Political Incentives to Privatize

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Abstract

While there exists a large literature characterizing the political determination of the size of the government, much less attention has been paid to the political determination of the scope of government (i.e., what activities are undertaken by public rather than private entities). While there are economic costs and benefits to privatization, there is also a political benefit to incumbents: by privatizing today, politicians transfer future revenues (when they might not be in office) to the present. This political benefit leads to over-privatization. We show that this political benefit persists even if politicians are able to borrow against public assets. We analyze the relationship between privatization and the political environment, as well as complete a normative analysis of the costs and benefits to society of allowing politicians to privatize assets.

[Keywords: Privatization, Borrowing, Accountability, Scope of Government]

In December of 2008, Chicago leased the city's parking meters and the associated revenue stream to a private consortium in exchange for $1.15 billion. A later investigation by the city's inspector general conservatively estimated the net present value of the revenue stream at more than $2.13 billion.[1] Why did the city effectively leave $947 million on the table? The inspector general is clear in his judgment:

> The temptation of entering into [asset sales] in order to receive upfront payment to solve short-term financial problems, without properly considering the long-term implication of the deal [led to the inefficient privatization]. - Inspector General Report, June 2, 2009, (Hoffman, 2009)

This paper considers the *political* determination of what assets remain in the public sphere and what are sold to the private sector. Public assets constitute much of the total wealth of governments and the sale of these assets is as important as borrowing to the long-term fiscal health of governments. The total value of the American highway and road network alone is estimated to be $2.4 *trillion* (Winston, 2010). Technological advancement such as electronic tolling makes it feasible to charge for and privatize services that have previously been provided as public or semi-public goods such as urban highways. While current federal law prohibits the use of tolls on existing federally funded interstate highways, recent proposals suggest allowing states to charge tolls.[2] There are other varied opportunities for privatization at various level of government. Recent examples of privatized assets include public utilities, recreation facilities, and public transportation lines.

While there exists a large literature characterizing the political determination of the size

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[1] The estimate was conservative in that it used a discount rate of 7%, 2 percentage points greater than the city's actual borrowing costs.

[2] Exceptions to the prohibition include grandfathered sections of the system such as the New Jersey Turnpike, pilot projects and specially built HOV lanes (Halsey III, 2014).

of the government (Alesina and Tabellini, 1990; Blais et al., 1993; Boix, 1998, 2001; Coughlin et al., 1990; Iversen and Cusack, 2000; Iversen and Soskice, 2006; Meltzer and Richard, 1981; Miller and Moe, 1983), much less attention has been paid to the political determination of the scope of government and privatization. With regards to the question of privatization in particular, previous studies have focused on the economic consequences and efficiency, but have largely ignored the political incentives of those making the privatization decision.[3] Ignoring the political dimension of privatization decisions leads to an incomplete and possibly misleading set of conclusions about the desirability of privatization. If privatization is beneficial but under-utilized, then allowing or encouraging privatization is unambiguously good. However, as we demonstrate, politicians have an incentive to over-privatize in certain circumstances and this tendency is exacerbated by specific political and market conditions. Thus, in order to understand the desirability of allowing privatization, it is essential to understand the political environment.

While we focus on assets that generate externalities, a related literate, motivated by the period of economic transition following the collapse of the USSR, considers the privatization of State Owned Enterprises (SOEs) that engaged in activities generally thought to be regular market activities in western economies (see Cavaliere and Scabrosetti (2008) for a survey). Many of the papers in this literature consider the costs of political interference into decisions such as employment levels. One role that emerges for privatization in this setting is as a means of increasing the costs of political intrusions (Shleifer and Vishny, 1994) by raising transaction costs. Thus, privatization is appealing to reformers interested in reducing inefficiencies (Boycko

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[3]   Models have focused on information asymmetries (Levin and Tadelis, 2010; Tirole and Laffont, 1993)], incentive provision (Hart et al., 1997; Trebilcock and Iacobucci, 2003), innovation (Bouché and Volden, 2011), self-regulation (Ostrom and Ostrom, 1999), commitment (Schmidt, 1996, 2000) and the classic market failures associated with natural monopoly and externalities (see Roland (2008) for a summary).

et al., 1996). While these papers do not consider the decision to privatize or not, Börner (2004) does. However, consistent with the themes of the literature on SOEs, Börner focuses on the problem of managerial incentives and employment rather than investment and externalities as we do. Furthermore, Börner does not explicitly consider election incentives but instead, focuses on the behavior of politicians with different objective functions.[4] Consequently, the electoral incentives and political uncertainty central to our model are absent and the analysis does not consider variations in the political environment or the possibility of borrowing.

To our knowledge, the only other paper to explicitly consider the electoral incentive to privatize is Biais and Perotti (2002), but they focus on an entirely different set of questions and hence, incentives and mechanisms. In their model, Biais and Perotti consider the question of *how* to privatize state assets in transition economies. Different privatization schemes (vouchers or public offerings with or without rationing) result in different asset allocations among the voting population and hence, changes in the median voter's preference for pro-industry policies. In contrast, we consider the question of *when* a political actor might choose to privatize. We model and analyze the political costs and benefits for a politician making the privatization decision in light of existing economic trade-offs. Our focus is on the difference between the value that politicians and voters attach to privatization and the effect of electoral and market institutions on this conflict. By privatizing today, politicians transfer future revenues (when they might not be in office) to the present (when they are certain to use them). We examine the privatization decision from the politician's perspective and contrast it with the voter's optimal choice. Our approach sheds light on positive questions (e.g., when will privatization occur?), as well as normative concerns (e.g., when is privatization beneficial to voters?). More generally,

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[4]   While one of the objective functions for the government is called a "vote maximizer", in practice, it is modeled as a politician that maximizes the surplus of the purchasers of the SOE and there is no election.

the insights from our consideration of the privatization decision extend to a variety of other fiscal decision including tax policy, pension negotiations and performance contracts, a theme to which we return in the conclusion.

Beyond contributing to the literature on privatization, we also view this paper as contributing to an emerging literature that explores the politics of infrastructure and investment, which highlights the durable nature of public investment. Callandar and Raiha (forthcoming) develop a model where investment in different infrastructures can affect the relative appeal of incumbents in the future by creating commitment problems for challengers. Glazer (1989) emphasizes that one of the benefits of durable investment (even when it is inefficient) is that it generates commitment relative to short-run investments that are subject to whims of collective choice. The commitment problem that exists between the lending market and the politician in our model highlights that one of the benefits of privatization is that it generates a commitment to invest in a profit-maximizing manner.

The connection between electoral incentives and the short-run decisions of incumbents highlighted in our model echoes insights from work by Mayhew (1974) and Tufte (1975). The effects of incumbent decisions on the economy are noted by Bartels (2009) and a literature in macroeconomics formalizes political incentives to manipulate the economy in the theory of political business cycles (see Drazen (2001) for a review).

As a general result, we find that the political benefit associated with privatization can lead to over-privatization, but whether over-privatization occurs depends on the political environment and market structures. When politicians are confident that they will be reelected, they behave more like long-term owners and retain and invest in public assets. This is optimal for voters as private owners ignore externalities associated with the assets. As political uncertainty

increases, public control becomes less appealing for voters as politicians discount the future more and invest less. However, as political uncertainty increases, the political benefit of privatization increases as well and this distorts the politician's decision, making it different from the voter's preference. For intermediate levels of political uncertainty, politicians privatize assets to enjoy the immediate windfall, even though voters prefer public ownership to privatization. As uncertainty increases, the public failure associated with government control exceeds the private failure associated with privatization and both voters and politicians prefer privatization. Therefore, the ability to privatize has an ambiguous effect on voters' welfare.

An important contribution of our model is that it allows us to examine a variety of institutional features related to elections and financial markets as well as how both affect the benefits of privatization from the voters' perspective and the likelihood of privatization. We find that electoral features that increase the patience of politicians, such as longer terms and higher term limits, have two distinct effects. First, they increase the quality of public control by aligning the preferences of politicians with voters. Second, they reduce the likelihood of over-privatization. The structure of the financial market also matters as we find that increased access to asset-specific borrowing markets, such as revenue bonds, reduce the incentives to over-privatize. In fact, access to borrowing can greatly increase voter welfare by reducing over-privatization precisely when it is most costly to voters. This result demonstrates how the presence of markets can ameliorate, but not eliminate, political failure by increasing the set of options that politicians have to achieve their aims. Additionally, our results on borrowing emphasize that the transfer of control is an essential element of privatization that distinguishes it from other forms of contracting that are often colloquially referred to as privatization.

We proceed as follows. In section 1, we describe the details of the model and discuss

our assumptions. In section 2, we characterize the investment behavior of both public and private owners illustrating that both may deviate from the socially optimal level. We further demonstrate that depending on initial parameters, either public or private ownership, each with its attendant shortcomings, may be optimal for the voter. In section 3, we compare the optimal ownership structure to the one chosen by the politician and characterize the factors that drive privatization. We show that over-privatization can occur and characterize when it is most likely and most costly. We then ask how unbundling control rights and cash flow rights through borrowing affects privatization. We conclude by connecting the theoretical insights of the model to existing literatures in political science and macro political economy and discuss future directions of research.

1   Model Preliminaries

The model consists of a representative voter (she), a politician (he) who must make a decision about the control of a public asset, and a profit-maximizing private investor (it). The asset is valuable as it generates revenue in the future, but it requires investment in the present. In addition to generating revenue that can be used for government spending, the asset generates an externality that could be negative or positive. Voters care about the quality of government services, which are a function of government spending and the quality of the politician as well as the externality generated by the asset. The politician can decide to privatize the asset. In this case, the government receives a lump-sum payment equal to the expected profitability of the asset in private hands. If the politician decides to retain control of the asset, he must decide on the level of investment.[5]

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[5] In related ongoing work, we ask what happens when the politician has additional regulatory instruments such as taxation at his disposal. In general, we find that the introduction of tax instruments has ambiguous effects on the frequency and type of privatization, but that the main political forces and effects we identify are unaffected.

The politician values social welfare and enjoys rents from holding office. However, the politician faces an election between the time the asset ownership and investment decisions are made and the time that the asset produces returns in the form of revenue and externalities. The private owner is a profit maximizer and faces no uncertainty in its role as owner. Consequently, the private owner invests to maximize the long-term profitability of the asset.

1.1 Timing, Investment Costs and Returns

The model proceeds over three periods. Let $t \in \{0, 1, 2\}$ denote the period. In period 0, the politician decides whether to privatize the asset and, in an extension, how much to borrow. In period 1, the owner of the asset decides on the level of investment. The level of government service, which is a function of the politician type and level of spending, is realized. Between periods 1 and 2, the voter observes the privatization decision, the level of government service and decides whether to retain the incumbent through an election. In period 2, the asset produces revenue and externalities that depend on the amount invested. Additionally, government services which depend on revenue, the externality and the office holder's type are realized, and the game ends. Throughout, we assume all features of the game are common knowledge and the only private information is the investment action taken by the politician or private owner. The type of the politician is also initially unknown to all players. The equilibrium concept is Perfect Bayesian Equilibrium (PBE), which implies that all players make correct conjectures about the investment activity undertaken by the owner of the asset. The sequence of play is summarized in figure 1.

Let x denote both the level and the cost of investment (we assume linear cost to facilitate exposition). The output of the asset consists of two components. The first is the market appropriable return of the asset: for a fixed investment of x, the asset returns $R(x)$ units
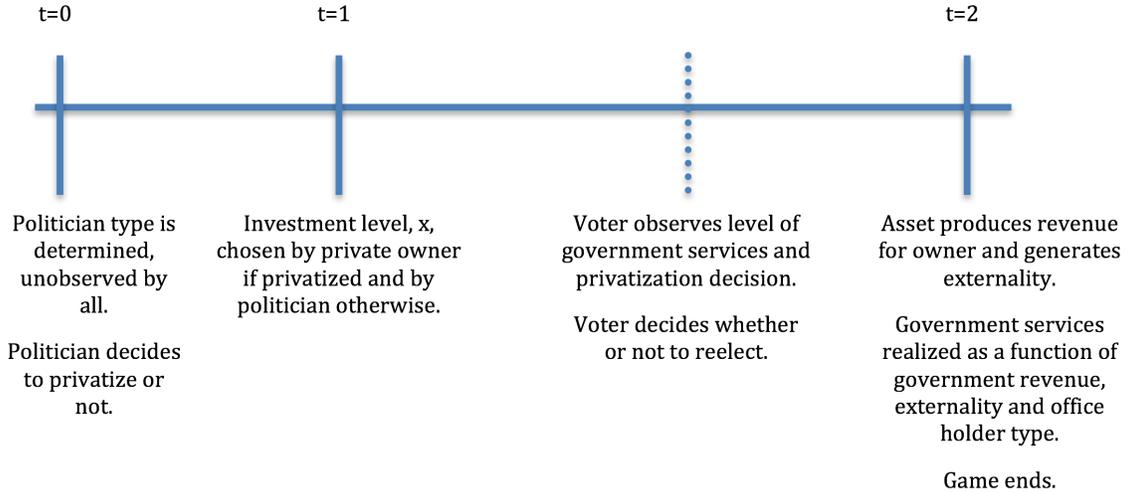
Figure 1: Sequence of Events

of revenue in the second period, where the technology exhibits decreasing returns to scale with $R' > 0, R'' < 0$, and $R(0) = 0$. The market appropriable returns are the only element of production that a private owner considers when making an investment decision and when valuing the asset. If the politician does not privatize the asset, these market returns become revenue for the government. In addition to the market appropriable returns, we assume that the asset generates non-appropriable externalities, $S(x)$. If these are negative externalities then we assume that $S' < 0$ and $S'' < 0$. If these are positive externalities then we assume that $S' > 0$ and $S'' < 0$. To ensure interior solutions, we assume that $R'(x) + S'(x) \to \infty$ as $x \to 0$. It is common knowledge that S and R are known by all players, but the level of investment is private knowledge (however, all players will make correct conjectures in equilibrium).

Let Q denote the amount the government receives for selling the asset. We assume a perfectly competitive market for asset control. Hence, the value of the asset is equal to the expected profit of the asset, $Q = R(x) - x$, where the level of investment is decided by the private owner and is anticipated by the politician. In Appendix B, we demonstrate that the main results of the model are robust to relaxing the assumption that the politician gets the full value for the asset as is the case with our motivating example of the privatization of Chicago's

parking meters. If the politician is not able to extract the full value of the asset from the buyer, it reduces the appeal of privatization for both the politician and the voter, but the same wedge introduced by the political benefit of privatization exists. Variation in the price of the asset generates comparisons about the quality of privatization rather than the possibility of over-privatization per se.

1.2 Utilities

In periods 1 and 2, the voter experiences government services that depend separably on the level of government spending and the quality of the office holder. In period 2, the voter also experiences the externality (positive or negative) generated by the asset. Let ν_t denote the quality of the politician in office at period t. We assume that government revenue raised through taxes is fixed and generates revenue flow, B_t, in each period. Apart from the borrowing against the asset considered in an extension, we assume the government neither borrows nor saves.

If the politician retains control of the asset, the quality of government services experienced in period 1 consists of the quality of the politician and government revenue net of investment costs:

$$E_1^G = \nu_1 + B_1 - x. \tag{1}$$

In period 2, the level of government services is equal to the quality of the politician, plus government revenue, plus the returns of the asset and the externality generated by the asset:

$$E_2^G = \nu_2 + B_2 + R(x) + S(x). \tag{2}$$

If privatized, the quality of government services in the first period consists of the quality of the politician, plus government revenue, plus the value of the asset in private hands (the sale price of the asset):

$$E_1^P = \nu_1 + B_1 + Q = \nu_1 + B_1 + R(x) - x. \tag{3}$$

In period 2, the level of services is equal to politician quality, plus government revenue and the level of externality under private control:

$$E_2^P = \nu_2 + B_2 + S(x). \tag{4}$$

The total utility of the voter is simply the sum of government services experienced over the two periods. As the asset is sold for its full appropriable value, differences in ownership matter to the voter only to the degree to which they affect investment decisions (but see Appendix B for the case where the government does not recover the full value of the asset).

The utility of the politician is assumed to equal the per-period utility of the voter plus exogenous rents to office, $\gamma > 0$, if in office. If out of office, the politician's utility is assumed to be zero. Private owners are assumed to be profit-maximizing and ignore any externalities associated with production. We characterize the investment behavior of the two possible owners, but begin by first describing the voter's optimal investment as a benchmark.

1.3   Discussion of Model

While the restriction to assets and activities that produce externalities might seem limiting, we believe this framework accommodates a variety of settings. First, many activities do generate negative or positive externalities. For example, oil and gas production is associated with local pollution and environmental harm in addition to contributing to global levels of greenhouse gases (Howarth et al., 2011). Investment in transportation infrastructure generates increased appropriable revenue through tolling and user fees as well as increases the value of nearby property (Bowes and Ihlanfeldt, 2001). If nearby real estate is not owned by those making infrastructure investments, then these increases in property values represent an non-appropriable positive externality. Returning to our earlier examples of privatized roads, private

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owners will not internalize congestion externalities imposed on other routes when setting toll rates. With regards to parking meters, rates set to maximize profits will not take into account issues related to access or externalities imposed on nearby business reliant on parking. Bus shelters are another commonly privatized asset where there is often misalignment between social and appropriable returns. As bus shelters generate revenue through display advertising, revenue is often maximized by placing shelters in areas with lots of pedestrian traffic and demographics desired by advertisers, criteria that might not coincide with providing shelters where bus riders need them. Another interpretation that is consistent with our model is that private owners will act as monopolists only concerned with the profitability of their activity, whereas public monopolists will value consumer welfare as well.

Alternatively, the spillovers may include activities and outcomes that are valued by a politician, but not by the market in general. For example, a private owner may employ less labor, reduce services, or reduce access to credit whereas a politician and his constituents might value these activities. Anzia and Moe (2014) provide evidence consistent with politicians that value public sector employment and higher public benefits. They suggest that the mechanism is either political pressure generated by public sector workers or the sincere preferences of politicians. In either case, as these pressures increase politicians will be less inclined to privatize assets.

The key characteristic about which the voter attempts to learn and that the politician seeks to obfuscate is their quality, ν. For example, politicians might differ in their ability to manage bureaucracies, wring out cost savings, identify efficient approaches and negotiate with suppliers. They might also differ in their character and or need to divert resources to inefficient but politically valuable uses. A high quality politician (an efficient, honest manager of public resources) is thus able to provide the same level of service as a low quality politician for less

money. Our notion of quality can be thought of as the instrumentally valuable component of valance.[6]

Our assumption that the politician's utility is zero when out of office can be substantially relaxed. What is important is that the politician values government services more while in office than when out of office. For example, his utility out office could include the level of externality or could simply be a fraction, $Z < 1$, of the utility that he would receive if reelected. The assumption that the politician benefits from public service more while in office than out (a form of present bias) is motivated in a variety of ways. First, high levels of public service improve the politician's electoral prospects and thus, his ability to enter into long-term agreements and relationships. Second, politicians are able to trade upon the goodwill of the electorate to achieve other personal or political goals. Third, politicians are able to direct public services towards their own favored projects.[7] Finally, politicians may enjoy the prestige and reflected glory that comes from a well-functioning government. See Maskin and Tirole (2004) for a similar set of assumptions and a discussion of a politician's notional discount rate.

2 Investment Behavior

2.1 Optimal Investment

Let x_{FB} denote the optimal level of investment from the voter's perspective and note that it is defined as the solution to the following first order condition which, given our assumptions, is both necessary and sufficient:

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[6]   Other elements of valance, such as charisma, in as much as they do not affect a politician's ability to negotiate, are thus, not included in our notion of quality. Including them in the model would not affect our results, as they would simply add additional political uncertainty to the politician's decision to invest.

[7]   One of the public investment projects saved by the sale of the Chicago parking meters was a large public park dedicated to the mayor's late wife.

$$S'(x) + R'(x) - 1 = 0. \tag{5}$$

As we demonstrate in the next section, the actual level of investment under private or public control varies from this optimal benchmark in different ways, suggesting that there is a trade-off between privatization and retained public control.

2.2   Investment under Privatization

If the asset is privatized, the private owner makes an investment, x, in period 1, obtains returns, $R(x)$, in period 2, and ignores the externalities generated by the asset. Let x_P denote this profit-maximizing investment level and note that it is defined as the solution to the following first order condition, which, since $R(x)$ is strictly concave, is both necessary and sufficient:

$$R'(x) - 1 = 0. \tag{6}$$

Comparing equation (6) to (5), it is immediately apparent that in the presence of a negative (*resp.* positive) externality, the firm over-produces (*resp.* under-produces) relative to the first best.

2.3   Investment under Political Control

Unlike the benchmark case or private investment, the investment decision under public control depends on the incumbent's political calculus. The representative voter conditions her reelection decision on the quality of government services, which is determined by the size of the budget, the level of investment, and the competence of the incumbent politician.

As the level of investment is fixed in period 1, the only factor that the voter can affect is the quality of the office holder in period 2. The voter thus forms an expectation about the incumbent type and chooses to retain if the expected type of the incumbent is greater than the expected type of the challenger (see Persson and Tabellini (2002), Ashworth (2005), and

Ashworth and Bueno de Mesquita (2006) for related models).

We assume that the challenger's quality, ν_C, is unknown and is distributed uniformly on the interval $[-\frac{\xi}{2}, \frac{\xi}{2}]$. Therefore, the expected challenger quality is $E[\nu_C] = 0$. We assume that the incumbent's quality, ν_I, is also unknown to both the voter and the politician and is distributed uniformly on $[-\frac{\xi}{2} + I, \frac{\xi}{2} + I]$ with the associated cumulative distribution function $F = \frac{1}{\xi}(X + \frac{\xi}{2} - I)$.[8] The expected incumbent quality, $E[\nu_I] = I$, can be greater or less than the expected challenger quality, where $I > 0$ corresponds to an advantaged incumbent and $I < 0$ to a disadvantaged incumbent. We additionally assume that I lies within the range of possible challenger types, $I \in [-\frac{\xi}{2}, \frac{\xi}{2}]$.

In order to determine the amount that the politician invests in equilibrium, we suppose the voter conjectures that the politician will choose a level of investment equal to x^*. We then determine the politician's actual investment decision in light of this conjecture and impose consistent beliefs upon the voter in order to derive the equilibrium level of investment.

For a given conjecture of investment, x^*, the voter, who observes spending, E_1^G, and knows budget, B_1, has the following estimate of the incumbent's type:

$$\hat{\nu}_I = E_1^G - B_1 + x^*. \tag{7}$$

where E_1^G is the observed level of spending equal to $B_1 - x + \nu_I$. The politician is reelected if the voter's updated belief about his quality is greater than the expected quality of the challenger. That is, if $\hat{\nu}_I \geq E[\nu_C] = 0$ (i.e., $\nu_I \geq x - x^*$).

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[8] The assumption that the politician does not know his type is not critical to our analysis. If the politician and the voter could perfectly observe the incumbent's type, there would still be uncertainty about the challenger type and our result would hold. The intermediate case in which the incumbent has private information about his type would introduce additional considerations about signaling, which are not the focus of our analysis, but the main features of our model would still be present.

Given the voter's conjecture about the level of investment, the politician believes he is reelected with probability:

$$Pr(\nu_I \geq \ x - x^*) = 1 - Pr(\nu_I < x - x^*) = 1 - F(x - x^*). \tag{8}$$

Given such a belief, the politician chooses x to maximize his total expected utility:

$$\underbrace{B_1 - x}_{\substack{\text{First Period} \\ \text{Spending}}} + \underbrace{(1 - F(x - x^*))}_{\text{Reelection Probability}} \underbrace{[B_2 + R(x)}_{\substack{\text{Second Period} \\ \text{Spending}}} + \underbrace{\gamma}_{\substack{\text{Second Period} \\ \text{Office Rent}}} + \underbrace{S(x)}_{\substack{\text{Second Period} \\ \text{Externality}}}]. \tag{9}$$

To understand the problem faced by the politician, consider the effect of an increase in investment (increased x) on the the politician's expected utility. The immediate effect is a decrease in first period spending and hence government services which are enjoyed by both the voter and the politician. An indirect effect of this reduction in government service is a decline in the voter's assessment of the politician's type. This reduced assessment is reflected in a decreased probability of winning ($(1 - F(x - x^*))$ is decreasing in x). The effect of this decreased reelection probability on the politician's utility depends on the rents of office (γ), the future budget (B_2), and the net benefits associated with the asset ($R(x) - S(x)$). While reductions in current spending and the reelection benefits are costs associated with investment, the benefits of investment are reflected in the expected future net benefits of the asset, which, in turn, depends on the probability of reelection.[9]

The first order condition for this problem defines the level of investment as a function of the voter's conjecture and the primals of the model. Given our assumptions about the distribution of politician types and the returns to production, our program is strictly concave and has an

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[9] Note that the politician will never invest more than the first best level. If he did, that would imply that $R'(x) + S'(x) < 1$ and he could do strictly better by reducing investment which would increasing current returns at a rate of 1 and reduce future returns by at most $R'(x) + S'(x)$. This further implies that for all feasible solutions of political investment, $R'(x) + S'(x) \geq 1 > 0$, which we will invoke in later proofs.

interior solution for all feasible levels of investment. Therefore, we have a unique solution defined

by the first order conditions[10]:

$$-1 - F'(x - x^*)[\gamma + B_2 + (R(x) + S(x))] + (1 - F(x - x^*))(R'(x) + S'(x)) = 0 \qquad (10)$$

Substituting in for the functional form of the uniform CDF and PDF and multiplying by $\frac{1}{\xi}$, we

arrive at the following:

$$(\frac{\xi}{2} - x + x^* + I)(R'(x) + S'(x)) - (R(x) + S(x)) - (\xi + \gamma + B_2) = 0 \qquad (11)$$

In order for the investment decision to be a Perfect Bayesian Equilibrium, the beliefs of the

voter must be consistent: hence, $x^* = x$. Imposing this condition on equation (11), we can

characterize the politician's choice of investment under government control as a function of the

incumbent's advantage (or disadvantage), I, the benefits of holding office in the second period

(γ and B_2), and the degree of electoral uncertainty ξ. Formally, $x_G(\gamma, \xi, I, B_2)$ is defined by the

following condition:

$$-(R(x_G) + S(x_G)) + (\frac{\xi}{2} + I)(R'(x_G) + S'(x_G)) - \xi - \gamma - B_2 = 0. \qquad (12)$$

2.4   Comparative Statics on Public Investment Decisions

The degree to which the incumbent is either advantaged or disadvantaged relative to the

challenger plays a significant role in much of the analysis that follows. When the incumbent

enjoys a greater advantage, the degree of political uncertainty decreases and the politician's

preferences become more aligned with that of the voter. As electoral reforms such as longer

terms or increased term limits also reduce political uncertainty, the results presented in terms of

incumbent advantage can be re-interpreted in terms of institutional reforms that lead to longer

terms of service by incumbents.

The temporal nature of the investment decision has two distinct components. First, the

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[10]   See Appendix A for proof.

voter does not directly observe incumbent quality or the level of investment. Instead, she observes government services, which are a function of both: reduced investment and an increase in an incumbent's quality both lead to increased spending on first period government services. This creates an opportunity for incumbents to manipulate voters' learning about their quality and introduces an *electoral effect* on investment. While the voter anticipates this behavior and is not fooled in equilibrium, the temptation to boost short-term spending by reducing investment nonetheless exists. As the benefits of being in office increase, so too does the incentive to obfuscate the voter's updating. The benefits of office in our model consist of both the level of expected government revenue in the second period, B_2, and the non-budgetary benefits of office, γ. As either of these increase, investment in the asset in the first period decreases.

The second effect on investment is the *political impatience effect*, which is related to the politician's belief that he will be in office in the future. An incumbent who is less confident about his reelection prospects places less weight on the future returns generated by current investment. As the incumbent's advantage (*resp.* disadvantage) increases, the probability that the incumbent is reelected increases (*resp.* decreases), and he weighs the future returns to investment more (less).[11] We formalize these results in Remark 1:

Remark 1. *The level of investment under political control, $x_G(\gamma, \xi, I, B_2)$, is continuous and strictly decreasing in benefits to office, γ, and second period fixed revenues, B_2, and continuous and strictly increasing in the advantage of the incumbent, I.*

Proof. This and all subsequent proofs are found in Appendix A. □

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[11] Because the voter is faced with the problem of selecting between two politicians of different types, even if she were able to perfectly observe the level of investment (x), she could not commit to reelecting conditional on the level of investment (see Fearon, 1999). Thus, even if investment were perfectly observable, there would still exist a wedge (political impatience) between the politician's and voter's interest, both at the investment stage, and privatization stage and our substantive results would hold. See Lemma 2 which assumes that investment is observable.

As mentioned, an alternative interpretation of electoral advantage is increased term lengths or other electoral features that lead to longer political careers. As the political horizon of the incumbent increases, the political impatience he faces decreases, and he places more value on future outcomes.

Alternatively, there may be no uncertainty about a politician's electoral prospects. If $\xi \to 0$ then the incumbent will either be known to always be better than the challenger ($I > 0$) and reelected with certainty or known to always be inferior to the challenger ($I < 0$) and never reelected. If always reelected, the politician shares the same investment preferences as the voter and invests at the optimal level. Conversely if never reelected, the politician never benefits from investment, only bears costs in the present and hence would invest zero.

The effects of political impatience and the temptation to fool the electorate are in the same direction, and the politician under-invests relative to the social optimum, a result we formalize in Lemma 1.

Lemma 1. *The level of investment under political control, x_G, is strictly less than the voter's optimal level of investment, x_{FB}.*

As mentioned, the electoral effect is driven by the temptation to boost short-term spending in order to increase the voter's assessment of the incumbent, which depends on the assumption that the voter cannot observe investment. If we instead assume that the voter can observe spending, would we still observe under-investment? The answer is yes and illustrates that the *electoral* and *political impatience* effects act independently of each other. This result is also of use when we consider the politician's decision to privatize later.

Consider a variation of the model where the voter observes both the level of expenditure, E_1^G, and investment level, x. The voter has complete information about the politician's quality, $\nu_I = E_1^G - B_1 + x$, and reelects him if $\nu_I \geq 0$. In other words, the probability of re-election is

equal to $1 - F(0) = \frac{1}{2} + \frac{I}{\xi}$, which we now denote by $\pi(I, \xi)$ for simplicity. When choosing his level of investment, the politician maximizes:

$$B_1 - x + \pi(I, \xi)[\gamma + B_2 + R(x) + S(x)]. \tag{13}$$

Let $\hat{x_G}$ be the level of public investment under observable investment. As the politician maximizes (13), $\hat{x_G}$ is defined by the following first order condition:

$$\pi(I, \xi)(R'(\hat{x_G}) + S'(\hat{x_G})) - 1 = 0. \tag{14}$$

Comparing this condition with (11), we can verify that $x_G < \hat{x_G}$. If the voter can observe the level of investment, the politician faces the same reelection chances but invests more. However, as the next lemma establishes, the level of investment is still less than the socially optimal level.

Lemma 2. *If investment is observed by the voter, the level of investment under political control is strictly less than the socially optimal level of investment, but strictly higher than the level of investment when investment is not observable. Additionally, that investment is not sensitive to the returns to office in the second period.*

Before, returns to office affected investment by increasing the temptation to fool the voter. With observable investment, obfuscation no longer plays a role, and investment is distorted only by political uncertainty about whether the politician will be in office in period 2.

In addition to the incumbent quality advantage or disadvantage, political impatience also depends on the amount of uncertainty that the voter and the politician have about the incumbent's type. However, the relationship between uncertainty and investment depends on whether the incumbent is advantaged ($I > 0$) or disadvantaged ($I < 0$). As a benchmark, define a neutral type as an incumbent with the same expected type as the challenger ($I = 0$) who makes an observable investment. For a disadvantaged incumbent, increased uncertainty about type leads to decreased political impatience and increased investment towards the level of a neutral type.

As uncertainty about type becomes great, there is essentially no advantage or disadvantage, and all incumbents behave like a neutral type. Remark 2 formalizes these results.

Remark 2. *If an incumbent is disadvantaged such that $I < 0$, then the level of investment under political control is strictly increasing in the degree of uncertainty about types, ξ. As the degree of uncertainty increases, investment by all types approaches the investment of the neutral type. That is, as $\xi \to \infty$, $x_G(\gamma, \xi, I, B_2) \to \hat{x}_G(\gamma, \xi, 0, B_2)$ for all $I \in [-\frac{\xi}{2}, \frac{\xi}{2}]$.*

2.4.1 Discussion of investment

Both public and private ownership have shortcomings. Private failure is present because private owners ignore the externalities associated with their activities. Public failure arises as public owners are overly concerned with the electoral effects of short-run spending and discount the future due to political uncertainty. The voter is faced with a choice between public or private failure and from her perspective, either ownership structure can dominate. However, the choice of the ownership structure lies with the incumbent and is subject to many of the same distortions. We turn to this problem in the following section.

3 Privatization Decisions

We first characterize the optimal ownership structure from the perspective of the voter to serve as a benchmark when considering the actual privatization decision in period 0. Privatization is optimal for the voter if government services under private control $(E_1^P + E_2^P)$ are greater than under public control $(E_1^G + E_2^G)$.[12] Substituting in the equilibrium choices of investment and suppressing the arguments of $x_G(\gamma, \xi, I, B_2)$, privatization is optimal if:

$$\underbrace{B_1 + (R(x_P) - x_P) + B_2 + S(x_P)}_{\substack{\text{Utility under} \\ \text{Privatization}}} > \underbrace{B_1 + -x_G + B_2 + R(x_G) + S(x_G)}_{\substack{\text{Utility under} \\ \text{Public Control}}}, \quad (15)$$

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[12] We assume that if government services are equal under public and private control, the voter prefers government ownership. This has no effect on our results.

which can be rewritten as

$$\underbrace{(R(x_P) - x_P) - (R(x_G) - x_G)}_{\substack{\text{Gains in Profitability} \\ \text{under Privatization}}} > \underbrace{S(x_G) - S(x_P)}_{\substack{\text{Differnce in Externality} \\ \text{under Government Control}}} . \qquad (16)$$

The left-hand side of equation (16) represents the gains in profitability due to moving from a government owner to a private owner. Since x_P is the unique maximizer of profit, the difference between profit under private control and public control is weakly positive and generically strictly positive. The right-hand side is a measure of the gains in the externality under government control. While the gains in profit under private control are always positive, it is possible that the value of the externality is higher under private control if the externality associated with the asset is positive and the public under-investment problem is severe enough. In fact, for either a positive or a negative externality, if the politician sufficiently discounts the future or is influenced by electoral concerns, then the under-investment problem can dominate and privatization is preferred.

While future benefits from office and uncertainty about incumbent quality both contribute to public failure, we characterize the voter's preference for privatization in terms of the incumbent's electoral advantage. The quality of the incumbent serves as a parameterization of the overall probability of winning: For a fixed level of γ, ξ and, B_2, a higher quality (higher I) increases the incumbent's chance of winning. As I varies from the lower bound of challenger quality $\left(-\frac{\xi}{2}\right)$ to the upper bound $\left(\frac{\xi}{2}\right)$, the probability of reelection varies monotonically and continuously from 0 to 1. Consequently, the level of investment under public control varies from 0 (when reelection is impossible) to the socially optimal level as the probability of reelection reaches 1.

In certain cases, the voter always prefers public ownership to private ownership. Public investment always generates a strictly positive level of welfare even if it is far from optimal.

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Therefore, if the level of investment under private control generates weakly negative welfare, then private ownership is strictly dominated by even very inefficient public control. We define an asset to be *private feasible* if output under privatization is welfare positive. That is, if $R(x_P) + S(x_P) - x_P > 0$. For a private feasible asset there exists a level of public failure at which a voter prefers privatization.

Lemma 3. *If an asset is private feasible, there exists $\bar{I}_V(\gamma, \xi, B_2)$ such that the voter prefers privatization if and only if $I < \bar{I}_V$.*

Whether or not the politician's preference for privatization corresponds with the voter's depends upon the benefits and costs to privatization for the politician, which we expand upon in the next section.

3.1   Political Asset Sale

When deciding whether to privatize, the incumbent trades off the immediate benefit against the loss of control. If privatized, the asset generates a windfall for the politician, but constitutes a loss of control over the use of the asset. Since the windfall is experienced in the present and the benefits of control are born out over time, a politician facing sufficient political uncertainty is willing to privatize.[13]

While the politician values the transfer of the value of the asset from the future to the present due to political uncertainty, privatization could also be appealing for electoral reasons. The windfall from the asset could allow the politician to boost short-run spending and further affect the voter's belief about his quality. The second effect is ruled out by our assumption

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[13]   Our results regarding the desirability of privatization are framed in terms of over-privatization relative to the social optimal. An alternative interpretation of these results consistent with the model is that politicians are willing to accept lower prices for assets than is socially desirable. Assuming that the politician gets the highest prices simply frames the results in terms of the *likelihood* of over-privatization rather than the *quality* of privatization. See Appendix B for an alternative characterization that considers the quality of privatization.

that privatization is observable and voters update their belief about the resources available for government services from B_1 to $B_1 + Q$. If politicians are able to secretly privatize the asset, the appeal of privatization would increase. Since we are interested in establishing over-privatization, assuming public observability of privatization biases us away from finding the result.

Under observable privatization, voters update their beliefs about spending levels and are able to perfectly infer the politician's type. As before, the politician is reelected with probability $\pi(I, \xi)$ and the value of privatization to the politician is:

$$\underbrace{R(x_P) - x_P}_{\text{Market Value of Asset}} + B_1 + \pi(I, \xi)[B_2 + \gamma + \underbrace{S(x_P)]}_{\text{Externality Under Private Control}}. \tag{17}$$

We begin by noting that under both privatization and retained control, the reelection rate faced by the incumbent is the same value, $\pi(I, \xi)$.[14] As with the voter, simply comparing utilities under each regime gives us the condition under which privatization is pursued by the politician:

$$\underbrace{B_1 + (R(x_P) - x_P) + \pi(I, \xi)(B_2 + \gamma + S(x_P))}_{\substack{\text{Utility under} \\ \text{Privatization}}} > \underbrace{B_1 + -x_G + \pi(I, \xi)(B_2 + \gamma + R(x_G) + S(x_G))}_{\substack{\text{Utility under} \\ \text{Public Control}}},$$

$$\tag{18}$$

which can be also be written as:

$$\underbrace{(R(x_P) - x_P) - (R(x_G) - x_G)}_{\substack{\text{Gains in Profitability} \\ \text{under Privatization}}} > \pi(I, \xi) \underbrace{(S(x_G) - S(x_P))}_{\substack{\text{Difference in Externality} \\ \text{under Government Control}}} + \underbrace{(\pi(I, \xi) - 1)R(x_G)}_{\substack{\text{Delayed value of revenue} \\ \text{under Government Control}}}. \tag{19}$$

As before, the left-hand side of (19) represents the gains in profitability of moving from a government owner to a private owner and the right-hand side represents the gains to public ownership. However, the gains to public ownership are discounted by the politician. Comparing the relative weight the politician places on privatization and public control, we see that he

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[14] This fact follows directly from the assumptions of the model, but is not substantively important for our results. We could assert by assumption that reelection rates differ under privatization and retained control. As long as these differences are not too great then all our results would still hold. For example, an incumbent with poor prospects would be willing to pay a limited electoral penalty to advance revenue through privatization. Of course, if this penalty were sufficiently high than it is possible that no incumbent would be willing privatize.

discounts public control more than the voter does. As a result, the politician never prefers public ownership when the voter does not and we can establish that under-privatization never occurs.

Proposition 1. *If the voter prefers privatization, then the politician prefers privatization.*

This distortion or wedge is driven by two distinct differences in the preferences. First, while both the politician and the voter value gains in the profitability of the asset, the relative value of the trade-off between profitability and the externality is different for the politician and the voter. Due to political uncertainty, the politician is willing to accept a greater decrease in welfare in the *future* for increased revenue in the *present.* Second, the politician values the transfer of revenue that would have accrued to the government under public control from the future to the present. The voter is indifferent between revenue in the present and the future as he does not discount the second period. While there is public failure (under-investment in the asset under retained control) and private failure (externalities are ignored), these distortions imply that the voter and the politician value these failures differently. These contribute to our second result, which states that over-privatization occurs when the degree of public failure is sufficient for the politician to prefer privatization, but not so great that the voter prefers privatization.

Proposition 2. *There exists $\bar{I}_{POL} > \bar{I}_V$ such that the politician prefers privatization if and only if $I < \bar{I}_{POL}$.*

While the wedge implies that the politician always values privatization more than the voter, it does not imply that they always disagree on the privatization decision. When the politician believes he is very unlikely to be reelected, then conditional on retaining control, he invests very little. This implies that public control is undesirable for the voter and by Proposition 1, for the politician as well. Therefore, in the case of high political uncertainty, the voter and

Agree: Privatize
•Private investment is superior to public investment and voter prefers privatization
•Incumbent is sufficiently impatient to prefer privatization

Disagree: Over-Privatize
•Public investment is superior to private investment and voter prefers public control
•Incumbent is sufficiently impatient to prefer privatization

Agree: Do Not Privatize
•Public investment is superior to private investment and voter prefers public control
•Incumbent is sufficiently patient to prefer retaining control.

Disadvantaged Incumbent

Advantaged Incumbent

$\bar{I}_V$

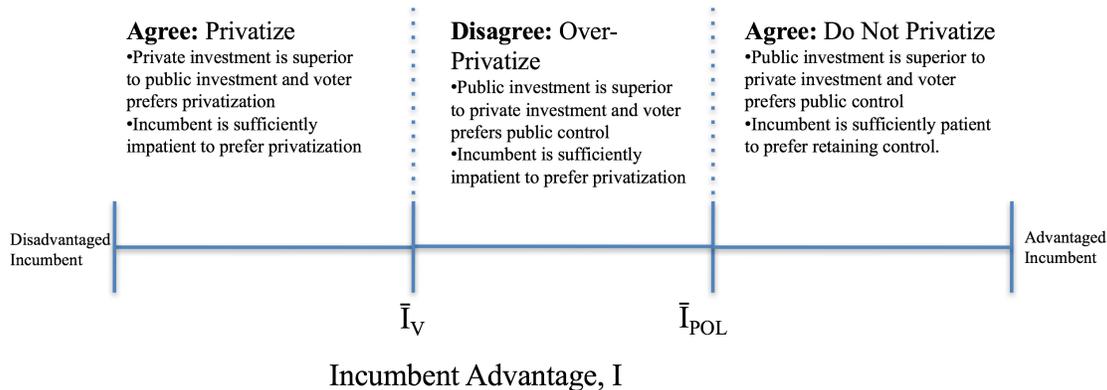$\bar{I}_{POL}$

Incumbent Advantage, I

Figure 2: Privatization Decision Agreement as a Function of Incumbent Uncertainty

the politician agree that privatization is best. Conversely, when the politician is very likely to be reelected, he prefers to retain the asset, invests enough that the voter also prefers public control, and again they agree. For intermediate uncertainty, the politician prefers privatization, but conditional on retaining control, invests enough that the voter would prefer public control. It is for these intermediate values that the politician over-privatizes (see figure 2).

3.2 Discussion of Over-privatization

While privatization occurs for $I < \bar{I}_{POL}$, it is only excessive from the voter's perspective if $I \in (\bar{I}_v, \bar{I}_{POL})$. If the incumbent discounts the future sufficiently (i.e., $I < \bar{I}_V$), then the degree of public failure is such that both the voter and politician prefer privatization. Similarly, if $I > \bar{I}_{POL}$, then both the politician and the voter prefer retaining public control. It is only for intermediate values of political uncertainty that a conflict regarding the privatization decision emerges.

Privatization is most costly for the voter when the preferences between the voter and incumbent regarding the privatization decision are furthest apart. Consider two values of the political advantage, $I_1, I_2 \in (\bar{I}_v, \bar{I}_{POL})$, where $I_1 > I_2$. For both I_1 and I_2, there is excessive privatization, but the cost to the voter in terms of forgone welfare is higher for I_1, since it

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is further from her indifference point. Reforms that reduce over-privatization by reducing the incumbent's threshold are especially valuable as they reduce over-privatization precisely when the associated costs are highest. This emerges as one of the benefits of a borrowing market considered in the next section.

3.3   Borrowing

Privatization is appealing for the politician as it allows for the transfer of future revenues to the present. Borrowing is an alternative means of transferring revenue to the present with the added benefit of retaining control. Whenever privatization is not preferred by the voter, it is because the politician's equilibrium use of the asset is closer to the the voter's optimal than a private owner's. If borrowing induces a politician to forgo privatization in these states, then it has the possibility of eliminating the burdens of over-privatization. As we demonstrate, while borrowing is welfare-improving, it nonetheless fails to eliminate over-privatization. The reason is that by retaining control, the politician generates a commitment problem with lenders. Unable to make binding commitments to use the asset in a profit-maximizing manner, lenders anticipate the politician's investment and do not lend an amount equal to the privatized value of the asset.

This highlights a fundamental distinction between privatization—which entails the sale and transfer of both beneficial and control rights—and borrowing—which entails the sale and transfer of only beneficial rights. Privatization generates a commitment as to the future use of an asset that borrowing cannot recreate.

To most closely connect the borrowing problem to the privatization problem, we model a revenue bond market where a bond backed by the returns of the asset is sold in period 0 and repaid using revenues generated by the asset in period 2. To focus on the moral hazard issue

that exists between politicians and lenders, we assume the politician's investment decision is observed by voters. This shuts down the incentive for the politician to manipulate spending to manipulate the voter's beliefs and, therefore, the reelection probability is fixed and only depends on the quality of the incumbent.

For a fixed loan amount, L, the politician chooses investment level, x, to maximize his expected utility, noting that revenue generated by the asset only flows to government coffers once the loan amount has been repaid:

$$L + B_1 - x + \pi(I, \xi)[S(x) + Max\{0, R(x) - L\}]. \tag{20}$$

The problem is that (20) is generally not concave or differentiable so the standard first order approach is not valid. In Appendix C, we undertake a detailed analysis of the problem and show that when borrowing is available, under public control the politician continues to invest the same amount, x_G and borrows a positive amount, L^*. Importantly, the politician is not able to borrow against the full expected returns of the asset in the second period and so $L^* < R(x_G)$.

The reason the politician is not able to borrow the full future revenue associated with the loan is that lenders take into account the politician's incentive to invest when they cannot capture the full returns of the asset. If the loan is too large, the politician would fail to invest enough and the loan would not be repaid. Thus, the size of the loan is structured so that the politician has a marginal incentive to value increased output and the level of investment with borrowing is the same as without borrowing and social welfare under political control is unaffected. However, because the politician has transferred wealth from period 2 to period 1, the politician strictly prefers public control with borrowing to public control without borrowing.

3.3.1 Over-privatization and Borrowing

When borrowing is allowed, the politician has more options when controlling the asset. While borrowing allows for some of the fiscal transfer effects of privatization, we show that there are still conditions under which privatization dominates public control.

As discussed, the politician's utility increases with the amount he can borrow thus if the asset remains under public control, the politician borrows the most lenders would be willing to provide, L^*, and invests the same level as in the case without borrowing. This unambiguously increases the benefits of retaining public control. We proceed by showing that over-privatization occurs, albeit less often than in the previous case. As before, the politician compares his utility under privatization and retained control:

$$\underbrace{B_1 + (R(x_P) - x_P) + \pi(\nu_c)(B_2 + \gamma + S(x_P))}_{\substack{\text{Utility under} \\ \text{Privatization}}} > \underbrace{B_1 + L^* - x_G + \pi(\nu_c)(B_2 + \gamma + R(x_G) - L^* + S(x_G))}_{\substack{\text{Utility under} \\ \text{Public Control}}},$$

(21)

which can be also be written as:

$$\underbrace{(R(x_P) - x_P) - (R(x_G) - x_G)}_{\substack{\text{Gains in Profitability} \\ \text{under Privatization}}} > \underbrace{\pi(\nu_c)(S(x_G) - S(x_P))}_{\substack{\text{Difference in Externality} \\ \text{under Government Control}}} + \underbrace{(\pi(\nu_c) - 1)(R(x_G) - L^*)}_{\substack{\text{Delayed Value of Revenue} \\ \text{under Government Control}}}. \quad (22)$$

However, since the loan must leave some residual incentive for the politician, $(R(x_G) - L^*) > 0$, the last term, $(\pi(\nu_c) - 1)(R(x_G) - L^*)$, is greater than before, but remains negative. Consequently, while the wedge between voter and politician is smaller, it still exists and over-privatization still occurs. We formalize these results in the following proposition:

Proposition 3. *If the politician is able to borrow, there exists $\bar{I}_{Borrow} \in (\bar{I}_V, \bar{I}_{POL})$ such that the politician prefers privatization if and only if $I < \bar{I}_{Borrow}$.*

Borrowing is beneficial, however, as the politician privatize less often. It is also the case that, conditional on retaining public control, a politician's utility is strictly larger when he can borrow. Conditional on privatization occurring, the social cost of privatization remains the

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same. Therefore, allowing borrowing is weakly preferable for the social planner.

We conclude that the absence of adequate borrowing instruments may force privatization to occur in situations where political control would be optimal. Thus, better functioning capital markets reduce over-privatization, especially when the social losses from over-privatization are highest. The logic is not one of competitive outside options. Instead the introduction of a borrowing market reduces the appeal of socially inefficient privatization. Nonetheless, even if borrowing is available, over-privatization can still occur.

4   Conclusion

The phenomenon we identify is a form of short-term fiscal populism: politicians trade future revenues for resources in the present to support current spending and to improve their political prospects. As these trades result in suboptimal investment, they sometimes harm welfare. The temptation to transfer returns from the future to the present even if socially costly occurs in settings other than privatization. Short-term fiscal populism has obvious manifestations in deficit spending and deferred capital spending, but also less obvious applications in tax code manipulation (such as delayed depreciation schedules), public sector employee negotiations (offering future pension benefits in exchange for lower current wages) and so called public-private partnerships that tap private capital for public social programs. In all of these settings, political actors are able to decrease costs or increase revenues in the present in exchange for inefficiently high costs or reduced revenues in the future.

Our model of accountability is based on competence and highlights the value of transferring (at costs) resources from the future to the present. As long as such transfers are valued by politicians more than the public–either for electoral or other reasons–the main insights from our model will continue to hold. Nonetheless, there may be settings where countervailing forces,

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such as a desire to signal a certain ideology, are present and the degree to which our mechanism dominates will depend on the context.

Our paper also demonstrates that even if politicians are not directly able to affect the choices of future office holders or to alter the preferences of voters, there nonetheless exists an electoral incentive to deviate from the optimal policy (see Prato (forthcoming) for a model where a politician's decisions can affect future voter preferences). We view this as complementary to the results of Besley and Coate (1998) on dynamic electoral linkages as we derive it in a model without ideology.[15]

Our results on borrowing markets also suggest that more complete financial markets may alleviate some of the most pernicious aspects of short-term fiscal populism, but caution is warranted. While financial instruments may reduce the incentive to pursue socially inefficient privatization, they may also introduce new opportunities for politicians to make other trades against the future. Social Impact Bonds (SIBs) are a recent example of such an instrument. When SIBs are issued, private market investors provide funding for public service projects such as early childhood education or anti-recidivism programs in exchange for repayment and bonuses that are conditional on the success of the program. SIBs can amount to regular borrowing if politicians seek funding for existing successful programs or for programs that otherwise would be funded and private investors only finance programs that are certain to succeed.[16]

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[15] Besley and Coate (1998), Alesina and Tabellini (1990), and others adopt an ideological model of politics and assume that politicians care about policy outcomes. Thus, the degree to which they discount the future depends on the likely identity of future office holders. If an incumbent is likely to be replaced by someone with similar preferences, they do not discount the future as much as if they are replaced by someone with very different preferences. As we are interested in the windfall and rents of office, we model only the quality of politicians and assume rents are proportional to government performance.

[16] SIBs are sometimes justified as a means of transferring risk to the private sector. However, this must be an incomplete explanation as private investors must be compensated to bear risk and the relative risk of

An important issue related to privatization that this paper has not addressed is the use of regulatory instruments such as taxation. We believe that the interaction of taxation and privatization is an important question to pursue, but one that raises a host of complications that are beyond the scope of this paper. Chief among these concerns is the question of commitment and timing. For example, a politician that is able to commit to long-run tax rates at the time of privatization will take into account not only the effect of tax rates on future revenue and externalities, but also the effect of tax rates on the market value of the asset. Conversely, if commitment is completely infeasible then future politicians will be tempted to effectively expropriate private owners by taxing the appropriable returns. An intermediate scenario would allow the politician to set the tax rate after the sale of an asset, but before the firm makes an investment. The net result is that the positive and normative effects of taxation are ambiguous and depend on assumptions about commitment and timing: privatization can become less or more desirable to the voter and the amount of privatization (both voter optimal and over-privatization) can increase or decrease. Additionally, depending on the type of externality and the level of commitment, the tax rate itself can vary from a subsidy (even when the asset generates a negative externality) to full expropriation and generically does not correspond with the Pigouvian rate. While the underlying intuitions from our model continue to hold in a model with taxation, we believe that complete and thorough examination of the interaction between taxation and privatization warrants further investigation.

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such programs is much greater for private sector than large government entities.

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