When to privatize? When to nationalize? A competition for ownership approach

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I. INTRODUCTION

The literature on privatization is now extensive. The current explanations for the phenomenon, however, are still at pain to explain the basic facts of the public to private changes in firms' ownership. They provide no rationale of why the privatization phenomenon occurred at about the same time in many countries, (albeit with varying intensity), and why not before. In addition, existent theories can hardly account for the privatization/nationalization policy reversals. Indeed, recent history shows that privatization phases alternate with nationalization episodes, following a general wave-like pattern. Post-WWII nationalizations were followed by privatizations from the 80s to 2007. Since the beginning of 2008, the privatization movement has dramatically slowed down[1] and the trend has even reversed with the beginning of the financial crisis in September 2008[2].

Facts thus flatly contradict one or several aspects of existent theories of the state ownership of firms, as far as they try to determine a general, a-temporal,

[1]''The first half of 2008 saw privatization proceeds for European Union fall to one of their lowest levels since […] the late 1980s.'' (Privatization Barometer, Interim Report 2008)

[2]Government takeover of private firms around the world are nothing less than partial nationalizations. Recent full and partial nationalizations include the Royal Bank of Scotland, HBOS-Lloyds TSB, Northern Rock, American International Group, Bradford and Bingley, Fortis, ING Group, Fannie Mae, Freddie Mac …

''best'' allocation of firms between private owners and the state, either from an economic efficiency, or from a political maximization of support, point of view. These theories do not provide reasons for policy changes such as privatization or nationalization. And this is the basic challenge to theorization.

A theory explaining these fluctuations of property rights allocation between two types of owners, private investors on the one hand and the state on the other hand, should make explicit first the respective motives of private investors and of the state, as well as the changing circumstances that can modify their choices, determining an exchange of equity ownership, one way or the other, between them.

II. A BRIEF SURVEY OF THE LITERATURE

A bird's eye survey shows that the various explanations do not account for the diversity and history of the privatization and nationalization policies. Most of them focus on privatization only, at least since the privatization wave of the 1980s.

As Opper (2004) points out two main directions have been taken within the field of research. The first one tries to identify optimal privatization methods (Boycko, Shleifer and Vishny 1995, Brada 1996). The second one deals with tests of differences in efficiency between State Owned Enterprises (SOEs) and private firms (as for instance González-Páramo and De Cos, 2005). Djankov and Murrell (2002) provide a good overview of these empirical studies.

Less attention has been paid to the reason why privatization movements prevailed in the recent period. Since these theories purport to explain policies, they correctly focus on the governments' motives: trying to improve economic efficiency and/or gain enough support to stay in power. All these approaches, however, face a common problem: by focusing on governments' ultimate motives, they exclude almost by definition any change in policy, because the ultimate and fundamental governmental motives cannot change so radically as to imply at times a preference for nationalization, and at other times for privatization, nor can they explain the large country to country and period to period variations in the degree to which they would follow such policies.

This weakness of that ''preference approach'' is present in all existent theories that we classify in three groups for discussion purpose: efficiency theories, political theories, and macroeconomic policy or hard budget constraint theories.

In the efficiency theories, the government tries to satisfy the electorate by choosing the mode of management control – by the state or by private investors – that will maximize efficiency, and thus the level of production and as a consequence the income of citizens.

In political theories, the government pursues a policy dictated by an overall vision of the ''good'' mode of production, either public or private, according to

the preferences (ideologies), of politicians and/or of the electorate, whether or not inspired by economists. It could also pursue an interest-group "realpolitik" aiming at a maximization of votes or support.

In the budget constraint (or macroeconomic) theories, the government will try to maximize its own discretionary resources, which are currently severely constrained, in order to face its spending needs (assumedly necessary to the pursuit of the vote motive) by selling public enterprises at a time when the proceeds of such sales will be maximal (or high at least).

Efficiency theories

A large part of the literature explains privatization movements by a difference in efficiency. Whether the government is self-interested or aims at maximizing social welfare, SOEs are considered in most cases relatively inefficient compared to private firms.

In the case of a self-interested government, bargaining behavior between public managers, politicians, and some interest groups leads to SOE's inefficiency (Borcherding, Bush, and Spann, 1977; Boycko, Shleifer and Vishny, 1996; Shleifer and Vishny, 1994). In addition, because of principal-agent problems described by Alchian (1965), Yarrow (1986) Vickers and Yarrow (1989), SOEs remain necessarily less efficient than private firms.

In the case of a benevolent government, some authors argue about the advantages of SOEs over private firms (Choksi, 1979; Labra 1980; Millward, 1976; Sacristan, 1980; Willner 1996) and the limits to the beneficial scope of privatizations (Sappington and Stiglitz, 1987; Shapiro and Willig, 1990). Nevertheless, there are still arguments for the superior efficiency of private ownership over public ownership. SOEs are less efficient than private firms because of public manager's weaker motivation in reducing costs (Hart, Shleifer, and Vishny, 1997). This difference in efficiency remains in the case of non-contractible goods (Hart, Shleifer, and Vishny, 1997) and in the case of natural monopolies (Kay and Thompson, 1986; Bishop and Kay, 1989).

A difference in efficiency between state owned and privately owned firms cannot explain, however, privatization and nationalization *movements* since it is static by nature. This makes the task of explaining why privatizations have occurred during the 1980s and not before exceedingly difficult with this sole argument. In this framework, the post WWII and the current nationalization waves can only be explained by "mistakes" in government policies or "ideology", which amounts to the same thing since an ideology is a set of ideas that does not rely on scientific truth. Since these mistakes are supposed to have endured for several decades, one has to rely also on the hypothesis of gross irrationality in the behaviour of politicians in power and of the economists who advised them.

Political theories

The "ideological" explanation of privatization and nationalization is weak since it assumes both irrationality on the part of deciders and an unexplained change of ideas from one period to another and between countries. Indeed a theory of endogenous change of ideologies is still to be created, while such changes would have to be sweeping to explain observed nationalization/privatization alternation.

Megginson and Netter (2001) note that "twenty years ago proponents of state ownership could just as easily have surveyed the postwar rise of state-owned enterprises and concluded that their model of economic organization was winning the intellectual battle with free market capitalism". In the same vein, Shleifer (1998) derides great economists of the past for their positive advocacy of nationalization, and he also adds: …"how the world has changed", from a general preference for government ownership to a general preference for private ownership. It implies that even professional economists would be characterized by a surprising instability of their analyses and that their judgments are dominated by a priori (exogenous) instable preferences.

It could be true, and ideologies happen to change in the medium run, but one has to be reminded that economic analysis consists of explaining changing choices not by a psychological change of preferences (that economists are not well equipped to explain), but by changes of relative prices and incomes. We are thus brought back to a search for economic determinants.

The alternative "realpolitik", interest group or political market equilibrium perspective adopted by Lopez-de-Silanes, Shleifer, and Vishny (1997), Shleifer and Vishny (1998), Opper (2004), and Bortolotti and Pinotti (2006), enumerates driving forces and obstacles to privatization (fractionalization of parties, unemployment levels for instance) that could evolve through time and differ between countries, explaining countries specificities more easily than common policy waves and reversals.

Hard budget constraint theories

A more recent set of studies explain privatization movements by hard budget constraints and State's financing needs (Yarrow 1999, Bel, 2009). This approach faces several problems. If a government has immediate financing needs, why should it privatize instead of increasing taxes or issuing bonds? If a government has large financial resources, why should he buy – nationalize – firms instead of lowering taxes or reimbursing its debt? In both cases, when should a government start nationalizing and privatizing and what are the appropriate levels of debt, taxes, and financial resources? The underlying public finance optimization problem and its solution are not made explicit.

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These theories also imply that governments sell their firms because financial markets are favorable (overvalued). However, when financial markets are thought to be overvalued, the private sector investors are also expected to be aware of the fact and to be rationally interested in selling their shares rather than buying more. All actors on the market, public and private, being sellers, there cannot be any exchange of property from public to private actors. The same is true when the market is believed undervalued. In that case, public and private actors are expected to be both buyers, thus no exchange can occur. There is no reason indeed why the government should systematically outperform private investors in the stock market.

Overall, an additional and general criticism to efficiency, political, and hard budget constraint theories is that they focus only on the government's behaviour and its ultimate motive of staying in power or augmenting its power. These three sets of theories are one-sided and fail to take into account the private sector's behaviour in the market exchange whereas nationalizations and privatizations consist in an exchange of property rights between two categories of actors, the State and the private sector. Indeed, nationalization can be considered as a market exchange, since, in open economies, the private owners of nationalized firms are generally compensated at about market prices (Langohr and Viallet, 1986)[3]. Privatizations obviously are also market exchanges since private investors' bids are necessarily voluntary. Thus, any theory of privatization and nationalization needs to explain the behaviour of both parties, the State and the private sector, in the market exchange.

III. A COMPETITION FOR OWNERSHIP

We suggest that the continuing mystery of privatization/nationalization can be solved by considering that the government's operational motive is the same than the private investor's motive: to control the firm's profit or cash flow in order to further one's own interests, while the ultimate motives differ. In the case of government, the one and major interest is political power and survival. In order to succeed any government (democratic or not) has to transfer some wealth to supporters, on top of consuming resources by itself. Instead of distributing profits to shareholders or retaining resources for the manager, the government which manages the state's properties uses the firms' resources to grant rents and advantages to selected and useful (to him) clienteles, thus aiming at maximizing his chances of staying in power. Both types of investors,

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[3]If the compensation for nationalization is less than the market price of the stockholders' equity, the government policy is partly a market exchange and partly a tax on shareholders (an expropriation without compensation). Our argument still applies to the market exchange part.

whether private or government, value firms for the cash flow they produce even though the beneficiaries of the cash flow they have in mind are different.

To control the cash flow, one has to own the equity of the firm, and thus both the state and the private investors are in a competition for the ownership of firms.

It follows that since private and government investors are both interested in firms, and if pure expropriations are ruled out, there should be a bidding contest between them for the control, i.e. for the ownership, of firms. In such a market competition for ownership the highest bidder should prevail. And the highest bidder is the one who values the firm most.

The value of the firm is the actualized value of the stream of future profits. If π is the value of current as well as future profits, the value of the firm V is π/k, k being the cost of capital or the cost of funds. The valuation of the firm by an agent thus depends on the expected profits π and the cost of capital k. The highest bidder will be the agent that has the highest π/k.

To make things manageable, let us first assume that there is no difference in efficiency between the public and the private sector.

The differences in valuations depend on the differences in the cost of funds.

$$\text{If}: \quad \text{k private} > \text{k state,}$$
$$\text{Then}: \quad \text{V private} = (\Pi/\text{k private}) < \text{V state} = (\Pi/\text{k state})$$

The government will outbid private investors. Each side will gain from the nationalization.

$$\text{Conversely, If}: \quad \text{k private} > \text{k state,}$$
$$\text{Then}: \quad \text{V private} = (\Pi/\text{k private}) > \text{V state} = (\Pi/\text{k state})$$

The private investor will outbid the government and each side will gain from the privatization.

As discussed previously, differences in efficiency between private and public firms may exist. If government management is less efficient than private management, state-owned firms' costs will be higher for any given production by a given coefficient, and the profit will be lower by a coefficient λ (<1). In that case the amount of profit that can be extracted from operating the firm will be Π for a private firm and $\lambda\Pi$ ($< \Pi$) for the state-owned firm.

In that case, a property allocation, "non corner" equilibrium can be reached only if k state $= \lambda$k private, that is, if the state has some comparative advantage at obtaining financing. This is plausible as the interest rates on government bonds are generally less than interest rates on corporate bonds for instance, due to a lower risk level (and risk premium) for the former.

However, such a difference in efficiency, and in the profit stream, is structural and permanent and thus cannot explain a *change* in the allocation of firms' ownership between the State and private investors. As a result, only divergences between k private and k state will determine movements of privatization or nationalization, as is the case where state and private management efficiency are identical.

The cost of funds is going to differ indeed because the source and structure of funds differ. Private investors obtain funds from issuing equity and bonds, while the government is financed by bonds and taxes[4]. It follows that the cost of capital of both actors is due to diverge frequently when the cost of equity diverges from the social cost of taxes, and when interest rates, the cost of equity, and the social cost of taxes fluctuate.

It follows that even if the managerial cost efficiency is the same for both private and public owners, their respective cost of capital being different, their incentives to buy or sell a given firm are different, thus allowing mutually advantageous trade of ownership rights.

Without any change in efficiency, politics, or ideology, a change of ownership could thus be explained by the fluctuations of the cost of equity, interest rates and social cost of taxes[5]. This in turn would explain why privatizations and nationalizations occur in waves but can differ in intensity from one country to another. The frontier is thus susceptible to change radically depending on the varying conditions of the competition for ownership.

It is a theory of the competition for ownership along the same classical lines as competition for ownership among private investors. Privatization (nationalization) being the purchase – at a price – of SOEs (private firms) by private investors (state investor) should be considered a rational outcome of current economic conditions.

This theory of the competition for ownership was first proposed and tested by Rosa (1988, 1993) [6]. However, in these papers, the cost of capital of the private sector was limited to the interest rate, and the weighted cost of funds was alluded to but not used in the tests. In the present research, we extend the previous model to remedy these shortcomings, and we introduce the weighted cost of public and private funds by taking into account the cost of equity, the private leverage and the public leverage, and we use a much newer and richer dataset.

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[4]The concept of a ''weighted average cost of State's fund'', similar to the corporate WACC is first used in Rosa (1988).

[5]The traditional efficiency explanation of nationalization/privatization frontier requires a change in the nature of the goods (private or public in the samuelsonian sense), or a change in externalities and market imperfections (the pigovian approach), a change in the relative efficiency of state and private management, or a change in the political equilibrium of groups and ideology, in order to explain a change of the frontier.

[6]Yarrow (1999) later replicated the same argument, but in the end focused only on the hard budget constraint aspect.

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IV. THE OWNERSHIP EQUILIBRIUM RATIO

The outcome of the competition for ownership depends on the valuation ratio R.

$$R = V\,private/V\,state$$
$$R = (\pi/kprivate)/(\pi/kstate) = kstate/kprivate$$

If:
r: Cost of equity capital
i: Interest rate assumed identical for state and private investors
l: Private leverage
g: Public finance leverage
t: Social cost of taxes
The respective costs of funds for private and state investors are:

$$\textbf{\textit{kprivate}} = [(1 - l)^* r + l^* i] \tag{1}$$

$$\textbf{\textit{kstate}} = [(1 - g)^* t + g^* i] \tag{2}$$

It follows that the private and state ownership values, Vprivate and Vstate, of the same firm are:

$$\textbf{Vprivate} = \Pi/[(1 - l)^* r + l^* i] \tag{3}$$

$$\textbf{Vstate} = \Pi/[(1 - g)^* t + g^* i] \tag{4}$$

As usual in the literature on the allocation of property rights in markets, the ownership goes to the highest bidder, the investor who values the corporation most.

When: Vprivate > Vstate, the state finds an advantage in selling and the private investors in buying. There is a voluntary exchange, a privatization move.

When: Vprivate < Vstate, there is a nationalization move.

Thus the ratio of private and state valuations, R, determines the direction of the exchange of property rights.[7] The private-state frontier fluctuates according

[7]Peirce (2004) criticized the model for assuming that privatizations and nationalizations could thus happen on a continuing basis, the scope of the public sector then being too unstable in theory, compared to the facts. Obviously, such exchanges do not take place very frequently in the real world given the transaction costs involved (including political costs). A privatization or a nationalization will be decided only when the change in the valuation ratio exceeds some threshold level.

to the values of diverse variables in the ratio: r, i, t, l and g.

$$R = \frac{\text{Vprivate}}{\text{Vstate}} = \frac{(1 - g)^* t + g^* i}{(1 - 1)^* r + 1^* i} \tag{5}$$

The ownership equilibrium ratio is 1. The ownership equilibrium is characterized by a ratio Vprivate / Vstate = 1. For this value both potential owners value the firm equally. No transaction should take place.

We want to know how the fluctuations of the various variables influence R.

V. THE IMPACT OF ECONOMIC CONDITIONS ON PRIVATIZATION AND NATIONALIZATION MOVEMENTS

The variables that affect the privatization and nationalization transactions in the model are the components of the state's and the shareholders' cost of capital, i.e. the cost of equity capital, the interest rate, the private leverage, the public leverage and the social (deadweight) cost of taxes.

The influences of the different variables are obtained by differentiating R with respect to the variables around its unitary equilibrium value. The sign of each derivative will determine the privatizing or nationalizing influence of these variables.

A positive derivative means that an increase in the factor's value leads to privatization because the value of the firm for private investors will increase more than the value of the firm for the state. And vice versa for a negative derivative.

Influence of the equity cost of capital, r

The derivative of R with respect to r is:

$$\delta R/\delta r = \delta\{[(1 - g)^* t + g^* i]/[(1 - l)^* r + l^* i]\}/\delta r$$
$$= \frac{-(1 - l)^*[(g - 1)^* t - g^* i]}{[r^*(l - 1) - i^* l]^2} \tag{6}$$

The theoretical sign is negative: an increase in the cost of shareholder's capital leads to nationalization.

Influence of the interest rate, i

The derivative of R with respect to i is:

$$\delta R/\delta i = \frac{(g - 1)^* l^* t - g^* r^*(l - 1)}{[i^* l - r^*(1 - l)]^2} \tag{7}$$

Here the sign of the interest rate influence on the ratio R depends on the sign of the following expression: $[(1 - l)^*g^*r - (1 - g)^*l^*t]$

Which could be positive or negative according to the value of the variables g, l, t, r.

If $(1 - g)^*l^*t > (1 - l)^*g^*r$

the whole derivative is negative and an increase in the interest rate leads to a nationalization.

If, on the other hand, $(1 - g)^*l^*t < (1 - l)^*g^*r$

the derivative is positive and an increase of the interest rate leads to a privatization.

All depends on the configuration in each time period of the variables g, l, t, r.

Influence of private leverage, l

Deriving R with respect to l gives:

$$\delta R/\delta l = \frac{(i - r)^*[(g - 1)^*t - g^*i]}{[l^*(i - r) + r]^2} \tag{8}$$

Again the sign of the derivative depends on the value of some variables, here i and r.

If the interest rate is higher than the cost of capital, the sign is negative. Then, an increase of the private leverage leads to nationalization. Usually however the equity premium being positive, the sign will be positive and an increase of the private leverage will lead to privatization.

Influence of the public leverage, g

Deriving R with respect to g gives:

$$\delta R/\delta g = \frac{-(t - i)}{i^*l - r^*(l - 1)} \tag{9}$$

The sign of the derivative depends on the sign of $(I - t)$. If the social cost of taxes is higher than the interest rate, as would usually be the case, the derivative will be negative.

Then an increase of the public leverage will lead to nationalization.

Influence of the social cost of taxes, t

Deriving R with respect to t gives:

$$\delta R/\delta t = \frac{-(g - 1)}{i^*l - r^*(l - 1)} \tag{10}$$

The sign here is positive. An increase of the social cost of taxes leads to privatization.

To sum up, the expected signs on privatization on theoretical grounds are:

a) Negative for the private equity cost of capital, and
b) Positive for the social cost of taxes.

They could be either positive or negative for the interest rate, the private leverage and the public leverage, depending on the respective values of the exogenous variables in any given period.

There is thus ample scope in the model for alternative privatization and nationalization moves, according to the conjunction of variable values in historical context.

However, some signs depend on the precise values taken by some variables in the model in given period of time. To account for the possible inversion of signs of the interest rate, the private leverage and the public leverage we construct dummy variables summarizing the influence of diverse variables on these signs, in every relevant observation period.

For instance, for the sign of influence of the interest rate on privatization (or nationalization) we compute in each period the sign of the term: $(1 - l)^* g^* r - (1 - g)^* l^* t$

For the sign of the private leverage we compute the sign in each period of $(r - i)$.

And for the sign of the public leverage we compute in each period the sign of $(i - t)$.

Then we introduce an interaction term of these dummies with the relevant variable, the sign of which they are susceptible to revert in certain periods:

- INTER 1: Interest rate $*$ dummy (0 if the expected influence is negative, 1 if the expected influence is positive).
- INTER 2: Public leverage $*$ dummy (0 if the expected influence is negative, 1 if the expected influence is positive).
- INTER 3: Private leverage $*$ dummy (0 if the expected influence is negative, 1 if the expected influence is positive).

We thus expect in theory a negative sign on the three variables themselves (interest rate, private leverage, public leverage) and a positive sign on the three interaction variables INTER 1, INTER 2 and INTER 3.

VI. DATA AND TEST

We test our theory on data for eight countries (Belgium, Denmark, France, Italy, the Netherlands, Spain, Sweden, and the United Kingdom) during the 1988–2002

period, whereas Rosa previously tested the initial model on data for nine countries (Belgium, Denmark, Ireland, France, Germany, Italy, Netherlands, Spain, and United Kingdom) for seven years (1963, 1971, 1973, 1976, 1979, 1982, 1985).

Our choice of these countries and of the period is based on data availability. Time series on privatizations and different components of the cost of funds are not available for other countries and longer time period.

The endogenous variable (PRIVAT/GDP) measures privatizations receipts as a per cent of GDP. This variable, rather than the number of privatizations, reflects the weight of privatizations into the economy. The often used number of privatizations obviously depends primarily on the dimensions of the firms that are privatized. Using it as the endogenous variable would have led us to consider countries involved in the privatization of an important number of restaurants and hotels (as the Czech Republic or Algeria for instance) as far more active than countries privatizing infrastructures and banks (as France and the United Kingdom)[8].

The exogenous variables are measured by the following:

- The equity cost of capital is approximated by the Earnings to Price Ratio (1/ Price Earnings Ratio). This is an approximation of the rate of return that investors demand for accepting to invest in firms, or the cost that firms have to bear to obtain equity financing. This approximation is equal to the true cost of equity capital when all earnings are distributed as dividends (the growth of the firm value is then nil), or when earnings are reinvested to provide a return just equal to the market capitalization rate. When the earnings are reinvested at a higher projected rate of return, the cost of equity capital is equal to the current Earnings to Price Ratio plus the net present value of growth opportunities of the firm, and the Earnings to Price Ratio then underestimates the true cost of equity capital. We thus assume in our tests that the growth opportunities do not vary too much through time or across countries in our sample. At the aggregate (country) level, and given the interconnexions of the economies and stock markets in our sample, the risk of a systematic bias in this measure then appears limited.
- The social cost of taxes is measured by the square of the average tax rate, $(\text{Taxes/GDP})^2$, as a rough approximation of ''Harberger's triangles''.
- The interest rate is the 3 month market rate, assumed identical for private and state borrowers.

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[8]The source of our endogenous variable is the most complete database available, the ''Privatization Barometer'' (FEEM, at http://www.privatizationbarometer.net/), which computes privatizations data in 25 European countries. It is the official data provider of the OECD.

- The public finance leverage is approximated by the ratio (Public Debt/(Public Debt + Taxes)) since governments finance their activities with taxes and debt.
- The financial leverage in private firms is approximated by the aggregated private debt of traded companies divided by their aggregated assets.
- And the three interaction variables have been defined previously.

As noted previously, the more common explanations found in the literature rely on the superior economic efficiency of private ownership versus state ownership, on the one hand, and on the ideological and interest group explanations on the other hand, with the occasional adjunction of budget constraint variables. Opper (2004) for instance explains privatization movements by a series of political, economic and social factors. Lopez-de-Silanes, Shleifer and Vishny (1997) also mix the three explanations into one by considering the role of the budgetary constraints of the counties in the US and the political resistance of unions and voters as factors explaining privatization levels in the US. On the other hand, Yarrow (1999) limits his explanation to the government budget constraint variable, as does Bel (2009) with regards to Nazi privatizations in the 1930s. None of these authors, however, takes into account the private investors side of the transactions, whether privatization or nationalization.

The economic determinants in our model such as public leverage, interest rates, and tax levels also reflect the government budget constraints which appear in some of the other works of the literature, but are justified there in a more ad hoc fashion. The difference in the theoretical basis of this work and of ours appears for instance in the inferences of the signs of influence for some of these variables.

Whereas we do not rely in our analysis on political variables, since we think of them as pertaining to the domain of preferences, and thus too stable to account for times series variability, in order to test the validity and robustness of our model against some of the political theories, we add two political variables used by Bortolotti and Pinotti (2006)[9]:

- The fractionalization of political power
- And the government's ideological orientation.

The variables used are summarized in Table 1. Given our choice of variables, our dataset of 8 countries for 15 years is the most complete currently available for this test, since:

- For an important part of the 25 countries in the database "Privatization Barometer", no data was recorded before 1992 or 1995. We made the choice of limiting the number of countries rather than the period of time.

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[9]Source of data: *Fondazione Eni Enrico Mattei*, FEEM Political Database 1975–2002, http://www.feem.it/fpd

Table 1

Summary presentation of the variables

Variable	Measurement	Source of data
Endogenous Variable (Privat/GDP)	Amount of privatizations as as % of GDP	Privatization Barometer and OECD
Cost of shareholder's capital (r)	1/Price Earning Ratio	Global Financial Database
Social cost of taxes (t)	(Tax receipts as a % of GDP)^2	OECD
Interest rate (i)	3 month market rate	Global Financial Database
Public finance leverage (g)	Public Debt /(Public Debt + Taxes)	OECD
Private finance leverage (l)	Aggregated Debt /Aggregated Assets	DataStream
INTER 1	Interest rate ∗ dummy (0 if the expected influence is negative, 1 if the expected influence is positive)	Global Financial Database
INTER 2	Public leverage ∗ dummy (0 if the expected influence is negative, 1 if the expected influence is positive).	OECD
INTER 3	Private leverage ∗ dummy (0 if the expected influence is negative, 1 if the expected influence is positive).	DataStream
Fractionalization of political power (fpp)	See http://www.feem.it/fpd	FEEM Political Database 1975–2002
Government's ideological orientation (ideo)	See http://www.feem.it/fpd	FEEM Political Database 1975–2002

- Available data from DataStream on aggregated private leverage since 1988 has also limited our choice of countries.
- Germany has been excluded from our dataset, because of the unclear impact of the reunification on endogenous variables of the model (i.e. public finance data)
- Greece has been excluded from our dataset, because of the lack of reliable data on public finance.
- Political variables of the "FEEM Political Database" were not gathered after 2002.
- Some public finance and private finance data for several countries are not available prior to 1988.

As is customary in panel data analysis (see Baltagi (1995)), we estimate both a fixed effects and a random effects model. The econometric methods we

Table 2

Random and Fixed Effects Model

Dependent variable: Privat/GDP	Random Effects Model				Fixed Effects Model			
Estimate in levels	(1)		(2)		(1)		(2)	
Label	Estimate	t Value	Estimate	t Value	Estimate	t Value	Estimate	t Value
Intercept	0.016594	1.66	0.015325	1.44	0.018013	1.23	0.016049	1.06
Cost of equity (r)	− 0.05712*	− 1.89	− 0.05782*	− 1.9	− 0.07154**	− 2.08	− 0.07415**	− 2.12
Social cost of taxes (t)	0.00776	0.34	0.00941	0.4	0.044362	0.94	0.049541	1.03
Interest rate (i)	− 0.04057*	− 1.64	− 0.04182*	− 1.66	− 0.05034**	− 1.95	− 0.05194**	− 1.99
INTER 1: Interest rate * dummy	0.027672	1.13	0.02931	1.17	0.039933	1.55	0.042937*	1.62
Public Leverage (g)	− 0.00531	− 0.44	− 0.00566	− 0.47	0.005367	0.29	0.005038	0.27
INTER 2: Public Leverage * dummy	− 0.00576	− 0.98	− 0.00518	− 0.85	− 0.00749	− 1.11	− 0.00648	− 0.92
Private Leverage (l)	− 0.01271	− 1.07	− 0.01178	− 0.96	− 0.03772**	− 2.11	− 0.03618**	− 1.99
INTER 3: Private Leverage * dummy	− 0.00171	− 0.41	− 0.00164	− 0.4	− 0.00353	− 0.83	− 0.00346	− 0.82
Fractionalization of political power (fpp)	− 0.00007	− 0.59	− 0.00007	− 0.57	− 0.00058*	− 1.63	− 0.0006*	− 1.67
Ideology (ideo)			0.000161	0.35			0.000239	0.52
R-Square	0.105		0.1061		0.2116		0.2137	
F Value					2.23		2.23	

Hausman Test				
	DF	9	10	
	m Value	24.7	38.95	
	Pr > m	0.0033	<.0001	

Significance level: 10 percent (*), 5 percent (**), and 1 percent (***).

use are the fixed effects model "FIXONE" and the random effects model "RANONE" in the SAS package. The following table (Table 2) presents the results of regressions with the random effects model and the fixed effects model. The correlation matrix and summary statistics are presented in Appendix.

A source of difficulty in the estimation of the model comes from a possible reverse causality problem. The privatization variable could impact financial markets since more privatization receipts could lead governments to reduce their debt and tax levels, and could thus affect the variables we consider exogenous, such as the interest rate, the equity cost of capital, or the leverage in the government budget. But several factors mitigate this possibility: first, the amounts of privatization receipts are quite small in the total government budgets. Second, by the tax smoothing mechanism (Barro 1979), the impact should be minimal on tax rates and thus on our variable measuring the welfare cost of taxes. It would be mostly accommodated by a change in the public debt level, but the direction of influence is uncertain: increased privatizations could be matched by increased debt or on the contrary could ease a debt reduction policy.

Assuming a variation in the debt level, the literature reports a very weak influence of government debt on interest rates[10]. For instance Engen and Hubbard (2004) conclude their paper as follows:

"the bulk of our empirical results suggest that an increase in federal government debt equivalent to one percent of GDP, all else equal, would be expected to increase the long term real rate of interest by about three basis points", that is, by 3/100th of one percent (0.03 of one percent).

Other authors tend to confirm such conclusions. Kinoshita (2006) estimates that "a one percentage point increase in the government debt-to-GDP ratio raises long-term real interest rates by 4–5 basis points", estimates close to those obtained by Laubach (2003) and Engen and Hubbard.

Moreover, since the private cost of equity capital is not independent of interest rates (through portfolio arbitrage and rebalancing) the impact of privatizations on stock returns should also be minimal. It does not seem then that a reverse causality problem should be the source of major difficulties in our empirical work.

VII. EMPIRICAL ESTIMATES AND COMMENTS

We test two variants of our equation in order to isolate the possible impact of ideology on privatization, a common if theoretically insufficient explanation of the phenomenon. Variant (1) does not incorporate the ideology variable while variant (2) does.

[10]Probably due in part to the broadening and internationalization of capital markets.

For the two tests (1) and (2), the fixed effects model is more appropriate than the random effects model, since the Hausman test is significant.

Some differences of significance appear for the exogenous variables.

The coefficient for the cost of equity is always negative and significant at 5% for all measures. As expected on theoretical grounds, a decrease of the cost of shareholder's capital leads to a privatization movement since it increases the private valuation of firms.

The coefficient for the interest rate is also always negative and significant at 5%. This is in conformity with the results previously obtained by Rosa. The coefficients, however, are much more significant in the present study. This vindication also gives an indication about the robustness of the analysis since the same result is obtained in a simpler, truncated model, and in the better specified and more complete present one.

The interaction variable INTER 1, which assess the impact of the interest rate, ceteris paribus, is always positive as expected, but is only significant in the second test (2). As we were expecting, when the cost of equity, the social cost of taxes and the public and private leverages are configured as follows: $(1 - g)^*l^*t > (1 - l)^*g^*r$, a decrease of the interest rate leads to a privatization movement.

However, the significant impact of interest rates on privatization should not conceal the fact that, based on the magnitude of the coefficients obtained in the two tests, we can say that a variation of the cost of equity exerts a relatively much stronger influence on privatization movements than a variation of the interest rate. In both tests, the coefficient obtained for the cost of equity is 40% larger than the one for the interest rate.

The coefficient for the private leverage is always negative and significant at 5%. As expected, when the interest rate is higher than the cost of capital, a decrease of the private leverage leads to a privatization movement. However its interaction variable INTER 2 is not significant.

As in Rosa (1993), the coefficient on the variable for the social cost of taxes is not significant, even if the sign is always positive as expected on theoretical grounds, thus further decreasing the plausibility of a pure budget constraint effect.

The coefficient on the variable for the fractionalization of political power is significant at 10% (fixed effect tests (1) and (2)) suggesting that indeed the political market structure can be an obstacle to privatization. However, as we were expecting, ideology is not significant. And finally, the hard budget constraint impact, tested here by the public leverage variable, again is not a significant determinant of privatization.

VIII. CONCLUSIONS

We have presented a positive theory of the fluctuating allocation of ownership rights between the State and private investors. This theory is based on a similar

interest of private investors and the State in the cash flow of firms, and does not necessarily assume inefficiency in the state owned firms, nor a sudden, unexplained reversal in ideological preferences. Both private investors and the State are rational but their respective cost of capital can and will diverge over time, changing the private/public valuation ratio, the basic determinant of the exchange of firm ownership. Both the state and the private investors want to control firms in order to use their cash flows either for increasing the wealth of shareholders and managers, or for government consumption and transfers to politically influent clienteles.

In the bidding competition for ownership the investor who will prevail is the one (State or private) which values the firm most. Most analyses of privatization polarize the attention on differences in managerial efficiency between private owners and the state, or on the ideological and political factor. But whatever these differences may be, observed differences in the cost of funds for privately owned firms and SOEs necessarily determine differences in valuation of the same firm by private investors on the one hand, and the state as an investor, on the other. It follows that a few economic variables, taken together, explain the direction of ownership transfers: the cost of equity capital, interest rates, the social cost of taxes, and public and private leverages.

This theory can explain the privatization and the nationalization waves, the possible reversals of policy from one to the other, as well as differences in the allocation of ownership between the public and the private across countries. Obviously other local political variables can also influence these policies, to amplify or dampen them since they reflect the ultimate redistributive aims of the government. But that influence will only be effective as far as the privatization or the nationalization does not decrease the government's overall resources. Otherwise, for instance, a government pursuing a nationalization policy in order to reduce unemployment, whereas the valuation ratio implies that the state valuation of firms is less than the private investors' valuation (due to a higher public cost of capital), would implicitly be willing to overpay for the firms acquisition, thus accepting a loss of resources in the process (an unfavorable trade with private investors). This loss of resource, and the associated loss of political support that it determines, constitutes the opportunity cost of pursuing a political objective contrary to the rational, valuation ratio determined, policy of support maximization. The higher this opportunity cost, the lower the probability of a government following such an unconditional – or "uneconomic" – strategy.

Vice versa, it is unlikely that a government would pursue an objective of increasing the efficiency of firms' management by privatizing when the private investors value the firms less than the state does (according to the relative costs

of funds criteria). This would necessitate that the government sells the firms at a loss, thus contracting its financial means and jeopardizing in the process its capacity to obtain political support.

The variables defining the valuation ratio thus fundamentally determine the common direction of privatization/nationalization policies and their possible reversal, as well as their differential national intensity.

It is to be noted also that hard budget constraint explanations are a also part of our theory but represent only half of the analysis since they do not consider the behavior of the partners in the exchange of property rights, the private investors. We thus claim that our theory provides the common framework into which other explanations can be inserted.

We have shown in the empirical part of the paper that the signs of influence of the relevant variables are those expected in theory, and are especially vindicated in our results for the cost of shareholder's capital, the interest rate, and the private leverage.

The results however are mixed for the public leverage and the social cost of taxes, even though the signs are always right. It seems in a way that the private investors are the main agents of rationality in the competition for ownership since the variables that directly affect their behavior are the ones that effectively and significantly determine the observed changes of ownership of firms during the last few decades. This conclusion, if valid, should cast some doubts on the capacity of an exclusively state centered approach to model and explain privatization and nationalization policies.

APPENDIX

Table 3

Summary Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum
Cost of equity (r)	120	0.06135	0.02507	7.36232	0.00594	0.11494
Social cost of taxes (t)	120	0.18475	0.05103	22.17018	0.09303	0.29052
Interest rate (i)	120	0.07303	0.03642	8.76308	0.0278	0.157
INTER 1:	120	0.04187	0.04636	5.02429	0	0.1512
Interest rate * dummy						
Public Leverage (g)	120	0.61769	0.07809	74.12289	0.46735	0.76069
INTER 2:	120	0.02653	0.1162	3.18343	0	0.54654
Public Leverage * dummy						
Private Leverage (l)	120	0.34364	0.0826	41.23734	0.11628	0.50838
INTER 3:	120	0.15205	0.18109	18.2464	0	0.449
Private Leverage * dummy						
Fractionalization of political power (fpp)	120	8.06957	8.72625	968.34822	0.42809	33.73911
Ideology (ideo)	120	5.50159	1.35388	660.19067	3.91007	8.27391

Table 4

Pearson Correlation Coefficients Prob > |r| under H0: Rho=0

	Cost of equity	Social cost of taxes	Interest rate	Interest rate * dummy	Public Leverage	Public Leverage * dummy	Private Leverage	Private Leverage * dummy	Fractionalization of political power	Ideology
Cost of equity	1	− 0.15749 0.0858	0.39432 <.0001	0.52329 <.0001	− 0.13313 0.1472	0.24386 0.0073	− 0.11081 0.2283	− 0.18774 0.04	− 0.06212 0.5003	− 0.02328 0.8007
Social cost of taxes	− 0.15749 0.0858	1	− 0.15439 0.0922	− 0.62305 <.0001	0.00584 0.9495	− 0.35706 <.0001	0.54866 <.0001	0.26941 0.0029	− 0.31072 0.0006	− 0.24183 0.0078
Interest rate	0.39432 <.0001	− 0.15439 0.0922	1	0.49398 <.0001	− 0.17133 0.0613	0.32529 0.0003	− 0.05593 0.544	− 0.63478 <.0001	− 0.04713 0.6092	0.08281 0.3686
INTER 1: Interest rate * dummy	0.52329 <.0001	− 0.62305 <.0001	0.49398 <.0001	1	0.15022 0.1015	0.41026 <.0001	− 0.45655 <.0001	− 0.35546 <.0001	− 0.09078 0.3241	0.09431 0.3056
Public Leverage	− 0.13313 0.1472	0.00584 0.9495	− 0.17133 0.0613	0.15022 0.1015	1	− 0.25485 0.005	0.18158 0.0472	0.15469 0.0916	− 0.32135 0.0003	0.01322 0.886
INTER 2: Public Leverage * dummy	0.24386 0.0073	− 0.35706 <.0001	0.32529 0.0003	0.41026 <.0001	− 0.25485 0.005	1	− 0.24083 0.0081	− 0.19331 0.0344	0.03391 0.7131	− 0.15565 0.0896
Private Leverage	− 0.11081 0.2283	0.54866 <.0001	− 0.05593 0.544	− 0.45655 <.0001	0.18158 0.0472	− 0.24083 0.0081	1	0.22842 0.0121	− 0.23109 0.0111	− 0.31687 0.0004
INTER 3: Private Leverage * dummy	− 0.18774 0.04	0.26941 0.0029	− 0.63478 <.0001	− 0.35546 <.0001	0.15469 0.0916	− 0.19331 0.0344	0.22842 0.0121	1	− 0.11302 0.2191	− 0.17999 0.0492
Fractionalization of political power	− 0.06212 0.5003	− 0.31072 0.0006	− 0.04713 0.6092	− 0.09078 0.3241	− 0.32135 0.0003	0.03391 0.7131	− 0.23109 0.0111	− 0.11302 0.2191	1	0.04173 0.6509
Ideology	− 0.02328 0.8007	− 0.24183 0.0078	0.08281 0.3686	0.09431 0.3056	0.01322 0.886	− 0.15565 0.0896	− 0.31687 0.0004	− 0.17999 0.0492	0.04173 0.6509	1

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SUMMARY

Recent history shows that the scope of government varies substantially across countries and through time. Privatization phases alternate with nationalization episodes. The post WWII nationalization policies in Europe gave way to a privatization wave in the 1980s and are now followed by a return to nationalization in the context of the current financial crisis.

Theories of privatization or nationalization typically compare, in a static framework, the economic or political efficiency of private and state ownership, either in general, or for a list of specific goods and services. They do not explain, however, why the privatization phenomenon occurred at about the same time in many countries, and why not before, nor can they account for changes in these policies and especially the policy reversals.

We model the fluctuating allocation of property rights in firms between private investors and the state, as the outcome of a competitive bidding for ownership in which the private investors value shareholders wealth, and the government values political support and survival, obtained through the transfer of the firms' cash flow to various political clienteles. The investors who value the firm most get the rights of control - a privatization or a nationalization according to which type of investor has the lowest cost of funds. Recent data on 15 years of privatization in 8 countries lend support to our theory.