad z_t(D0) = \mathcal{T}_t.$$

Let $V_t(C), V_t(D1)$ and $V_t(D0)$ be the value of each strategy and $V_t^* = \max[V_t(C), V_t(D1), V_t(D0)]$. We have

$$V_t(C) = \hat{z}_t + \beta p V_{t+1}^*;$$

$$V_t(D1) = \hat{z}_t + \hat{x}_{2,t} + \beta p \mathcal{T}_{t+1};$$

$$V_t(D0) = \mathcal{T}_t.$$

The politician chooses full compliance at each t only if

$$V_t(C) = V_t^* \geq \max[V_t(D1), V_t(D0)]$$

for every t. With the additional assumption that politicians comply when indifferent, this is necessary and sufficient. We obtain, by routine substitutions, that $V_t(C) \geq \{V_t(D1), V_t(D0)\}$ if, and only if the following conditions hold at each $t = 0, 1, 2, ...$:

$$(\mathbf{IC0})_\mathbf{t} \quad \sum_{k=0}^{\infty} (p\beta)^k \hat{z}_{t+k} \geq \mathcal{T}_t;$$

$$(\mathbf{IC1})_\mathbf{t} \quad \sum_{k=0}^{\infty} (p\beta)^k \hat{z}_{t+k} \geq \hat{z}_t + \hat{x}_{2,t} + p\beta \mathcal{T}_{t+1}.$$

Further, we can rewrite $(\mathbf{IC1})_\mathbf{t}$ as

$$\sum_{k=0}^{\infty} (p\beta)^k \hat{z}_{t+1+k} \geq \frac{\hat{x}_{2,t}}{p\beta} + \mathcal{T}_{t+1} \geq \mathcal{T}_{t+1}.$$

We obtain, from this, that $(\mathbf{IC1})_t \Rightarrow (\mathbf{IC0})_{\mathbf{t+1}}$. It follows that the standard $\hat{s}_t$ is incentive compatible if, and only if, $(\mathbf{IC0})_0$ and $\{(\mathbf{IC1})_t\}_{t=0}^{\infty}$ are satisfied.

Finally, recall that $\hat{\tau}_t = \hat{z}_t + \hat{x}_{1t} + \hat{x}_{2t}$. The electorate chooses $\hat{z}_t$ to minimize $\sum_k \beta^k \hat{\tau}_{t+k}$ subject to incentive compatibility constraints $\mathbf{IC0}_0$ and $\{(\mathbf{IC1})_t\}_{t=0}^{\infty}$, yielding

$$\sum_{k=0}^{\infty}(p\beta)^k \hat{z}_k = \mathcal{T}_0;$$

$$\sum_{k=0}^{\infty}(p\beta)^k \hat{z}_{t+k} = \frac{\hat{x}_{2,t-1}}{p\beta} + \mathcal{T}_t;$$

for $t = 1, 2, \cdots$. Substitutions yield

$$\hat{z}_0 = \mathcal{T}_0 - p\beta\mathcal{T}_1 - \hat{x}_{2,0};$$

$$\hat{z}_t = \mathcal{T}_t - p\beta\mathcal{T}_{t+1} + \frac{\hat{x}_{2,t-1}}{p\beta} - \hat{x}_{2,t},$$

for $t = 0, 1, 2$ with $\hat{x}_{2,t-1} = 0$. From this we obtain Corollary 1. Finally, from the budget constraints $\hat{\tau}_t = \hat{z}_t + \hat{x}_{1,t} + \hat{x}_{2,t}$ we get that

$$\hat{\tau}_t = \mathcal{T}_t - p\beta\mathcal{T}_{t+1} + \hat{x}_{1,t} + \frac{\hat{x}_{2,t-1}}{p\beta}.$$

Proof of Propositions 1 and 2. The electorate's problem is to find a sequence of performance standards, $\widehat{s}_t = \{\widehat{\tau}_t, \widehat{x}_{1,t}, \widehat{x}_{2,t}\}$ that solves

$$\max_{s_t} \sum_{t=0}^{\infty} \beta^t \left[w_t - \tau_t + a_t^{\pi} x_{1,t}^{\alpha} + \beta \left[a_t(1+g)\right]^{\pi} x_{2,t}^{\alpha}\right] + a_0^{\pi} x_{2,-1}^{a}$$

subject to

$$\tau_t \geq x_{1,t} + \frac{x_{2,t-1}}{\beta p} + \mathcal{T}_t - \beta p \mathcal{T}_{t+1}, \text{ for } t = 0, 1, 2, ...$$

$$\tau_t \leq \mathcal{T}_t = a_t(1-\theta), \text{ for } t = 0, 1, 2, ...$$

$$x_{1,t} \geq 0, \ x_{2,t} \geq 0, \ \tau_t \geq 0 \text{ for } \ t = 0, 1, 2...$$

$$x_{2,-1} = 0.$$

The Lagrangian for this problem is

$$\begin{aligned} L = &\sum_{t=0}^{\infty} \beta^t \left[w_t - \tau_t + a_t^{\pi} x_{1,t}^{\alpha} + \beta \left[a_t(1+g)\right]^{\pi} x_{2,t}^{\alpha}\right] \\ &+ \sum_{t=0}^{\infty} \lambda_{1,t} \left[\beta p \mathcal{T}_{t+1} - \mathcal{T}_t \ + \tau_t - x_{1,t} - \frac{x_{2,t-1}}{\beta p}\right] \\ &+ \sum_{t=0}^{\infty} \lambda_{2,t} \left[\mathcal{T}_t - \tau_t\right] \end{aligned}$$

where $\lambda_{1,t} \geq 0$ and $\lambda_{2,t} \geq 0$ are the multipliers. The Kuhn-Tucker conditions for $t = 0, 1, 2...$ are

$$\beta^t a_t^{\pi} \alpha x_{1,t}^{\alpha-1} - \lambda_{1,t} \leq 0, \quad x_{1,t} \geq 0 \text{ w.c.s.}$$

$$\beta^t \left[a_t(1+g)\right]^{\pi} \beta\alpha x_{2,t}^{a-1} - \frac{\lambda_{1,t+1}}{\beta p} \leq 0, \quad x_{2,t} \geq 0 \text{ w.c.s.}$$

$$\lambda_{1,t} - \beta^t - \lambda_{2,t} \leq 0, \quad \tau_t \geq 0 \text{ w.c.s.}$$

$$\tau_t - x_{1,t} - \frac{x_{2,t-1}}{\beta p} + \beta p \mathcal{T}_{t+1} - \mathcal{T}_t \geq 0, \quad \lambda_{1,t} \geq 0 \text{ w.c.s.}$$

$$\mathcal{T}_t - \tau_t \geq 0, \quad \lambda_{2,t} \geq 0 \text{ w.c.s.}$$

The Inada conditions imply that $x_{1,t} > 0$, $x_{2,t} > 0$ and $\tau_t > 0$. Hence, $\lambda_{1,t} > 0$ for all $t = 0, 1, 2, ...$ The precise solution depends on whether or not the revenue constraint is binding. Suppose that it is not binding at time t. Then $\lambda_{2,t} = 0$ and $\lambda_{1,t} = \beta^t$. We find that

$$a_t^{\pi} \alpha x_{1,t}^{\alpha-1} = 1$$

$$\beta p a_t^{\pi} \alpha x_{2,t-1}^{a-1} = 1$$

$$\tau_t = x_{1,t} + \frac{x_{2,t-1}}{\beta p} - \beta p \mathcal{T}_{t+1} + \mathcal{T}_t.$$

Solving these equations yields

$$\widehat{x}_{1,t} = (a_t^{\pi}\alpha)^{\frac{1}{1-\alpha}} = x_{1,t}^*$$

$$\widehat{x}_{2,t-1} = (a_t^{\pi}\alpha)^{\frac{1}{1-\alpha}} (\beta p)^{\frac{1}{1-\alpha}} = p^{\frac{1}{1-\alpha}} x_{2,t-1}^*$$

$$\widehat{\tau}_t = (a_t^{\pi}\alpha)^{\frac{1}{1-\alpha}} \left[1 + (\beta p)^{\frac{\alpha}{1-\alpha}}\right] + a_t(1-\theta)\left[1 - \beta p(1+g)\right]$$

Notice that

$$\frac{\widehat{\tau}_t}{Y_t} = \alpha^{\frac{1}{1-\alpha}} \left[1 + (\beta p)^{\frac{\alpha}{1-\alpha}}\right] a_t^{\frac{\pi+\alpha-1}{1-\alpha}} + (1-\theta)\left[1 - \beta p(1+g)\right]. \tag{23}$$

Next, suppose that the revenue constraint is binding at time t. Then $\lambda_{2,t} > 0$ and $\lambda_{1,t} = \beta^t + \lambda_{2,t}$. We find that

$$a_t^{\pi} \alpha x_{1,t}^{\alpha-1} = 1 + \frac{\lambda_{2,t}}{\beta^t}$$

$$\beta p a_t^{\pi} \alpha x_{2,t-1}^{a-1} = 1 + \frac{\lambda_{2,t}}{\beta^t}$$

$$\tau_t = \mathcal{T}_t$$

$$\beta p \mathcal{T}_{t+1} = x_{1,t} + \frac{x_{2,t-1}}{\beta p}.$$

Solving these equations yields

$$\widehat{x}_{1,t} = \frac{1}{1 + (\beta p)^{\frac{\alpha}{1-\alpha}}} \beta p \mathcal{T}_{t+1}$$

$$\widehat{x}_{2,t-1} = \frac{(\beta p)^{\frac{1}{1-\alpha}}}{1 + (\beta p)^{\frac{\alpha}{1-\alpha}}} \beta p \mathcal{T}_{t+1}.$$

Notice that

$$\frac{\widehat{\tau}_t}{Y_t} = 1 - \theta.$$

To get the two propositions, we compare the second-best public sector portfolio with the efficient one. Suppose the revenue constraint is not binding. Then, we get

$$\frac{\widehat{x}_{1,t}}{\widehat{x}_{2,t}} = p^{\frac{-1}{1-\alpha}} \frac{x^*_{1,t}}{x^*_{2,t}}$$

which is Proposition 2. Proposition 1 follows by setting $p = 1$. To complete the analysis, we need to characterize the portfolio when the revenue constraint is binding. Here, three cases can arise. First, suppose the revenue constraint is binding at t and at $t+1$. We get

$$\frac{\widehat{x}_{1,t}}{\widehat{x}_{2,t}} = \frac{1}{(\beta p)^{\frac{1}{1-\alpha}}(1+g)} = (1+g)^{\frac{\pi+\alpha-1}{1-\alpha}} p^{\frac{-1}{1-\alpha}} \frac{x^*_{1,t}}{x^*_{2,t}}.$$

Second, suppose the constraint is not binding at t but is binding at $t+1$. We get

$$\frac{\widehat{x}_{1,t}}{\widehat{x}_{2,t}} = \frac{a_t^{\frac{\pi+\alpha-1}{1-\alpha}} \alpha^{\frac{1}{1-\alpha}} (1 + (\beta p)^{\frac{\alpha}{1-\alpha}})}{(\beta p)^{\frac{2-\alpha}{1-\alpha}} (1+g)^2}.$$

Third, suppose the revenue constraint is binding at t but not at $t+1$. We get

$$\frac{\widehat{x}_{1,t}}{\widehat{x}_{2,t}} = \frac{(\beta p)^{\frac{-\alpha}{1-\alpha}} (1+g)}{\alpha^{\frac{1}{1-\alpha}} (1 + (\beta p)^{\frac{\alpha}{1-\alpha}}) a_t^{\frac{\pi+\alpha-1}{1-\alpha}}}.$$

Finally, notice that the revenue constraint will never become binding if i) $\pi \leq 1 - \alpha$ and ii) $(1-\theta) > \frac{a_0^{\frac{\pi-(1-\alpha)}{1-\alpha}} \alpha^{\frac{1}{1-\alpha}} (1+\beta p)^{\frac{\alpha}{1-\alpha}}}{\beta p (1+g)}$.

Proof of Proposition 3. Let $\widetilde{u}_t$ denote the performance standard set by the electorate at time t. A politician is reelected if, and only if $u_t \geq \widetilde{u}_t$; otherwise the challenger enters office. Let $z_t(\widetilde{u}_t) \geq 0$ denote the rent allowed by the standard in period t. Faced with this standard, the incumbent can decide to comply. This yields

$$V_t^C = z_t(\widetilde{u}_t) + \beta p V_{t+1},$$

where V_{t+1} is the continuation value of political office. Alternatively, the incumbent can decide not to satisfy the standard and accept defeat in the upcoming election. This yields

$$V_t^D = \mathcal{T}_t.$$

Incentive compatibility requires that $V_t^C \geq V_t^D$ for all t. Simple manipulations of these incentive constraints yield that $z_t(\widetilde{u}_t) \geq \mathcal{T}_t - \beta p \mathcal{T}_{t+1} = a_t(1-\theta)(1-\beta p(1+g))$ for all t. The politician wants to maximize his rent each period subject to the constraint that voters get utility $\widetilde{u}_t$ and the revenue constraint is satisfied:

$$\max_{\{\tau_t, x_{1,t}, x_{2,t}\}} \tau_t - x_{1,t} - x_{2,t}$$

st.

$$a_t - \tau_t + a_t^{\pi}(x_{1,t}^a + x_{2,t-1}^a) \geq \widetilde{u}_t$$

$$\tau_t \leq \mathcal{T}_t$$

and non-negativity constraints $z_t \geq 0$, $x_{1,t} \geq 0$, $x_{2,t} \geq 0$, $\tau_t \geq 0$. The Lagrangian is

$$\begin{aligned} L = {} & \tau_t - x_{1,t} - x_{2,t} + \phi_{1,t}(a_t - \tau_t + a_t^{\pi}(x_{1,t}^a + x_{2,t-1}^a) - \widetilde{u}_t) \\ & + \phi_{2,t}(\mathcal{T}_t - \tau_t). \end{aligned}$$

where $\phi_{1,t}$ and $\phi_{2,t}$ are non-negative multipliers. The Kuhn-Tucker conditions are

$$1 - \phi_{1,t} - \phi_{2,t} \leq 0, \quad \tau_t \geq 0 \ \text{ w.c.s.}$$

$$-1 + \phi_{1,t} a_t^{\pi} \alpha x_{1,t}^{\alpha-1} \leq 0, \quad x_{1,t} \geq 0 \ \text{ w.c.s.}$$

$$-1 \leq 0, \quad x_{2,t} \geq 0 \ \text{ w.c.s.}$$

$$a_t - \tau_t + a_t^{\pi}(x_{1,t}^a + x_{2,t-1}^a) - \widetilde{u}_t \geq 0, \ \ \phi_{1,t} \geq 0 \ \text{ w.c.s.}$$

$$\mathcal{T}_t - \tau_t \geq 0, \ \ \phi_{2,t} \geq 0 \ \text{ w.c.s.}$$

Suppose the revenue constraint is not binding and $\phi_{2,t} = 0$. It follows that $\phi_{1,t} = 1$ and

$$\widetilde{x}_{2,t} = 0$$

$$\widetilde{x}_{1,t} = x^*_{1,t} = (a_t^{\pi}\alpha)^{\frac{1}{1-\alpha}}$$

$$\widetilde{\tau}_t = \widetilde{x}_{1,t} + a_t(1-\theta)(1-\beta p(1+g)).$$

Next, suppose the revenue constraint is binding and $\phi_{2,t} > 0$. We get

$$\widetilde{x}_{2,t} = 0$$

$$\widetilde{x}_{1,t} = \beta p \mathcal{T}_{t+1}$$

$$\widetilde{\tau}_t = \mathcal{T}_t.$$

The public sector portfolio is in either case equal to 0. The revenue constraint will never become binding if i) $\pi \leq 1-\alpha$ and ii) $(1-\theta) > \frac{a_0^{\frac{\pi-(1-\alpha)}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}}{\beta p(1+g)}$.

Voice and spending on public goods Use equation (21) to calculate

$$\frac{\partial\left(\frac{\widehat{\tau}_t}{Y_t}\right)}{\partial p} = \frac{\alpha}{1-\alpha}\left[a_t^{\frac{\pi+\alpha-1}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}\beta^{\frac{\alpha}{1-\alpha}}p^{\frac{2\alpha-1}{1-\alpha}}\right] - (1-\theta)\beta(1+g).$$

If the tax potential has not been reached at time t, then it must be true that

$$a_t^{\frac{\pi+\alpha-1}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}\left(1+(\beta p)^{\frac{\alpha}{1-\alpha}}\right) < (1-\theta)\beta p(1+g).$$

Rewrite this as follows

$$a_t^{\frac{\pi+\alpha-1}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}p^{-1} + \left[a_t^{\frac{\pi+\alpha-1}{1-\alpha}}\alpha^{\frac{1}{1-\alpha}}\beta^{\frac{\alpha}{1-\alpha}}p^{\frac{2\alpha-1}{1-\alpha}} - (1-\theta)\beta(1+g)\right] < 0.$$

For $\alpha = \frac{1}{2}$ this can be written as

$$\frac{1}{4}a_t^{2\pi-1}p^{-1} + \left.\frac{\partial\left(\frac{\widehat{\tau}_t}{Y_t}\right)}{\partial p}\right|_{\alpha=\frac{1}{2}}.$$

Hence, $\left.\frac{\partial\left(\frac{\widehat{\tau}_t}{Y_t}\right)}{\partial p}\right|_{\alpha=\frac{1}{2}} < -\frac{1}{4}a_t^{2\pi-1}p^{-1} < 0$. Finally, $\frac{\partial\left(\frac{\widehat{\tau}_t}{Y_t}\right)}{\partial p} < \left.\frac{\partial\left(\frac{\widehat{\tau}_t}{Y_t}\right)}{\partial p}\right|_{\alpha=\frac{1}{2}}$ because $\frac{\alpha}{1-\alpha} < 1$ for $\alpha < \frac{1}{2}$. The condition $\alpha < \frac{1}{2}$ is sufficient. It is relatively hard to find parameter values that produce a positive relationship between voice and $\frac{\widehat{\tau}_t}{Y_t}$. One example, however, is $\alpha = 0.9$, $\beta = 0.9$, $\theta = 0.2$, $\pi = 1.4$, $g = 0.1$, and $a = 1.1$. This makes $\frac{\widehat{\tau}_t}{Y_t}$ increasing in p for p close enough to 1, but not elsewhere.

VI. Data Appendix

Definitions and sources. The definitions of the variables used in the regression analysis are listed below. All data are from 1996 or nearest year with available data.

- *voice* = voice and accountability index, normalized to range from 0 (low voice) to 1 (maximum voice). It measures aspects of political contestability and transparency and is constructed from survey data. The following aspects of voice are considered: orderly political transfers; transparency and fairness of the legal system; civil liberties; political rights; freedom of press; and democratic accountability. Source: Kaufman et al. (1999a, 1999b).

- TR = central government spending on social security and welfare as it appears in the table "Expenditure by function for consolidated central government". Source: IMF (2001a).

- PG = central government expenditure on goods and services as it appears in the table "Expenditure and lending minus repayments by economic type, consolidated central government". Source: IMF (2001a).

- LPG = central government capital expenditure as it appears in the table "Expenditure and lending minus repayments by economic type, consolidated central government". Source: IMF (2001a).

- Y = Gross Domestic Product (GDP) in local current prices. Source: IMF (2001b).

- T = total revenue for central government (excluding grants) as it appears in the table "Revenues and grants, consolidated central government". Source: IMF (2001a).

- *open* = ratio of exports of goods and services plus imports of goods and services over two times GDP. Source: Penn World Tables 5.6 update.

- *old* = the ratio of the population above 65 of age to the total population aged between 15 and 65. Source: World Bank (2000).

- *pop* = total population as of mid-1993. Source: World Bank (2000) and United Nations (2000).

- $POLITY$ = index of political regime type, normalized to range from -10 (most autocratic) to 10 (most democratic). Source: Marshall and Jaggers (2000).

- GDP/CAP = real GDP per capita in thousands of 1985 international dollars. Source: Penn World Tables 5.6. update.

Sample coverage The sample used in the regression analysis covers as many countries as data is available for. The sample therefore contains some countries which are dictatorships or monarchies. We have chosen to keep all countries in order to enlarge the variation in recorded voice. See the next section for a discussion of sensitivity to choice of sample. The sample covers the following countries (order according to their score on the (1990-96 average) $POLITY$ index, and if equal score, then in alphabetic order): Bahrain [score of -9], Kuwait, Syria, Bhutan, Burundi, Indonesia, Morocco, Rwanda, Iran, Zimbabwe, Burkina Faso, [score of -4 or better]: Cameroon, Croatia, Egypt, Tunisia, Singapore, Yemen, Malta ,Peru, Zambia, Malaysia, Mexico, Russia, Nepal, Sri Lanka, Dominican Rep, Estonia, Nicaragua, Argentina, Belarus, Colombia, Paraguay, Romania, Brazil, Bulgaria, Chile, Latvia,

variable	Obs	mean	std. dev	min	max
voice	81	.59	.18	.23	.84
POLITY	81	.77	.30	.05	1
TR/Y	68	8.4	6.3	.09	22.6
PG/Y	81	10.0	4.8	.77	26.5
LPG/Y	80	3.9	3.6	.41	30.1
T/Y	81	26.5	9.9	10.4	52.9
open	81	79.2	46.3	17.5	287.3
old	81	.15	.6	0	.3
pop	81	39.7	106.8	.26	898.2
GDP/CAP	81	11164	9017	692	37511

Table 3: Summary Statistics of the Data Used in the Regression Analysis.

Namibia, Pakistan, Venezuela, Bolivia, the Czech Republic, India, Madagascar, Mongolia, Panama, Poland, South Africa, Thailand, Trinidad and Tobago, Turkey, Australia, Austria, Belgium, Canada, Costa Rica, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, the Republic of Ireland, Israel, Italy, Japan, The Republic of Korea, Lithuania, Luxembourg, Mauritius, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, the United States, Uruguay and New Zealand [score of 10].

The sample of countries used in Figure 1 contains the 17 countries used by Tanzi and Schuknecht (2000), except New Zealand, and, in addition, Denmark, Greece, Iceland, Luxembourg, the Republic of Korea, Portugal, and Mexico. The sample of countries used by Tanzi and Schuknecht (2000) contains Australia, Austria, Belgium, Canada, France, Germany, the Republic of Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Estimation techniques and robustness The regressions are estimated with STATA 7.0 using OLS but adjusting the standard errors to allow for heteroscedasticity. The results are robust to changes in econometric specification. The log specification reported in Table 2 gives the best overall fit. Results are also robust to inclusion of a full set of regional dummies, a measure of the fraction of young people (aged less than 15), alternative measures of the size of government, and are not sensitive to exclusion of countries one at the time. The results are sensitive, however, to the choice of sample. Using $POLITY$ to rank countries on a scale from -10 (most autocratic) to +10 (most democratic), the results are robust to excluding the most autocratic countries (with a score of -10 to - 4 (for $\frac{TR}{Y}$ and $\frac{LPG}{Y}$) or -10 to -3 (for $\frac{PG}{Y}$)). Excluding more countries, reduces the significance of the estimated coefficients on voice but the signs are preserved. The sample with countries that scores -4 or better on the $POLITY$ index excludes countries like Zimbabwe and Indonesia. The most autocratic countries that remain in this restricted sample is Croatia, Cameroon, Egypt and Singapore.