



Munich Personal RePEc Archive

Innovation in State-owned Enterprises: Reconsidering the Conventional Wisdom

Belloc, Filippo

Department of Economics, University "G. d'Annunzio" of
Chieti-Pescara

1 November 2013

Online at <https://mpra.ub.uni-muenchen.de/54748/>
MPRA Paper No. 54748, posted 27 Mar 2014 20:11 UTC

Innovation in State-owned Enterprises: Reconsidering the Conventional Wisdom

Filippo Belloc*

Abstract

A very well established economic literature maintains that State-owned enterprises (SOEs) are inefficient comparatively to privately-owned ones (POEs). In this paper we argue that SOEs' inefficiency is not due to the State ownership *per se*, rather it is caused by some conditions other than ownership which SOEs often, but not necessarily, relate to. In particular, we focus on dynamic efficiency - specifically, the production of technological innovation - of SOEs in manufacturing industries, where SOEs should contend with POEs in a competitive environment. We suggest that targeted measures aimed at increasing managers' commitment to long-term investment strategies and at reducing corruption and political interference, though being complex and difficult to implement, can be much more (positively) incisive on long-run technical progress than the simple privatization of companies. This leaves room for exploration and implementation of policies that might reconcile State ownership and market competition in industrial sectors.

Keywords: State-owned enterprises, innovation, privatization.

JEL classification: H11, L33, O31, P12.

*Department of Economics, University "G. d'Annunzio", Viale Pindaro 42 - 65127 Pescara, Italy (email: f.belloc@unich.it).
I certify that I have the right to deposit the contribution with MPRA.

1 Introduction

The governance structure of firms is crucial to their ability to produce technological innovation (Belloc, 2012). A firm's governance structure is defined over several dimensions, encompassing financial decision-making, investors' activism, board composition, organization of labour and owners' identity (i.e. the identity of those retaining residual rights of control). The global financial crisis started in 2008 has stimulated a vigorous discussion on the redefinition of corporate governance regulation and on its function in the recovering of high value productions and economic growth (OECD, 2012). The role played by corporate owners, in particular, is one of the core areas in this debate. Ownership by hedge funds, mutual funds and other institutional investors has received a great attention in recent studies (e.g. Aghion *et al.* (2009)), while government ownership is left to the margin in current economics research. Authoritative observers encourage the State, as a corporate owner, to conclude its withdrawing from firms in product markets and to shrink itself to residual actions, because traditionally it has proved to be an inefficient entrepreneur, especially in competitive environments (Zingales, 2012).

In this paper we discuss about the relationship between State ownership of business corporations (i.e. the government holds a substantive share of the firm ownership or maintains *de facto* control) and technological innovation. In particular, we refer to commercial enterprises operating in competitive markets (such as manufacturing sectors), in which sectoral regulation is absent and the State ownership is fully insulated from State regulatory functions.

The conventional argument that State-owned enterprises (SOEs) are inefficient comparatively to privately-owned ones (POEs) is sustained by a very well established economic literature. Large part of the empirical studies on the comparative performance of SOEs focuses on utilities, most often in non-competitive markets, where firms have a natural or spacial monopoly (typically, electric and water utilities), or where there is a regulated duopoly (often this has been the case of airlines and railroads), or where output cannot be priced by competitive forces (e.g., health-related services). Representative works include, among others, Pescatrice and Trapani (1980), Atkinson and Halvorsen (1986), Hausman and Neufeld (1991), Ehrlich *et al.* (1994), La Porta and López-de-Silanes (1999). Notwithstanding a few exceptions, the majority of available studies shows that SOEs are less efficient than POEs, efficiency commonly being measured by short-term performance indicators such as returns on assets, returns on sales, and net income (see Vining and Boardman (1992) for a survey covering 90 comparative studies, Megginson and Netter (2001) for a literature review on performance changes of privatized companies, and Djankov and Murrell (2002) for quantitative investigations on firm restructuring in transition economies). A bunch of studies examines corporate performance after privatization, using samples that include also some non-utility firms, and corroborates POEs superiority in terms of operating efficiency and profitability (Megginson *et al.*, 1994; Boubakri and Cosset, 1998; D'Souza and Megginson, 1999; Dewenter and Malatesta, 2001). Empirical studies comparing SOEs and POEs performance in competitive product markets are far fewer. They propose unanimously that SOEs are less efficient than POEs, where efficiency, again, is measured by means of short-term indicators concerning costs saving

(Funkhouser and MacAvoy, 1979), productivity and operating surplus (Kim, 1981; Picot and Kaulmann, 1989), stock market value (Boardman *et al.*,1986), return on equity, assets and sales (Boardman and Vining, 1989; Vining and Boardman, 1992), and net value added (Majumdar, 1998). Such an unambiguous and extensive evidence seemed to resolve conclusively the academic discussion on this issue in favor of POEs comparative superiority over SOEs. This conclusion has been partly refined by some more recent studies examining the link between government divestment of SOEs and firm performance in R&D activities. The analysis of a sample of firms covering both utility and manufacturing sectors shows that newly privatized companies reduce the amount of resources devoted to R&D while simultaneously increase R&D efficiency, i.e. quality and quantity of patents production (Munari *et al.* 2002; Munari and Sobrero, 2003; Munari and Oriani, 2005). The same studies explain the improvement in R&D productivity after privatization as the reorientation of R&D programs towards innovation output with higher commercial applicability.

This long standing and well nourished flow of studies tends to suggest a definite and powerful policy implication, that is the State withdrawal from corporations, especially in competitive sectors where the absence of market failures rules out any other scope for State ownership. Yet, the existing evidence actually provides only a weak support to this recommendation. In this paper we discuss that SOEs may show lower innovative activity than POEs due to various reasons having different determinants and different effects, which must be isolated and analyzed separately in order to be properly assessed. We argue that available empirical studies have never rigorously disentangled the various and diverse sources of SOEs inefficiency, conflating them in a generic notion of State ownership effect, with very incisive consequences on past and current market reform design.

The sources of SOEs (dynamic) inefficiency are investigated and documented by theoretical economic literature (see Vickers and Yarrow (1991) for a synthesis). SOEs' inefficiencies can be distinguished between those due to the typical conditions in which SOEs operate (i.e. insulation from pure market competition) under the assumption that governments are benevolent, and those due to the possible malevolent nature of the government, which implies that politicians and bureaucrats use their control power to extract undue rents. These conditions can be then analyzed both within and outside the firm boundaries. Table 1 proposes a simple classification of the sources of SOEs inefficiency according to the two lines benevolent/malevolent government and firm-internal/firm-external dimension.

Insert Table 1 about here

Following this classification, in the paper we discuss the four main reasons commonly advocated to sustain SOEs comparative inefficiency (i.e. poor monitoring of managers, lack of market discipline, public managers corruption and malevolent politicians interference) and argue that the available literature does not provide unambiguous arguments linking these factors to lower incentives to invest in innovation in SOEs, nor does support the traditional claim that the State, as such, inevitably induces public managers to be weakly committed or corrupted in government-owned firms. In particular, we argue that the sources of

SOEs inefficiency are not intrinsic to the owner's identity *per se*, i.e. the government, rather they concern conditions (such as culture, legislation and the degree of political competition) extrinsic to it.

We also propose that the intrinsic aptitudes of the State, as a corporate owner, should favor firm innovation activity. First, unlike private entities, the State can impose mandatory payments (e.g. taxes) through which innovative investments can be financed. Consequently, the State can finance basic and less applied research to a greater extent than POEs, being it able to fund the research activity regardless of the revenues that can be raised from the output of the research. Second, the State is not a profit-maximizing entity and - provided that does not incur losses - it is neutral to profits variations, it is therefore able to engage with uncertainty to an extent private companies cannot. This gives to the State a comparative advantage in dealing with risky innovative projects in both basic and applied research areas. Third, the State as a corporate owner may show a higher capability to lead knowledge networks. SOEs may engage more easily than POEs with inter-firm collaborations (including patent sharing and cross-licensing) for the purpose of innovation production, because - by definition - SOEs have a part or the entire bundle of control rights in the hands of a same owner, the State. Moreover, given its privileged position on the economy progress and trends, the State can relatively more easily coordinate intra-industrial change, so leading industrial districts and local systems of innovation. Thus, in conclusion, our main argument is not that SOEs are more efficient than POEs, indeed most often the reverse is true, but is that the efficiency gap is not due to a pure owner identity effect.

It is worth emphasizing that the discussion about the innovation activity of SOEs in competitive unregulated markets is rather rare in economic literature, as the debate on the entrepreneurial role of the State traditionally has focused on regulated environments, where State-run firms are required to correct market failures (like natural monopolies, externalities or public goods production). However, the comparative innovation performance of firms in regulated contexts is specific to the existing regulatory frameworks, that vary across countries, sectors and individual relevant markets. Besides, in certain cases State-run firms may benefit from favorable regulatory conditions, while in other cases also private companies might 'capture' regulator's actions for private advantage (Stigler, 1971). Moreover, the scope of correcting market failures is in many instances unrelated to the promotion of technical progress. It is difficult, therefore, to learn something significant and generalizable from the innovation performance of SOEs under State regulation. Notwithstanding this, it is surprising to observe that a systematic investigation of the conditions affecting SOEs' innovation activity in unregulated competitive settings is still missing. As a consequence, sector specific or even market specific results tend to be erroneously generalized and imprudently used as a wrong base for policy making.

The contribution of this paper is twofold. First, we contribute to the existing literature on State ownership by providing a systematic review of the traditional arguments on SOEs inefficiency, juxtaposing possible criticism to each of them. Available discussion papers tend to emphasize arguments favourable to private ownership (e.g., Vickers and Yarrow (1991) and Megginson and Netter (2001)), while its drawbacks are often

overlooked. With this paper, we propose a comprehensive picture of the issues at hand. Second, we contribute to the policy-making debate by suggesting certain insights that challenge conventionally held beliefs on the link between State ownership and poor innovation performance in industrial (competitive) enterprises. We maintain that, when the extrinsic sources of SOEs dynamic inefficiency can be measured and insulated, there should be no evidence that State ownership *per se* weakens a firm's innovation capabilities. This leaves room for exploration and implementation of policies that might reconcile State ownership and market competition in industrial sectors. More specifically, we recommend to integrate business policy and public policy in order to design an active role for the State in leading technical progress in market-based economies.

The remaining of the paper is organized as follows. In Section 2, we present the possible causes of SOEs dynamic inefficiency, both under benevolent and malevolent governments. In Section 3, we list three main reasons why the State can actually be more capable of performing risky and innovative investments than private owners. In Section 4, we indicate on which areas the policy making debate should focus in order to design effective policy improvements relevant to SOEs innovation activity. With Section 5 we conclude raising new issues for future research.

2 The sources of SOEs dynamic inefficiency

2.1 Benevolent government

Let us begin with the assumption that the government is benevolent. A benevolent government is one operating on behalf of its constituency consistently with the preferences expressed by voters and without making strategic use of undisclosed information in order to satisfy a private agenda. Under the benevolent government assumption, SOEs are commonly deemed to suffer from weak managerial incentives to run the firm efficiently. This is explained by economic literature in terms of imperfect monitoring of managers by politicians-owners (within the firm boundaries) and in terms of SOEs insulation from normal market discipline (*vis-à-vis* POEs).

2.1.1 Poor monitoring of managers

Traditional argument

The problem of poor monitoring of managers is explained by property rights theory as primarily due to a reduced transferability of SOEs ownership (Peltzman, 1971; Alchian and Demsetz, 1972; De Alessi, 1974).¹ If the State tends to retain property rights over the firm and does not sell ownership shares in the market, capitalization of future economic results in share prices is inhibited and this weakens owners' incentives to monitor managerial behavior. This argument recalls the principal-agent theory (see, e.g., Holmstrom (1979)), according to which the basic problem within firms is agents' - in this case, public managers' - shirking behavior. Conventional interpretations also link poor monitoring of public managers

to SOEs' closure to outside equity investors. Traditional corporate governance literature affirms that the decision to be listed opens the firm to the market for control and provides an incentive mechanism inducing managerial performance improvements. In the presence of a market for control, managers should be more reluctant to take self-serving actions that lower corporate value, because a consequent reduction in the stock price would increase the probability of an unfriendly takeover, that in turn implies a change of ownership and the replacement of the management itself. For this reason, an active market of corporate control is generally viewed as a device disciplining managers (Scharfstein, 1988). Typically, SOEs' managers are deemed insulated from the replacement threat.

From a different perspective, public management literature argues that poor managerial monitoring in SOEs may negatively affect their innovation performance because it determines more bureaucracy, i.e. formal procedures for decision-making, in order to bind managers' behavior (Bretschneider, 1990; Baldwin, 1990; Scott and Falcone, 1998). That bureaucratic rules can be set as a response to dysfunctional behavior is sustained also by agency theory (Holmstrom and Milgrom, 1991, 1994). An excess of bureaucracy can have negative effects on SOEs' innovation for two reasons. First, bureaucracy reduces flexibility and, in the presence of penalties for procedure violation, it induces higher risk-aversion of managers with respect to uncodified, although potentially successful, business strategies such as innovation projects. Second, bureaucracy may entail more complex and time consuming procedures for the dismissal of public employees, strengthening job security even for uncompliant managers.

Criticism

It is true that agency costs emerge in SOEs (like, after all, it happens also in POEs: see the classical paper by Jensen and Meckling (1976)), nonetheless that poor monitoring of public managers is due to State-ownership *per se*, because State-ownership as such excludes transferability, and that this is a cause of weak innovation capability of SOEs is not convincing for two reasons.

First, SOEs can be listed in equity markets. The State is not in duty bound to keep full enterprise ownership, it can exchange a part or even the entire ownership of the firm on financial markets. This is the case of partial or complete 'corporatization' (i.e. the transformation of a State enterprise into a stock corporation organized under company law), which has so largely characterized economy restructuring in both Western and transition countries in the last twenty years (OECD, 2005; Roland, 2008).² Thus, in principle, the State-owner could have the incentive to monitor managers in order to increase efficiency, if it wants then to enjoy a premium through the exchange of ownership shares - just like private investors do.

Second, the decision to go public on the securities market is not in a proved positive relationship with firm innovation. Ferreira *et al.* (2013) model firms' incentives to invest in innovative projects under different ownership structures and find that, when a firm is not listed, outside investors cannot observe how corporate investment projects proceed and thus insiders are more tolerant of failures and more inclined to invest in innovative activities. In contrast, publicly traded securities imply disclosure of all the relevant information

and quickly react to business successes and failures, so encouraging insiders to choose conventional projects. Corroborating empirical evidence on this is provided by Battisti *et al.* (2014), who show how listed firms tend to have lower total factor productivity and to adopt less productive technologies.³ Additional negative effects of active markets for firm control on innovative investment strategies are as follows. First of all, stock market pricing of listed companies often is inefficient (consider for example the recent cases of the American Enron and the Italian Parmalat, that were considered solid companies by equity investors just before their collapse respectively in 2001 and 2003; see also Stout (1988) on the inefficiency of securities markets). Furthermore, an active market for control may directly bottle up innovative investments. Managers may refrain from investing in the formation of firm-specific human capital if they anticipate a future interruption of their job relation with the firm. Thus, under the threat of a change in both ownership and management and of contracts renegotiation, managers may provide suboptimal levels of value-creating investments *ex-ante* (Shleifer and Summers, 1988). Moreover, if public managers believe that the market of firm ownership operates with short-sightedness (or if buyers are imperfectly informed about the SOE's business strategies), they may tend to expand short-term profits even at the expense of long-term innovative investment strategies in order to reduce the replacement threat (Stein, 1988). Finally, changes of ownership not always are motivated by the need of replacing an underperforming management and might respond to rent seeking behaviors or other private objectives that have nothing to do with improving corporate performance. Thus, while it is true that ownership stability (be the owner the State or a private entity) may cause poor monitoring, ownership instability - in its turn - may also weaken managers' innovation incentives.

In conclusion, with respect to the argument of SOEs being heavily bureaucratic, it is worth noting that it is not State-ownership *per se* which requires bureaucracy. The degree of complexity of norms regulating the business decision-making can vary widely across SOEs and can be quite high also in POEs (Buchanan, 1975; Lachman, 1985; Knott, 1993). Corporate governance regulation and labour contract law define how much procedures are thick, and these are domains linked but extrinsic to the identity of the owner.

2.1.2 Lack of market discipline

Traditional argument

The relationship between market competition and innovation production is one of the most debated issues in economic research (see for instance Aghion *et al.* (2005)). Notwithstanding that definite general results are not available, SOEs being less innovative than POEs because insulated from genuine competition is a very common claim. The argument that SOEs avoid market discipline recalls two different issues. On the one hand, it is generally observed that SOEs are protected by legal barriers preventing potential competitors from entering the market or by entrenched regulators. This provides SOEs with undue advantages over actual or potential competitors (e.g. Levy and Spiller, 1994). On the other hand, the lack of market discipline often characterizing SOEs reflects the so-called soft budget constraint problem. The budget constraint of

a firm is soft if the government helps the firm out of trouble - i.e. the government covers firm's losses - through subsidies, tax exemption, credit granted at soft conditions, etc. (Kornai, 1979). Under a soft budget constraint, managers are not pushed to concern about firm's financial conditions and they may tend to undertake reckless strategies even at the risk of grave losses (Laffont and Tirole, 1993; Shleifer and Vishny, 1994; Shirely, 1995). This argument has been largely used to support privatization initiatives as a commitment device of the government to harden the budget constraint of firms (Schmidt, 1996a, 1996b).

Criticism

Above all, it is important to emphasize that, in principle, in those cases in which SOEs do not operate in a competitive market environment it is so because they are required to correct market failures, where - by definition - the market is not competitive. This is common in public natural monopolies, public goods production or public service provision in unprofitable areas. These non-competitive conditions in which SOEs may operate clearly do not characterize State ownership *per se*, but they are external to SOEs. Rather, SOEs are set up in response to them (Atkinson and Stiglitz, 1980). Where State ownership is established in order to correct market failures, SOEs are not targeted to innovation production. In this case, the question of their comparative dynamic efficiency with respect to POEs should be investigated only conditional to the specific (regulatory) environment they meet, what requires dedicated sectoral analyses, beyond this paper's scope.

As for the issue of SOEs' unrestricted budgets, the main criticism is that a soft budget constraint is not inherent in State ownership. Indeed, in the absence of political pressures asking the SOE to meet social needs unrelated to productive efficiency (for example the SOE might be asked to increase employment beyond the optimal level), a hard budget constraint can be imposed in practice (Rowthorn and Chang, 1993). For instance, this is what happened in the EU countries under the competition policy of the European Commission, which prescribes the general prohibition of State aid with the aim of ensuring that all European firms (both privately-owned and State-owned) operate on a level-playing field. The OECD (2005, 2011) reports that commercially operating SOEs do not normally have access to concessionary finance and in many countries, both old and new OECD members, are barred from borrowing from State-controlled institutions. Moreover, it has been noted that, following the Single European Act of 1986, in certain countries - such as Italy - credit for public firms became even more expensive than for private firms (Bertero and Rondi, 2000). It is worth mentioning also that, more recently, crisis-related measures, including State aid in the form of recapitalisation, guarantee, impaired assets, and liquidity measures, have been implemented in EU countries to the advantage of POEs as well (European Commission, 2011). At present it is, therefore, unrealistic to consider the soft budget constraint problem, as it was formulated by Kornai with reference to the socialist system, a cause of State-ownership hindering *per se* a firm's innovation performance in market-based industrial economies.

Besides, empirical evidence linking a soft financial constraint and weak innovation activity at a firm level

is actually absent. Some studies on the effect of a firm's leverage on its productive performance exist. For example, Bertero and Rondi (2000) examines the relationship between SOEs' debt and productivity through a shift from a soft to a hard budget constraint regime in Italy. However, to the best of our knowledge, how a soft budget constraint influences specifically innovation activity has never been investigated. Furthermore, if one tries to infer what could be the effect of financial pressure on innovative investments from corporate finance and management studies, it emerges that an excessive short-term attention to cash flows may discourage - rather than encourage - innovative investments, that most often produce results only in the long-run (Kochnar and David, 1996; Zahra, 1996; Hoskisson *et al.*, 2002; Yafeh and Yosha, 2003). Thus, if managers are 'insulated' against the negative financial consequences of an innovative project's failure due to purely stochastic reasons, differently from what the soft budget constraint literature affirms, managers' incentives to innovate may improve (Aghion *et al.*, 2009).

2.2 Malevolent government

We now relax the assumption of benevolent governments. That the government is malevolent means that politicians composing the government tend to pursue certain private objectives even if this is at the expenses of the social welfare or in contrast to social preferences. The malevolent nature of the government should be intended as malevolent attitude of public administrators, both elected (i.e. politicians) and non-elected (i.e. bureaucrats, including public firm managers). It is true that bureaucrats should remain anonymous and politically neutral even in the presence of malevolent politicians. Nonetheless, to the extent that politicians can influence non-elected personnel (for instance because they can alter career advancements), malevolent motivations of politicians are likely to affect also bureaucrats' actions, then emerging corruption and other illegal behaviors. In the presence of malevolent governments, two additional complications arise within and outside the firm boundaries, i.e. respectively managerial corruption and political capture of business objectives.

2.2.1 Corruption and illegal behavior of public managers

Traditional argument

Corruption and illegal behaviors in public administration can have critical consequences on economic activity, as dishonest bureaucracies fuel rent-seeking behaviors, hamper efficient decision-making, lower security of property rights and ultimately may reduce incentives and opportunities to invest (Shleifer and Vishny, 1993; Mauro, 1995). Within SOEs, corruption and illegal behavior can take different forms. Primarily, corruption of public managers can be due to lobbies, interest groups or individual persons bribing managers to influence a SOE's resource allocation. For instance, external parties - other firms or private entities - may be interested in entering in a contractual agreement with the SOE for input provision and may bribe public managers to conclude a contract including unfavourable conditions for the SOE. Another

example is the sale of control rights or physical assets to other firms or individuals under illicit agreements that bring undue gains both to the public manager and to the buyer. In these situations, efficient resource allocation is undermined, thereby slowing down the process by which technological advances are embodied in new productive processes and weakening the firm's capabilities to be innovative and competitive. Illegal behaviors in SOEs do not emerge necessarily as the consequences of bribing or corruption, often they are due also to conflicts of interest of public managers. A conflict of interest involves a conflict between the public responsibility and private interests of a public manager, in which the manager has private stakes that could improperly influence the performance of his official duties, being running the firm efficiently the first of these duties (OECD, 2003). Conflict of interests may involve otherwise legitimate collateral activities, personal affiliations, and family interests, if these interests are likely to influence improperly the manager's performance. Common cases include the negotiation of future employment by a public manager prior to leaving the SOE and an improper use of inside information (not available to the public, gathered in the course of official duties) aimed at obtaining undue private gains.

Criticism

Where the public manager is an official having discretion over the provision of special 'goods', such as licenses and permits needed by private subjects to comply with laws, the public manager clearly has a peculiar power that can be object of bribing. In SOEs running industrial production, differently, a public manager does not enjoy the same position. Still he can be involved in conflict of interest, but it is difficult to say *a priori* whether this happens to a greater (or lower) extent than for private managers in POEs. In private corporations, individual shareholders and managers often have conflicts of interest with other stakeholders arising from their investments in derivatives or securities of other corporations (Anabtawi and Stout, 2008). It happens that, in POEs, activist managers holding corporate shares may try to influence corporate decisions in a self-serving way, even at the expenses of corporate performance and value-creating productions. In particular, a manager might push for business strategies that increase the value of another security the manager also holds. For instance, Hu and Black (2006) argue that the so called 'empty voting' strategies can drive business policies to inefficient investment decisions: if an executive manager has decisive control power while simultaneously holds an outside option that protects his economic interest, he can also credibly threaten the other stakeholders in order to obtain a private gain at their expenses.⁴ Various forms of self-dealing by corporate insiders in POEs, including excessive compensation, appropriation of corporate opportunities, self-serving financial transactions such as directed equity issuance or personal loans to insiders, and outright theft of corporate assets are acknowledged and have been measured by notable studies (see, e.g., Djankov *et al.*, 2008).

Yet, it could be argued that in SOEs the risk of corruption and illegal behaviors of managers is relatively higher because public managers enjoy higher discretion than private ones. Where firm internal regulation leaves broad discretion to managers, they may engage in dishonest actions more likely. This actually

happens in many circumstances under State-ownership (Shleifer and Vishny, 1993; Megginson and Netter, 2001). Nonetheless, in industrial sectors SOEs' managers deal with business objectives similar to those of POEs, their behavior can be then subjected to labor contract laws and self-dealing regulations analogous to those applied by their private owner counterparts (on the need for public governance to learn from private governance see the new public management literature (Hood, 1991; Metcalfe, 1993; Box, 1999), while for criticism see Frey and Benz (2005)). Also in this case, therefore, a lower (dynamic) efficiency that SOEs may suffer because of dishonest managers seems difficult to be imputed to State ownership *per se*, at least in competitive industrial productions, whilst it is more reasonably attributable to exogenous circumstances, i.e. poor legislation and culture (Svensson, 2005).

2.2.2 Political capture of business objectives

Traditional argument

The capture of SOEs' business objectives by politicians traditionally has been deemed the principal reason for privatization (Shapiro and Willig, 1990; Shleifer, 1998). Shleifer, in particular, argues that the main concern in the privatization debate is the elimination of politically motivated resource allocation. Why a government that exerts political influence on a firm's business should be considered a 'malevolent' government? The answer is ambiguous. On the one hand, a strand of notable studies affirms that governments, when they use their control power over SOEs, tend to force excess spending and employment at the firm, create corporate projects that transfer wealth to supporters and introduce distortionary costs which impair the productive process (Becker, 1985; Shleifer and Vishny, 1994; Boycko *et al.*, 1996). Even if, under certain circumstances, the SOE may show a high productivity, the State will pay higher wages to workers exceeding productivity levels (Corneo and Rob, 2003). Thus, if we benchmark SOEs' business to dynamic efficiency, then political influence is detrimental and the government assumes a malevolent connotation.⁵ Nevertheless, on the other hand, to increase employment and wages, to settle production plants in depressed areas, to internalize negative externalities, or to correct other market failures, though at the price of reducing profits, not necessarily do lessen social welfare and often are actually implemented in the public interest - as well-known handbook economic theory predicts (Atkinson and Stiglitz, 1980). From this point of view, political influence over the SOE does not reflect malevolent motivations. Also in these cases, however, productive efficiency could be sacrificed to economic or social needs that have nothing to do with technological progress and innovation.

Criticism

Restricting here our analysis to those cases in which the government undoubtedly behaves in a malevolent manner (i.e. it runs the firm aimed at pursuing private objectives at the expenses of the social welfare), the relevant question is about what conditions favor political opportunism of the government. Different theories try to address this issue. Human capital theory argues that education and human capital is necessary for

formal institutions to operate efficiently. When a population's education is modest, then the government's abuses are more likely to be unchallenged (see, e.g., Glaeser, 2004). Alternatively, La Porta *et al.* (1998, 1999) have emphasized legal origins as one of the primary roots of regulation frameworks, institutional checks and balances, and governments' behavior. But probably the variable most relevant to government opportunism is the degree of political competition (Besley and Burgess, 2001; Brunetti and Weder, 2001; Persson and Tabellini, 2004). The uncertainty of politicians about re-election reduces the incentives for the incumbent government to alter SOEs' business in order to extract economic and non-economic rents. Moreover, if citizens cannot 'punish' a malevolent government through their votes, they may also lack the incentives to acquire information on both the politician's and the public manager's actions. The determinants of the citizens' ability to hold politicians accountable for abuse of power include also the political framework (i.e., parliamentary versus presidential and proportional versus majoritarian; see Persson and Tabellini (2004)), the extent to which the press is free (Besley and Burgess, 2001; Brunetti and Weder, 2001), and, more in general, citizens' participation rights (Frey, 1997).

What emerges from this literature is that there is no reason to predict a malevolent behavior of the government when the conditions favoring political opportunism are absent. Phrased differently, politicians react to (economic and non-economic, such as cultural) incentives like any other individual does: if the politicians' behavior can be qualified as malevolent, then this simply means that the existing incentives are wrong. Hence, a government's misbehavior running a SOE can actually be prevented if appropriate incentive schemes (both economic and institutional) are set. Examples abound. A representative case is that of Finland, which dominates international rankings on press freedom (RWB, 2012), transparency of government policy-making, judicial independence, efficiency of government spending and public trust in politicians (WEF, 2012). There is an extensive evidence of many finnish companies, currently State-owned or prior to privatization, being national leaders for their productivity standards and innovativeness. Among others, Kemira (chemicals), Metso (metal engineering), Outokumpu (metals and technology), Rautaruukki (mining and metals), and Enso (forest industry) are all companies that under State ownership have been very active in R&D activities and high technology productions. In particular, the finnish successful story in telecommunications equipment was pioneered by the entrepreneurial vision of the State. The world's first mobile car phone produced by Telenokia in 1984 was indeed made possible by the merge in 1981 between the electronics division of Nokia (whose activity originally was in the paper and rubber products sector) and Televa, a SOE specialized in electronics and producing digital switches for the domestic market (Willner, 2003). We can conclude from these experiences that possible malevolent intentions of the government are not connatural to the State itself, but they are generated by poor institutional frameworks which determine principal-agent problems in the politician-citizens relationship (to the same extent as poor corporate law may cause agency costs between a blockholder and minority shareholders in private companies). Again, it is not the identity of the State-owner, *per se*, that introduces distortions in the innovative activity of SOEs.

3 State and private owner: what's the difference?

We have discussed that the conditions possibly inducing a weak monitoring of managers (a reduced presence on financial markets and poor public labour contract law) and their possible misbehavior (corruption and political pressure) are extrinsic to State ownership *per se*. Thus, when SOEs are not isolated from market discipline - as in competitive industrial sectors - the relevant issue is about what remains that differentiates State and private owners with respect to innovation. Put differently, firm ownership does matter? We next argue for a positive answer to this question and propose that the pure effect of State ownership on firm innovation should be positive, contrary to what is generally understood.

A first aspect behind a positive influence of State ownership on innovation relates to the public good nature of basic knowledge. Basic knowledge is fundamental knowledge produced in research domains where applications and commercialization are not immediately apparent. Basic knowledge has two critical properties: non-rivalrous consumption (i.e. the consumption of one individual does not reduce available benefits from consumption of another) and non-excludability (i.e. it is difficult or impossible to exclude an individual from consuming the good). If a piece of knowledge satisfies both attributes, then no one can be excluded from the use of the given knowledge and any additional user enjoys the knowledge at a zero marginal cost (Arrow, 1962). Consequently, efficiency implies charging a price of zero, but at zero price no private firm will be willing to bear the costs of producing that (basic) knowledge. The State can solve this problem by financing basic research, being it able to fund the research activity regardless of the revenues that can be raised from the output of the research. Unlike private entities, the State, as such, can impose mandatory payments (e.g. taxes) through which investments can be financed. Differently, applied knowledge has a practical application purpose, it is specific to given products or business and it is incorporated in goods that can be commercialized. This implies that it can be codified and protected (through trade secrets or patents) in order to exclude others from using it. In this case, privately-held firms can reap the returns from producing the knowledge, and will have therefore the incentive to engage with the research. Available evidence shows that, while POEs tend to invest less in basic research and more in applied research looking for immediate and greater returns, the State in fact is found to invest relatively more in basic areas where innovative results emerge only in the long-run (see, e.g., Stiglitz (1999), Salter and Martin (2001)).

While this traditional market failure explanation provides a crucial favor for State-run research in basic areas, the argument for a positive relationship between State ownership and innovation goes beyond that. The State has a peculiar quality providing it with an advantage over POEs in both basic and applied research activities: the State as such is not a profit-maximizing entity and - provided that does not incur losses - it is neutral to profits variations, it is therefore able to engage with uncertainty to an extent private companies cannot. On the contrary, privately-owned corporations aim at maximizing dividends for shareholders and react to any variation of profits. The ability to deal with risks is decisive in innovation production. The production of innovation is indeed an uncertain activity, as it is based on a process of discovery that may or may not succeed in generating new technology. In addition, even if the innovation process generates new

knowledge, there is not guarantee that the new technology then will have a concrete or commercial success. In other terms, the final returns of the innovation process cannot be predicted when the process starts. Actually, the most original and potentially innovative R&D projects not only take years to materialize into concrete results, but often fail before leading to new products. In these cases, the private sector is shown too risk adverse to fund and to engage with the most uncertain phases of the research, it shies away. Here, SOEs can play a major role. SOEs are less averse to possible R&D failures and may deal easier with high risk radical innovation projects. Mazzucato (2011), among others, reports that governments in industrialized countries have funded the riskiest research, whether applied or basic, and have been the source of many radical innovations also in non-basic research areas in pharmaceuticals, biotech and other high-tech sectors. For instance, the initial algorithm used in Google was funded in the US by a public grant by the National Science Foundation. Analogously, molecular antibodies, which have been the foundation for biotechnology, were discovered in the UK in the public labs of the Medical Research Council. More in general, Ruttan (2006), Mazzucato and Dosi (2006), Block and Keller (2011) and Lazonick and Tulum (2011) discuss how large scale and long-term investments by the State have been the engine behind many general purpose innovations in the internet and computer industry, nanotechnology sector and biopharmaceuticals.

Besides the intrinsic ability to deal with risks, the State as a corporate owner may show an additional aptitude sustaining innovation production, given by its capability to lead knowledge networks. Private corporate structures, especially in firms of a small size, tend to be specific to individual sectors and sub-sectors and incompatible with the highly interdisciplinary nature of many innovative R&D activities (Motoyama *et al.*, 2011). Innovative research has a cumulative nature, and almost all technical progress builds on technology provided by earlier innovators (Scotchmer, 1991). The result is that, at present, only relatively few innovations are pioneering, building on a single stand-alone invention; rather, most innovations are interdependent, often linked to each other across sectors and different technological areas. This makes the exchange of knowledge and best practices through inter-company and inter-sectoral linkages crucial to the firm ability to produce innovations, in particular in the current context in which the production of new technology requires an increasing number of proprietary intellectual assets owned by others. In fact, a firm owning an intellectual property right has not only the power to exclude others from the use of a given technology, but it can also prevent the non-right-holders from investing - and so innovating - in the research activities requiring that proprietary technology (Heller and Eisenberg, 1998). SOEs may have two relative advantages over POEs in building inter-firm collaborations (including patent sharing and cross-licensing) for the purpose of innovation production. First, the presence of the State in the ownership of different corporations might strengthen the network of relations between firms, because they have a part (or the entire) bundle of control rights in the hands of a same owner. Also POEs might have in some cases a same controlling shareholder, but in SOEs this happens by definition. The managerial literature on corporate board composition shows that boards connections act as a mechanism of exchange of information and innovative governance practices among companies (Arora and Gambarella, 1991). Moreover, interlocking directorates

thanks to the presence of a same owner facilitate the diffusion of the best strategies and the development of capabilities of the boards to overcome cognitive rigidities and to cope with dynamic scenarios (Carpenter and Westphal, 2001). The second aspect is more general and relates to the greater capability the State might have in understanding the connections between different research disciplines, given its privileged position on the economy progress and trends. That is, in practice, the State can relatively more easily coordinate intra-industrial change, and can lead industrial districts and local systems of innovation, whereas POEs maintain a more passive role in this respect. Corroborating examples are many. It is worth recalling, for instance, the Defense Advanced Research Projects Agency that in the US has engaged in business and technological brokering, linking university researchers to entrepreneurs, connecting start-up companies with venture capitalists, and assisting the starting of new firms and the commercialisation process of innovations (Mazzucato, 2011). Or the case of the hydrogen energy sector in Korea, where the State has been a key actor in R&D activities, with strong collaborative relations with private firms, and has acted as a network organizer and manager in order to facilitate the sharing of risks among interested economic actors and the reinforcing of the knowledge base of the industry (Choi *et al.*, 2011). Similarly, another successful story in Korea is about POSCO (Pohang Steel Company) in the steel industry, that was set up as a State-owned company in 1968 and that then became one of the most technologically efficient steel makers in Asia contributing to the industrial development of the region (Chang, 2007).

What emerges is that intrinsic factors should lead State ownership to spur technological innovation when public managers' commitment is high and when the government does not make strategic use of its powers to satisfy a private agenda. Under a benevolent government and good institutions, in other words, we should observe a positive relationship between State ownership and innovative investments. Figure 1 presents some macro evidence on this. In Figure 1 we consider the ten countries with the best score in the international WEF (2012) rankings on corruption and politicians' misbehavior and for which data on R&D and State ownership are available and comparable (Australia, Denmark, Finland, Germany, Iceland, Luxembourg, the Netherlands, New Zealand, Norway, Sweden). In particular, we compare the business enterprise R&D expenditure and the degree of State control (measured by the OECD (2013) as the extent to which the State intervenes in the business sector through share ownership and special voting rights in privately-owned firms). We consider data referring to the period preceding the 2008 crisis.

Insert Figure 1 about here

According to the conventional wisdom, SOEs are underperforming comparatively to POEs because of poor public managers commitment and malevolent political influence, these being intrinsic characteristics of State-ownership. However, in the countries selected in Figure 1, contrary to the traditional view, State-ownership appears compatible with very low levels of (perceived) managers' and politicians' misbehavior. Where this happens, moreover, State control results to be positively related to innovation performance. First, Figure 1(A) shows that the five countries with the highest level of State control, on average, are also

those with the highest level of R&D expenditure in the business enterprise sector. Second, Figure 1(B) shows that the three countries which have chosen to increase State control between 2005 and 2008 have then benefited from the highest increase in R&D investments (about 17.7%), while those countries that have adopted a privatization solution (i.e. have reduced State control) have experienced only a modest increase in R&D expenditure (about 3.7%). Although these are only descriptive statistics at an aggregate level (many other variables may be relevant in this context), the pattern emerging from this figure at least unveils that the privatization solution is not unambiguously superior under good institutions governing the State intervention in corporate ownership. On the contrary, at very low levels of corruption and malevolent government pressures as it is the case of the ten countries considered in Figure 1, a higher level of State control seems most conducive to improved firms' innovation activity.

4 Policy issues

Useful policy insights should emerge from this analysis. In the last three decades a well-received policy initiative in most Western economies has been to withdraw the State from corporate ownership. Being easy to implement and also a mean for raising revenues, it has been a preferred solution for short-termist governments. This policy option, however, responds to a simplistic view according to which State ownership *per se* induces low dynamic efficiency in industrial corporations. On the contrary, as we have argued, State ownership can have a role in the support of innovative investments by business enterprises. We believe that more effective policies, therefore, will be those reconciling State ownership and market competition in industrial sectors. Targeted measures aimed at increasing managers' commitment to long-term investment strategies and at reducing corruption and political interference, though being complex and difficult to implement, can be much more (positively) incisive on long-run technical progress than the simple privatization of companies. While it is important to maintain a pragmatic view and to acknowledge that rent-seeking intentions may be pervasive among SOEs' administrators, policy-makers should not consider public officials' misbehavior as an issue intractable except by narrowing State functions and control. Rather, the policy debate should examine much more deeply (than it currently does) several issues including the appropriate conditions under which operational autonomy of managers should be allowed and strengthened, the tools through which the ownership entity should be held accountable (i.e. how the State should exercise its ownership rights), disclosure of operational material concerning both financial and non-financial information, the appointment of independent or external directors in the board, and the mechanisms for enhancing board participation of employee representatives. In particular, in this section, we propose three key policy issues to be considered for improving SOEs' governance with respect to innovation activity.

4.1 Managerial autonomy

The first area for policy improvements concerns managerial autonomy from undue political interference. The business decision making should be insulated from political influence for three main reasons. First, autonomous board governance deters possible opportunistic actions played by political representatives. To the extent that political executives have malevolent intentions, the involvement of political actors in the company's strategic decision making may be detrimental to SOEs performance, in particular if the enterprise's business is an arena for political contests. Political bodies may try to influence corporate decisions in a self-serving way aimed at harming political counterparts regardless of the company objectives and interests. Second, even in the presence of benevolent governments, board governance tends to allow more efficient and informed decision making. Political representatives are likely to have different views on the SOEs' production priorities and to collect their distinct preferences in single operational decisions may be particularly difficult. Moreover, political delegates may lack the competencies necessary to formulate informed strategies to run the company. Being involved in the firm's day-to-day operations, managers can provide timely and more efficient decision making than government officials. Third, insulated board governance promotes specific investments. Innovative productions require specific investments in order to be performed, such as investments in firm-specific human or physical capital having very little salvage value. If political forces can enter the business decision making and can credibly threaten corporate specific investors (like employees or managers) with the aim of obtaining private benefits at their expenses, then the SOE's internal incentives to undertake specific investments or to apply effort and skills to innovation processes may be weakened. These three advantages of autonomous board governance hold under both private and State ownership (see, for example, Stout, 2007), nevertheless they assume a relatively stronger relevance in SOEs because political delegates - unlike private shareholders in POEs - are not affected directly by the negative consequence of their actions over the company.

While SOEs' innovation performance can be improved under greater managerial autonomy, also the presence of co-ordination channels for information transmission between corporate boards and State bodies can improve technological productions. On the one hand, the management's legitimate business judgement should be independent from political interference; on the other, however, proper connecting entities should enable managerial boards to gather all the relevant information the State can provide on industrial policies and on the strategic sectoral organization directed by public authorities. Thus, SOEs' governance policies should help companies to take advantage of both autonomy from malevolent political influence and of the coordination activities run by the State.

We suggest two guidelines for normative policy intervention on SOEs' governance in this respect.

First, the board members nomination process should ensure that managers and directors have the necessary competencies, skills and business experience to run successfully SOEs' activities. In many countries, the nomination process is largely based on political representation, and board members often lack the needed expertise. National-level corporate law should define the requirements to be met by eligible candidates and

settle mandatory steps to ensure transparent selection of board members. Board composition regulation should also establish the presence of outside members in order to increase the independence of the board and consequently improve its capabilities to operate as an active entity insulated from political influence. Additionally, SOEs corporate governance regulation may encourage the presence of the so-called chief technology officers (CTOs). In high technology companies, the CTO can have a comprehensive view of the various technological aspects relevant to the SOE's activity and can help better decision making, permitting an effective continuity between technological needs and the more general business strategies (Roberts, 2001).

Second, corporate law should provide a clear definition of functions and responsibilities for board members and directors of SOEs. This is central for separating out the management's business judgment domain from political interference, and to help a transparent and coherent transmission of information between SOEs' boards and representative entities without incurring in undue political influence.

4.2 Transparency

Regular monitoring of managerial activities and the full accountability of boards cannot be achieved without effective reporting systems allowing the assessment of SOEs' production activities and operational performance. Board evaluation should be possible by both internal and external entities, i.e. respectively audit committees and the public. While the former should focus on operational aspects of the business activity, the latter constitutes an overall monitoring level on SOEs objectives and long-term general strategies. In particular, transparency of managerial activity can be ensured by three levels of information disclosure.

A first level concerns *ex-ante* disclosure of the general objectives of the SOE. An important component of the transparent administration of a State-owned firm is indeed a clear definition of the general business objectives in order to make directly observable the overall (un)success of the company to the public. This is crucial in high technology sectors, where the innovative success of the enterprise requires long-term investments that are highly costly in the short-run and that produce positive results only after medium/long periods. *Ex-ante* disclosure can be achieved through several channels, including publicly accessible statements of corporate intents, disclosure of the business contracts (such as those concerning investments and inputs provision) relating the core activity, and communication of the general corporate plans. Also information on board members (qualification, experience, salaries and specific responsibilities) should be included in the *ex-ante* disclosure.

A second level of disclosure concerns periodic communications on performance and short/medium term results. This allows a sort of on-going monitoring on the step-by-step progress of the business activity and an *ex-post* evaluation of the managerial performance. At this level, the disclosure mechanisms involve more specific and technical information, which are necessary for an extensive analysis of the strategic decision making of managers. The monitoring entity, here, is only partly the public, while audit committees settled both within the corporation and at the reference ministries or governmental departments should be more directly involved given the specific competencies necessary for this type of function.

Third, finally, a dedicated level of monitoring should focus on financial disclosure. Financial disclosure should be aimed at making publicly available all the relevant information on the financial aspects of the SOE, through periodic open access financial reports. At this level, stringent standards of reporting should be applied in order to allow detailed monitoring. As extensively discussed in Section 2, if the government is malevolent, an SOE's business could be influenced by public administrators' private preferences with the consequence of inefficient outcomes in the investment and strategic decision making. Financial monitoring is important to align managerial behavior to what is necessary for the long-term corporate success.

While national legislations in OECD countries often establish precise procedures for information disclosure and transparency, specific rules at the three levels here mentioned are missing in some countries and only generally provided in others (OECD, 2005). Mandatory regulation for information disclosure articulated on these three dimensions is therefore an important area for policy improvements.

4.3 Employee participation to the governance structure

A third issue in SOEs' corporate governance that deserves further discussion in the policy making debate is the increase of employee representativeness at the corporate board level. Workers participation to the strategic decision making is an important driver of investments in firm-specific human capital, that in its turn is a key component of innovative productions. The incomplete contracting approach suggests that employees may be less willing to apply their skills and effort to firm-specific learning processes if the employer cannot commit himself not to extract rent from workers after they have developed specific competences (see the general framework provided by Williamson (1985)). From this point of view, giving a direct voice in the business decision making to employees may support internal commitments between workers and managerial levels. Theories of worker participation to the firm governance maintain that employee representation on boards facilitates cooperative behaviors and can correct coordination failures, because it provides workers with the possibility to check managerial actions (see, e.g., McCain (1980) and Smith (1991)). While, in general, improved commitments between employees and employer are conducive to productivity gains, in high technology sectors a context of joint management and power sharing is fundamental for the success of innovation programs.

The available empirical literature on the relationship between employee participation to the business decision making and technological innovation is limited to POEs. However, the evidence provided is sufficiently general to be a reference also for SOEs' corporate governance. For instance, Laursen and Foss (2003) find that human resource management (HRM) practices characterized by work groups for operational decision making and problems resolution, planned job rotation and delegation of responsibility are likely to spur specific human capital development and a firm's ability to innovate. Analogously, Scott and Bruce (1994), Michie and Sheehan-Quinn (2001), Searle and Ball (2003), and Shipton *et al.* (2005), among others, find that management-employee information sharing and collaborative leadership of employers encourage the workers' incentives to acquire new skills and to contribute to innovation processes.

Mandatory presence of employee delegates at the board level would act as an important stimulus to the innovation activity of SOEs. Some OECD countries have already established mandatory rules for employee board level representation in SOEs (OECD, 2005); others, however, still lack clear normative schemes. Many countries, moreover, do not consider any form of employee representation for public listed SOEs.

5 Work ahead

The arguments proposed in this paper suggest that future research should more deeply investigate the reasons of SOEs comparative underperformance. In particular, future empirical studies should try to separate out extrinsic from intrinsic factors (i.e. corruption and malevolent political pressures from State ownership *per se*). Indeed, in the many instances in which POEs show an apparently superior innovative activity, extrinsic and intrinsic factors both exert an effect but the former, on average, tend to dominate over the latter. If it is so, then the available econometric evidence is flawed to the extent that it is obtained from regression models which, first, most often use short-term performance indicators (i.e. returns on assets, returns on sales, or net income) as the dependent variable, and, second, do not disentangle the lack of managers' commitment, corruption and malevolent political pressures, but only use a single ownership variable conflating these effects and the pure ownership factor. The limits of available literature open room for future empirical research: once the effects of extrinsic forces are properly controlled for, the innovative abilities of SOEs may result much higher than it is currently estimated.

While with this article we have limited our discussion to theoretical arguments, we also believe that appropriate methodological solutions are available to measure econometrically the 'true' impact of State ownership on firm innovation performance by isolating extrinsic variables. This attempt goes well beyond the scope of the present paper, nevertheless we can here suggest some possible solutions. For instance, political capture of a SOE can be proxied by the degree of political concentration of the government in office. Less fragmented governments have a higher ability to exert opportunism over the SOEs business strategies, by manipulating SOEs' managers behavior. This variable (i.e. political concentration) then can be interacted with a proxy of firm size, in order to measure the economic returns of political interference and therefore the scope for political capture. Balance sheet financial variables (covering, among other items, productive and unproductive investments and personnel hiring expenses), moreover, can be used to proxy the degree of managerial diversion of funds and the lack of budget discipline.

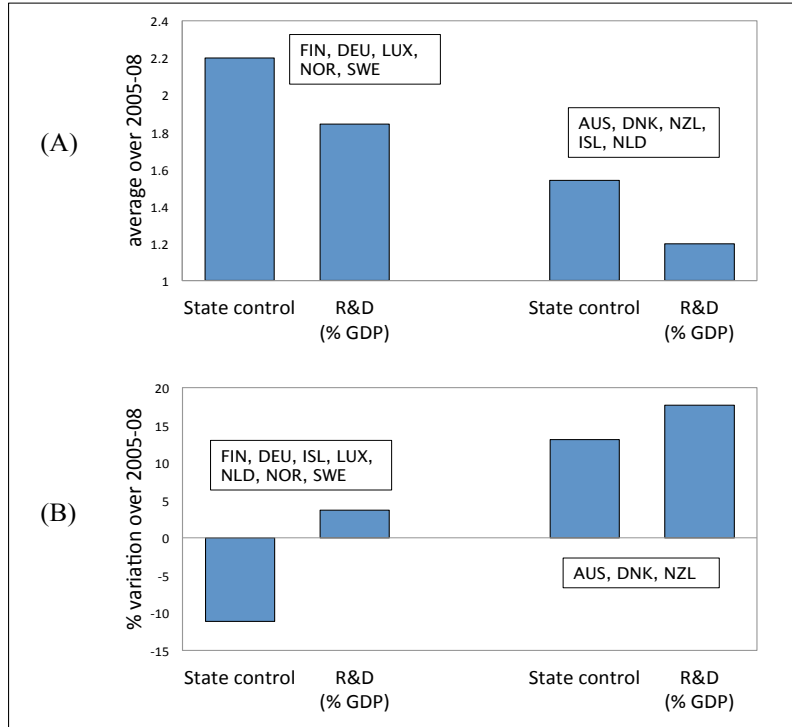
New empirical evidence would be of great help for the exploration and the design of policies that might reconcile State ownership and market competition in industrial sectors. In the last decades, the privatization of large segments of strategic sectors has been largely indicated as a 'must have' in governments' policy packages. Nonetheless, the progressive decline of the innovative activity in industries where previously State owned companies were technological leaders suggests the need for more effort in analyzing what can actually drive technological progress and in defining appropriate industrial policies to this end. With this paper, we

have tried to indicate some guidelines for policy improvements at the SOEs corporate governance level.

Table 1: Disentangling the sources of SOEs inefficiency.

BENEVOLENT GOVERNMENT			MALEVOLENT GOVERNMENT		
		<i>Underpinnings</i>			<i>Underpinnings</i>
FIRM-INTERNAL	<i>i</i>) Poor monitoring of managers	Reduced transferability (lack of equity market evaluation) [Peltzman, 1971; De Alessi, 1974]; excessive bureaucracy [Baldwin, 1990; Scott and Falcone, 1998]	<i>iii</i>) <i>i</i> + managerial corruption and illegal behavior		Bribing; conflict between public responsibilities and private interests of managers [Shleifer and Vishny, 1993; Mauro, 1995]
FIRM-EXTERNAL	<i>ii</i>) Lack of market discipline	The government can cover firm's losses (soft budget constraint) [Kornai, 1979; Laffont and Tirole, 1993]	<i>iv</i>) <i>ii</i> + political capture of business objectives		The government exploits the firm to transfer wealth to supporters (politically motivated resource allocation) [Becker, 1985; Shapiro and Willig, 1990; Shleifer and Vishny, 1994; Boycko <i>et al.</i> , 1996]

Figure 1: State control and business enterprise R&D.



Variables definition. State control is a composite indicator measuring: (i) the pervasiveness of state-ownership across business sectors, (ii) the extent of public ownership in network sectors, (iii) the existence of government special voting rights in privately-owned firms, and (iv) price control and the use of command and control regulation (the final index ranges from 0 (= min control) to 6 (= max control)) (source: OECD, 2013). R&D is the business enterprise R&D expenditure expressed as a percentage of the country's GDP (source: OECD, 2013). Countries selected are the ten countries with the highest score in the WEF (2012) indicators of diversion of public funds to companies, individuals, or groups due to corruption (the index ranges from 1 (= is common) to 7 (= never occurs)), and of favoritism in decisions of government officials (the index ranges from 1 (= usually favor well-connected firms and individuals) to 7 (= are neutral)), and for which comparable data on the State control and R&D variables are available. Values of State control and R&D are averaged over the selected sub-groups of countries. Sub-groups are determined as follows. In the panel (A) the five countries with the highest State control score in 2005 are divided from the five countries with the lowest State control score. In the panel (B) the three countries that have increased State control over the 2005-2008 period are divided from the remaining seven that have reduced State control.

References

- [1] Aghion, P., Bloom, N., Blundell, R., Griffith, R. and Howitt, P. (2005) Competition and Innovation: An Inverted-U Relationship. *Quarterly Journal of Economics*, 120(2): 701-728.
- [2] Aghion, P., Van Reenen, J. and Zingales, L. (2009) Innovation and Institutional Ownership. *CEPR Discussion Paper*, n. 7195.
- [3] Alchian, A. and Demsetz, H. (1972) Production, Information Costs, and Economic Organization. *American Economic Review*, 62(5): 777-795.
- [4] Anabtawi, I. and Stout, L.A. (2008) Fiduciary Duties for Activist Shareholders. *Stanford Law Review*, 60(5): 1255-1308.
- [5] Arora, A. and Gambarella, A. (1991) Complementarity and External Linkage: The Strategies of the Large Firms in Biotechnology. *Journal of Industrial Economics*, 37(4): 361-379.
- [6] Arrow, K. (1962) Economic Welfare and the Allocation of Resources for Invention. In R. Nelson (ed) *The Rate and Direction of Inventive Activities* (pp. 609-625), Princeton: Princeton University Press.
- [7] Atkinson, S.E. and Halvorsen, R. (1986) The Relative Efficiency of Public and Private Firms in a Regulated Environment: The Case of U.S. Electric Utilities. *Journal of Public Economics*, 29(3): 281-294.
- [8] Atkinson, A.B. and Stiglitz, J.E. (1980) *Lectures on Public Economics*. London, UK: MacGraw-Hill.
- [9] Baldwin, N. (1990) Perceptions of Public versus Private Sector Personnel and Informal Red Tape: Their Impact on Motivation. *American Review of Public Administration*, 20(1): 7-27.
- [10] Battisti, M., Belloc, F. and Del Gatto, M. (2014) Unbundling Technology Adoption and TFP Effects at the Firm Level: Do Intangibles Matter? *Journal of Economics and Management Strategy*, forthcoming.
- [11] Becker, G.S. (1985) Public Policies, Pressure Groups, and Dead Weight Costs. *Journal of Public Economics*, 28(3): 329-347.
- [12] Belloc, F. (2012) Corporate Governance and Innovation: A Survey. *Journal of Economic Surveys*, 26(5): 835-864.
- [13] Belloc, F. (2013) Law, Finance and Innovation: The Dark Side of Shareholder Protection. *Cambridge Journal of Economics*. 37(4): 863-888.
- [14] Bennett, J. and Sparshott, J. (2012) GM: 'Government Motors' No More. *Wall Street Journal*, December 20: B1-B2.

- [15] Bertero, E. and Rondi, L. (2000) Financial Pressure and the Behaviour of Public Enterprises under Soft and Hard Budget Constraints: Evidence from Italian Panel Data. *Journal of Public Economics*, 75(1): 73-98.
- [16] Besley, T. and Burgess, R. (2002) The Political Economy of Government Responsiveness: Theory and Evidence From India. *Quarterly Journal of Economics*, 117(4): 1415-1451.
- [17] Block, F. and Keller, M. (eds) (2011) *State of Innovation: The US Government's Role in Technology Development*. Columbia: Paradigm.
- [18] Boardman, A.E., Freedman, R. and Eckel, C. (1986) The Price of Government Ownership: A Study of the Domtar Takeover. *Journal of Public Economics*, 31(3): 269-285.
- [19] Boardman, A.E. and Vining, A.R. (1989) Ownership and Performance in Competitive Environments: A Comparison of the Performance of Private, Mixed, and State-Owned Enterprises. *Journal of Law and Economics*, 32(1): 1-33.
- [20] Boubakri, N. and Cosset, J.C. (1998) The Financial and Operating Performance of Newly-Privatized Firms: Evidence from Developing Countries. *Journal of Finance*, 53(3): 1081-1110.
- [21] Box, R. (1999) Running Government Like a Business: Implications for Public Administration Theory and Research. *American Review of Public Administration*, 29(1): 19-43.
- [22] Boycko, M., Shleifer, A. and Vishny, R.W. (1996) A Theory of Privatization. *Economic Journal*, 106(435): 309-319.
- [23] Bretschneider, S. (1990) Management Information Systems in Public and Private Organizations: An Empirical Test. *Public Administration Review*, 50(4): 536-545.
- [24] Brunetti, A. and Weder, B. (2003) A Free Press is Bad News for Corruption. *Journal of Public Economics*, 87(7): 1801-1824.
- [25] Buchanan, B. (1975) Red Tape and the Service Ethic: Some Unexpected Differences between Public and Private Managers. *Administration and Society*, 6(4): 423-444.
- [26] Carpenter, M.A. and Westphal, J.D. (2001) The Strategic Context of External Network Ties: Examining the Impact of Director Appointments on Board Involvement in Strategic Decision Making. *Academy of Management Journal*, 44(4): 639-661.
- [27] Chang, H.J. (2007) *State-owned Enterprise Reform*. New York: UNDESA.
- [28] Choi, H., Park, S. and Lee, J. (2011) Government-Driven Knowledge Networks as Precursors to Emerging Sectors: A Case of the Hydrogen Energy Sector in Korea. *Industrial and Corporate Change*, 20(3): 751-787.

- [29] Corneo, G. and Rob, R. (2003) Working in Public and Private Firms. *Journal of Public Economics*, 87(7): 1335-1352.
- [30] D'Souza, J. and Megginson, W.L. (1999) The Financial and Operating Performance of Newly-Privatized Firms in the 1990s. *Journal of Finance*, 54(4): 1397-1438.
- [31] De Alessi, L. (1974) An Economic Analysis of Government Ownership and Regulation: Theory and Evidence from the Electric Power Industry. *Public Choice*, 19(1): 1-42.
- [32] Dewenter, K. and Malatesta, P.H. (2001) State-Owned and Privately-Owned Firms: An Empirical Analysis of Profitability, Leverage, and Labour Intensity. *American Economic Review*, 91(1): 320-334.
- [33] Djankov, S., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2008) The Law and Economics of Self-Dealing. *Journal of Financial Economics*, 88(3): 430-465.
- [34] Djankov, S. and Murrell, P. (2002) Enterprise Restructuring in Transition: A Quantitative Survey. *Journal of Economic Literature*, 40(3): 739-793.
- [35] Ehrlich, I., Gallais-Hamonno, G., Liu, Z. and Lutter, R. (1994) Productivity Growth and Firm Ownership: An Empirical Investigation. *American Economic Review*, 102(5): 1006-1038.
- [36] European Commission (2011) *State Aid Scoreboard: Report on State Aid Granted by the EU Member States*. Brussels.
- [37] Ferreira, D., Manso, G. and Silva, A.C. (2013) Incentives to Innovate and the Decision to Go Public or Private. *Review of Financial Studies*, forthcoming.
- [38] Frey, B.S. (1997) A Constitution for Knaves Crowds Out Civic Virtues. *Economic Journal*, 107(443): 1043-1053.
- [39] Frey, B.S. and Benz, M. (2005) Can Private Learn from Public Governance. *Economic Journal*, 115(507): 377-396.
- [40] Funkhouser, R. and MacAvoy, P.W. (1979) A Sample of Observations on Comparative Prices in Public and Private Enterprises. *Journal of Public Economics*, 11(3): 353-368.
- [41] Glaeser, E., La Porta, R., Lopez-de-Silanes, F. and Shleifer, A. (2004) Do Institutions Cause Growth? *Journal of Economic Growth*, 9(3): 271-303.
- [42] Hausman, W. and Neufeld, J.L. (1991) Property Rights versus Public Spirit: Ownership and Efficiency of U.S. Electric Utilities Prior to Rate-of-Return Regulation. *Review of Economics and Statistics*, 73(3): 414-423.
- [43] Heller, M.A. and Eisenberg, R.S. (1998) Can Patents Deter Innovation? The Anticommons in Biomedical Research. *Science*, 280(5364): 698-701.

- [44] Holmstrom, B. (1979) Moral Hazard and Observability. *Bell Journal of Economics*, 10(1): 74-91.
- [45] Holmstrom, B. and Milgrom, P. (1991) Multitask Principal Agent Analyses: Incentive Contracts, Asset Ownership and Job Design. *Journal of Law, Economics and Organization*, 7(1): 24-52.
- [46] Holmstrom, B. and Milgrom, P. (1994) The Firm as an Incentive System. *American Economic Review*, 84(4): 972-991.
- [47] Hood, C. (1991) A Public Management for All Seasons? *Public Administration*, 69(1): 3-19.
- [48] Hoskisson, R.E., Hitt, M.A., Johnson, R.A. and Grossman, W. (2002) Conflicting Voices: The Effects of Institutional Ownership Heterogeneity and Internal Governance on Corporate Innovation Strategies. *Academy of Management Journal*, 45(4): 697-716.
- [49] Hu, H.T.C. and Black, B. (2006) Empty Voting and Hidden (Morphable) Ownership: Taxonomy, Implications, and Reforms. *Business Lawyer*, 61(3): 1011-1070.
- [50] Kim, K.S. (1981) Enterprise Performances in the Public and Private Sectors: Tanzanian Experience, 1970-75. *Journal of Developing Areas*, 15(3): 471-484.
- [51] Knott, J. (1985) Comparing Public and Private Management: Cooperative Effort and Principal-Agent Relationships. *Journal of Public Administration Research and Theory*, 3(1): 93-119.
- [52] Kochnar, R. and David, P. (1996) Institutional Investors and Firm Innovation: A Test of Competing Hypothesis. *Strategic Management Journal*, 17(1): 73-84.
- [53] Kornai, J. (1979) Resource-Constrained Versus Demand-Constrained Systems. *Econometrica*, 47(4): 801-819.
- [54] Jensen, M.C. and Meckling, W.H. (1976) Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, 3(4): 305-360.
- [55] La Porta, R. and López-de-Silanes, F. (1999) Benefits of Privatization: Evidence from Mexico. *Quarterly Journal of Economics*, 114(4): 1193-1242.
- [56] La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998) Law and Finance. *Journal of Political Economy*, 106(6): 1113-1155.
- [57] La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998) The Quality of Government. *Journal of Law, Economics and Organization*, 15(1): 222-279.
- [58] Lachman, R. (1985) Public and Private Sector Differences: CEOs' Perceptions of Their Role Environments. *Academy of Management Journal*, 28(3): 671-680.

- [59] Laffont, J. and Tirole, J. (1993) *A Theory of Incentives in Procurement and Regulation*. Cambridge, USA: MIT Press.
- [60] Laursen, K. and Foss, N. (2003) New Human Resource Management Practices, Complementarities, and their Impact on Innovation Performance. *Cambridge Journal of Economics*, 27: 243-263.
- [61] Lazonick, W. and Tulum, O. (2011) US Biopharmaceutical Finance and the Sustainability of the Biotech Business Model. *Research Policy*, 40(9): 1170-1187.
- [62] Levy, B. and Spiller, P.T. (1994) The Institutional Foundations of Regulatory Commitment: A Comparative Analysis of Telecommunications Regulation. *Journal of Law, Economics, and Organization*, 10(2): 201-246.
- [63] Majumdar, S.K. (1998) Assessing Comparative Efficiency of the State-Owned Mixed and Private Sectors in Indian Industry. *Public Choice*, 96(1): 1-24.
- [64] Mauro, P. (1995) Corruption and Growth. *Quarterly Journal of Economics*, 110(3): 681-712.
- [65] Mazzucato, M. (2011) *The Entrepreneurial State*. London: Demos.
- [66] Mazzucato, M. and Dosi, G. (eds) (2006) *Knowledge Accumulation and Industry Evolution: Pharmabiotech*. Cambridge: Cambridge University Press.
- [67] McCain, R.A. (1980) A Theory of Codetermination. *Journal of Economics*, 40(1-2): 65-90.
- [68] Megginson, W.L., Nash, R. and van Randenborgh, M. (1994) The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis. *Journal of Finance*, 49(2): 403-452.
- [69] Megginson, W.L. and Netter, J.M. (2001) From State to Market: A Survey of Empirical Studies on Privatization. *Journal of Economic Literature*, 39(2): 321-389.
- [70] Metcalfe, L. (1993) Public Management: From Innovation to Imitation. In J. Kooiman (ed) *Modern Governance: New Government-Society Interactions* (pp. 173-189), London: Sage.
- [71] Michie, J. and Sheehan-Quinn, M. (2001) Labour Market Flexibility, Human Resource Management and Corporate Performance. *British Journal of Management*, 12(4): 287-306.
- [72] Motoyama, Y., Appelbaum, R. and Parker, R. (2011) The National Nanotechnology Initiative: Federal Support for Science and Technology, or Hidden Industrial Policy? *Technology in Society*, 33(1-2): 109-118.
- [73] Munari, F., Roberts, E.B. and Sobrero, M. (2002) Privatization Processes and the Redefinition of Corporate R&D Boundaries. *Research Policy*, 31: 31-53.

- [74] Munari, F. and Sobrero, M. (2003) Privatization's Effects on R&D Investments. In M. Calderini *et al.* (eds) *Corporate Governance, Market Structure and Innovation* (pp. 67-91), Cheltenham, UK: Edward Elgar.
- [75] Munari, F. and Oriani, R. (2005) Privatization and Economic Returns to R&D. *Industrial and Corporate Change*, 14(1): 61-91.
- [76] OECD (2003) *Guidelines for Managing Conflict of Interest in the Public Service*. Paris: OECD.
- [77] OECD (2005) *Corporate Governance of State-Owned Enterprises*. Paris: OECD.
- [78] OECD (2011) *State-Owned Enterprise Governance Reform: An Inventory of Recent Change*. Paris: OECD.
- [79] OECD (2012) *Corporate Governance, Value Creation and Growth: The Bridge between Finance and Enterprise*. Paris: OECD.
- [80] OECD (2013) *STAN - Structural Analysis Database*. Paris: OECD.
- [81] Peltzman, S. (1971) Pricing in Public and Private Enterprises: Electric Utilities in the United States. *Journal of Law and Economics*, 14(1): 109-47.
- [82] Persson, T. and Tabellini, G. (2004) Constitutions and Economic Policy. *Journal of Economic Perspectives*, 8(1): 75-98.
- [83] Pescatrice, D.R. and Trapani, J.M. (1980) The Performance and Objectives of Public and Private Utilities Operating in the United States. *Journal of Public Economics*, 13(2): 259-276.
- [84] Picot, A. and Kaulmann, T. (1980) Comparative Performance of Government-owned and Privately-owned Industrial Corporations: Empirical Results from Six Countries. *Journal of Institutional and Theoretical Economics*, 145: 298-316.
- [85] Roberts, E.B. (2001) Benchmarking Global Strategic Management of Technology. *Research and Technology Management*, 44(2): 25-36.
- [86] Roland, G. (2008) *Privatization: Successes and Failures*. New York, USA: Columbia University Press.
- [87] Rowthorn, B. and Chang, H.J. (1993) Public Ownership and the Theory of the State. In T. Clarke and C. Pitelis (eds) *The Political Economy of Privatization* (pp. 31-39), New York, USA: Routledge.
- [88] Ruttan, V. (2006) *Is War Necessary for Economic Growth? Military Procurement and Technology Development*. New York: Oxford University Press.
- [89] RWB - Reporters Without Borders (2012) *Press Freedom Index 2011/2012*. Paris.

- [90] Salter, A.J. and Martin, B.R. (2001) The Economic Benefits of Publicly Funded Basic Research: A Critical Review. *Research Policy*, 30: 509-532.
- [91] Scharfstein, D. (1988) The Disciplinary Role of Takeovers. *Review of Economic Studies*, 55(2): 165-199.
- [92] Schmidt, K.M. (1996a) The Costs and Benefits of Privatization: An Incomplete Contracts Approach. *Journal of Law, Economics and Organization*, 12(1): 1-24.
- [93] Schmidt, K.M. (1996b) Incomplete Contracts and Privatization. *European Economic Review*, 40(3-5): 569-579.
- [94] Scotchmer, S. (1991) Standing on the Shoulders of Giants: Cumulative Research and the Patent Law. *Journal of Economic Perspectives*, 5(1): 29-41.
- [95] Scott, S.G. and Bruce, R.A. (1994) Determinants of Innovative Behavior: A Path Model of Individual Innovation in the Workplace. *Academy of Management Journal*, 37(3): 580-607.
- [96] Scott, P. and Falcone, S. (1998) Comparing Public and Private Organizations: An Explanatory Analysis of Three Frameworks. *American Review of Public Administration*, 28(2): 126-145.
- [97] Searle, R.H. and Ball, K.S. (2003) Supporting Innovation through HR Policy: Evidence from the UK. *Creativity and Innovation Management*, 12(1): 50-61.
- [98] Shapiro, C. and R. D. Willig (1990) Economic Rationales for the Scope of Privatization. In E. N. Suleiman and J. Waterbury (eds) *The Political Economy of Public Sector Reform and Privatization* (pp. 55-87), Boulder, Colo. USA: Westview Press.
- [99] Shipton, H., Fay D., West, M., Patterson, M. and Birdi, K. (2005) Managing People to Promote Innovation. *Creativity and Innovation Management*, 14(2): 118-128.
- [100] Shirely, M. (1995) *Bureaucrats in Business: The Economics and Politics of Government Ownership*. Washington DC, USA: Oxford University Press.
- [101] Shleifer, A. (1998) State versus Private Ownership. *Journal of Economic Perspectives*, 12(4): 133-150.
- [102] Shleifer, A. and Summers, L. (1998) Breach of Trust in Hostile Takeovers. In A. Auerbach (ed) *Corporate Takeovers: Causes and Consequences* (pp. 33-35), Chicago: University of Chicago Press.
- [103] Shleifer, A. and Vishny, R.W. (1993) Corruption. *Quarterly Journal of Economics*, 108(3): 599-617.
- [104] Shleifer, A. and Vishny, R.W. (1994) Politicians and Firms. *Quarterly Journal of Economics*, 109(4): 995-1025.
- [105] Smith, S.C. (1991) On the Economic Rationale for Co-determination Law. *Journal of Economic Behaviour and Organization*, 16(3): 61-81.

- [106] Stein, J.C. (1988) Takeover Threats and Managerial Myopia. *Journal of Political Economy*, 96(1): 61-80.
- [107] Stigler, G.J. (1971) The Theory of Economic Regulation. *Bell Journal of Economics and Management Science*, 2(1): 3-21.
- [108] Stiglitz, J.E. (1999) Knowledge as a Global Public Good. In I. Kaul, I. Grunberg and M. Stern (eds) *Global Public Goods* (pp. 308-325), Oxford: Oxford University Press.
- [109] Stout, L.A. (1988) The Unimportance of Being Efficient: An Economic Analysis of Stock Market Pricing and Securities Regulation. *Michigan Law Review*, 87(3): 613-709.
- [110] Stout, L.A. (2007) The mythical benefits of shareholder control. *Virginia Law Review*, 93(3): 789-809.
- [111] Svensson, J. (2005) Eight Questions about Corruption. *Journal of Economic Perspectives*, 19(3): 19-42.
- [112] Vickers, J. and Yarrow, G. (1991) Economic Perspectives on Privatization. *Journal of Economic Perspectives*, 5(2): 111-132.
- [113] Vining, A.R. and Boardman, A.E. (1992) Ownership versus Competition: Efficiency in Public Enterprise. *Public Choice*, 73(2): 205-239.
- [114] WEF - World Economic Forum (2012) *The Global Competitiveness Report 2012-2013*. Geneva.
- [115] Williamson, O.E. (1985) *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracts*. New York: Free Press.
- [116] Willner, J. (2003) Privatisation and Public Ownership in Finland. *CESifo Working Paper Series*, n. 1012.
- [117] Yafeh, Y. and Yosha, O. (2003) Large Shareholders and Banks: Who Monitors and How? *Economic Journal*, 113(484): 128-146.
- [118] Zahra, S.A. (1996) Governance, Ownership, and Corporate Entrepreneurship: The Moderating Impact of Industry Technological Opportunities. *Academy of Management Journal*, 39(6): 1713-1735.
- [119] Zingales, L. (2012) *A Capitalism for the People: Recapturing the Lost Genius of American Prosperity*. New York, USA: Basic Books.

Notes

¹Some argue that the reduced ability of the State-owner to monitor and verify managerial effort is due to the lack of clear-cut performance indicators in SOEs. This problem, however, applies to service sectors (like health care or education) but is not a distinctive issue of SOEs with respect to POEs in competitive manufacturing industries, where business objectives of State-owned and privately-owned firms do not differ in their nature and measurability.

²The State can also temporarily enter into POEs ownership. As an example, it is worth mentioning the recent case of General Motors (GM): the U.S. Treasury invested heavily into GM ownership in 2009, and then GM bought back a part of the government's shares at the end of 2012 paying a 7.9% premium over the stock's market price (Bennett and Sparshott, 2012).

³Belloc (2013) shows that, while a greater size of financial markets may provide firms with more funds for R&D activities, corporate openness to small and diversified outside shareholders may also imply coordination failures among corporate investors when innovative projects are undertaken.

⁴'Empty voting' can be defined as the votes emptied of an accompanying economic interest. This refers to those cases in which shareholders have substantial voting power while having limited or zero economic ownership. The derivatives revolution has made possible such pattern, providing hedge funds and sophisticated financial investors with the possibility to reduce their economic exposition to corporate outcomes while preserving voting rights.

⁵It is worth noting that, in principle, if the government is malevolent and tries to capture business objectives, the lack of disciplining devices against managerial discretion (i.e. managers insulation, which some literature deems to be a cause of firm inefficiency) should act as a countervailing force to political interference.