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Discussion Paper No. 2002/29

Does a Switch of Budget Regimes Constrain Managerial Discretion?

Evidence for Italian Public Enterprises' Investment

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March 2002

Abstract

This study examines the effect of the hardening of the budget constraint on the investment behaviour of Italian state owned enterprises (SOEs). It carries out a natural experiment that exploits the 1987 shift of budget regimes due to the pressure of European Union economic policies on the Italian government.

Drawing from the theory of capital market imperfections, we apply the empirical framework for the analysis of investment-cash flow sensitivity to a panel of state-owned manufacturing firms during the period 1977-93. We parallel state firms to Anglo-Saxon public corporations which, under separation of ownership and control, are afflicted by agency problems, managerial discretion, misallocation of free cash-flow and overinvestment. We argue that, under a soft budget constraint, state firms' managerial discretion and, in particular, collusion between managers and vote-seeking politicians, lead to wasteful investment. …/…

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We estimate a number of investment models with additional cash flow terms and test for parameter constancy across budget regimes. Consistently with our predictions, we find that there is a significant, positive correlation between cash flow and investment when the budget regime is soft and, with a harder budget regime, the relationship disappears. Our findings support the managerial discretion hypothesis. They show that hardening the budget constraints brings about an important change in the investment behaviour of public enterprises, with managers losing the discretion necessary to indulge in collusion with politicians, empire building and wasteful investment. Furthermore, we provide empirical evidence of the efficiency enhancing effect of the European economic policies on the behaviour of SOEs in Italy. In this respect the experience of Italian SOEs provides a useful benchmark to draw policy implications for the restructuring process in EU accession, transition and emerging economies.

Acknowledgements

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1.   Introduction

A growing body of theoretical and empirical literature has developed in recent years to investigate the effects of the soft budget constraint syndrome[1] on transition, centralized and mixed economies (Kornai, 1998; Qian and Roland, 1998; Berglof and Roland, 1998; Maskin and Xu, 2001).

Only few papers investigate how firms react to a change in budget regime or, more generally, to economic reforms aimed at enhancing efficiency through firms' restructuring (see, for example, Pinto, Belka and Krajeski, 1993; Majumdar, 1996; Li, 1997). This is partly because in most countries associated with the syndrome market reforms and institutional reforms are still under way (see Kornai, 2001). We contribute to fill this gap by presenting evidence, for a panel of Italian public enterprises, of a change in investment behaviour that is due to a change in the budget regime in which they operate. In the case of Italian firms the shift has already occurred and displayed its disciplinary effects,[2] thus allowing us to exploit a natural experiment to investigate the firms' real and financial responses to a change in the financial environment. In this respect the experience of Italian state-owned firms may be used as a benchmark to draw policy implications for the restructuring process in other countries.

Italy is a mixed economy where, until very recently, a large portion of the economy was controlled by the state.[3] Our analysis of Italian institutions shows that, until the mid 1980s, Italian state-owned firms operated under a soft budget constraint and that in the late 1980s that regime switched from soft to hard. We show that a determinant role in driving this change was played by European economic policies. The requirements to enter the European Monetary Union and, before that, the discipline imposed by participation in the European monetary system and the single market programme pushed the Italian government towards a much tougher approach to its budget deficit and therefore to the financing of public enterprises.

The case of Italy provides a unique example to prove that a hard budget constraint regime can be enforced through an upward devolution of economic policies to a supranational institution such as the European Commission. It can be extended for example to EU

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[1] A soft budget constraint regime is in place 'wherever a funding source - e.g. bank or government - finds it impossible to keep an enterprise to a fixed budget, i.e., whenever the enterprise can extract ex post a bigger subsidy or loan than would have been considered efficient ex ante' (Maskin, 1996).

[2] This paper is part of a research programme into the financial discipline of public enterprises. In Bertero and Rondi (2000) we provide econometric evidence on the *effects* of the hardening of the budget constraint on public firms' productivity and employment across budget regimes. In Bertero and Rondi (2002) we analyse how that switch of regime came about as a consequence of pressure from the European Union and generalize to other contexts the supranational mechanism that triggered it.

[3] La Porta, Lopez-de-Silanes and Shleifer (1999) find that the state is the single most important, large shareholder after individual families in most economies. The positive contribution of public enterprises to the postwar development of some European economies, such as France and Italy, is well documented (see for example, Kumar, 1993; Vernon and Aharoni, 1981; Prodi, 1976). This is in contrast to the equally well documented poor performance of state-owned firms in recent decades, not only in those and other industrialized economies, but also in transition and developing ones (Bartel and Harrison, 1999).

accession or to any other country willing to enforce economic reforms and budgetary discipline in exchange for the benefits of membership of supranational institutions (e.g. GATT, WTO, IMF, the World Bank).[4] More generally, regardless of what forces—supranational institutions or domestic economic reforms—drive the shift in regime, more empirical evidence is required to show how firms may react to this switch and through which mechanisms a change in company behaviour can occur.

This paper investigates the behavioural responses of managers to a switch in the budget constraint by focussing on the important question of the link between managerial discretion[5] and investment spending by state-owned firms across budget regimes. We draw from financial economics the theoretical framework for the analysis of the impact of capital markets imperfections on the investment decisions of private firms and we adapt that approach to take into account the different institutional characteristics of public enterprises.

Information economics and agency theory provide the theoretical foundations to explain, with two different interpretations, why empirical research has found that investment is positively correlated with cash flow or other measures of internal finance, after controlling for future investment opportunities.[6] One interpretation, the 'financing constraints hypothesis', explains the investment-cash flow link in terms of financial constraints arising in imperfect capital markets when investors are less informed than managers about the quality of the investment project (Myers and Majluf, 1984). With asymmetric information, costly monitoring and contract enforcement problems, a premium is added to the (unique) perfect markets cost of capital, and internal and external funds are no longer perfect substitutes. A decrease in current cash flow, by signalling a decrease in internal net worth, raises the shadow cost of capital, tightening the financing constraints. This discourages investment and leads to underinvestment.

A second interpretation of the excess sensitivity of investment to cash flow, the 'managerial discretion hypothesis', highlights the agency problems arising from the misalignment of managers' interests and shareholders' objectives (Jensen and Meckling, 1976; Grossman and Hart, 1982). In a world of perfect capital markets, private firms' investment projects are chosen according to the positive net present value criterion, with the objective of maximizing shareholders' wealth. But, when ownership and control are separated, private firms' managers enjoy greater discretion in the decision-making process. As suggested by Jensen (1986)'s 'free cash flow theory', in this context managers are able to overlook equity holders' wealth and, for example, invest in excess of what is needed to finance positive net present value projects (see also Stultz, 1990). Rather than paying out

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[4] See Bertero and Rondi (2002).

[5] 'Managerial discretion is the ability of managers to choose and pursue objectives and strategies that differ from those of the owners' (Aharoni, 1981:184). We consider taxpayers to be the owners of public firms (see Section 3). In this paper the terms *public firms, public enterprises* (commonly used in the public economics literature) and *state-owned firms, state-owned enterprises* (commonly used in the transition economics literature) are all used interchangeably to mean firms whose majority shareholder is the government. In contrast, we use the term *private firms* to mean firms not owned by the government (and *not* to indicate firms not quoted).

[6] On the importance to control for future profit opportunities in investment equations, see Nickell (1978), Schiantarelli (1996) and Hubbard (1998).

dividends to shareholders, they use cash flows to maximize their personal reputation and perquisites. Moreover, when ownership is not only separated from control but also *dispersed*—e.g. in widely held quoted firms—the literature shows that the existence of free riding shareholders leaves managers with even greater discretion (see Hart 1995). For firms with severe agency problems, the observed positive correlation between investment and cash flow indicates overinvestment. According to this interpretation, however, if any kind of discipline (in particular, the debt discipline) could reduce managerial discretion we would no longer observe the relationship between investment and cash flow. A distinctive element of the financial environment of public firms is that they normally operate under a soft budget constraint regime.

> The *budget constraint* is *soft* if the state helps the firm out of trouble. There are various means to do so: subsidies; individual exemption of taxes or other charges…; prolongation of the due credit payment, etc. The state is a universal insurance company which compensates the damaged sooner or later for every loss. The paternalistic state guarantees automatically the survival of the firm… the hardness or softness of the budget constraint reflects an attitude… [It] is an ex-ante behavioural regularity, which exerts an influence on the firms' decision. (quoted in Schmidt, 1996 from Kornai, 1979)

But the softness/hardness of the constraint can be of different degrees and can also change over time. Kornai (1996) discusses how, as the budget regime moves towards a harder constraint, public firms are subject to greater financial discipline.

In the context of the empirical work testing the impact of financing constraints on investment decisions (Fazzari et al., 1988), the soft budget constraint scenario is equivalent to public enterprises belonging to a subsample of 'ultimately unconstrained' firms (see Kaplan and Zingales, 1997) on account of government financial support. As for asymmetric information or contract enforcement problems, these are likely to be mitigated, for public firms, by the accountability required of public organizations or by the links between state enterprises and state-owned banks.

In contrast, agency problems are severe for public firms and are likely to exacerbate the related possibility of abusing managerial discretion (see Grundfest, 1990).[7] Bureaucratic corruption is perhaps the most complex type of agency problem (Prendergast, 2000) and is likely to be enhanced in a soft budget regime. Many authors view bureaucratic corruption as an important element contributing to the inefficient behaviour and under-performance of public enterprises (Shleifer and Vishny, 1993; Shleifer and Vishny, 1994; Huther and Shah 2000; Triesman, 2000). One form of corruption is the collusion between public managers and politicians in maximizing objectives other than social welfare, most importantly, objectives that maximize votes. An important consequence of this collusion is suboptimal public overinvestment (Mauro, 1995), for example when public managers agree to build an unnecessary plant in the constituency of particular politicians.

Overinvestment is facilitated by the financial regime in which public enterprises operate. When the budget constraint is *soft*, it fails to discipline the financial behaviour of managers. These are left with the power to allocate funds, a circumstance that enhances

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[7] See also Laffont and Tirole, 1991, Tirole 1994, Shleifer and Vishny 1994.

their temptation to collude with politicians and 'cause their firms to grow beyond the optimal size' (Jensen, 1986:323). We therefore interpret the particular collusion between public enterprises' managers and politicians as an abuse of managerial discretion and investigate its effect on investment decisions.

In this paper we develop a methodology that allows us to test for the importance of agency problems and managerial discretion effects on the investment decisions of public enterprises. For the empirical investigation we use a panel of 150 Italian state-owned manufacturing firms over the period 1977-93. We exploit the shift in budget regimes of 1987 and carry out a natural experiment testing for a *cross-time* variation in the investment behaviour over the sample period. We estimate an accelerator model of investment with added cash flow terms, and test whether the sensitivity of investment to cash flow changes when the budget regime switches from soft to hard. Consistently with these predictions we find that that the regime shift leads to the disappearance of the relationship between cash flow and investment. For control purposes we present evidence also for a large sample of private firms. We test the robustness of our results across alternative investment models.

This study makes three contributions, in different areas. First, it extends the analysis of the impact of capital market imperfections on investment to firms either controlled by the Government or operating in countries associated with the soft budget constraint syndrome. Second, it contributes to the literature that examines how firms in transition or developing countries may react to the hardening of the budget regimes by providing empirical evidence of the disciplinary effect of a shift of budget regimes on the investment behaviour of public enterprises. Third, it provides empirical evidence of the efficiency enhancing impact of economic policies aimed at introducing the single European market and the European Monetary Union.

The paper is divided into seven sections. Section 2 investigates how investment decisions and managerial discretion differ between private and public firms. Section 3 puts these differences in the context of Italian institutions and discusses the switch from a soft to a hard budget regime. Section 4 presents the investment models. Section 5 describes the dataset. Section 6 presents the empirical models and the results. Section 7 concludes the paper.

2.   Public enterprises, budget constraints and investment decisions

The agency problems/managerial discretion view is of great relevance for public firms, once the similarities with widely-held quoted corporations are identified. This section explores how the predictions of the managerial discretion hypothesis have to be adjusted to account for the different and more complex context in which public managers operate. The equivalent for public firms of the maximization-of-shareholders'-wealth objective is the maximization of a social welfare function, which is a combination of two constrained objectives. The first is exactly the same as for private firms and is the maximization of taxpayers' wealth, driven by the profit and efficiency motive. The second, a direct consequence of the mandate of public firms (Sappington and Stiglitz, 1989), is the fulfilment of the *industrial or economic policy objectives*—set by the government—of growth and employment maximization and of regional development.

Chart 1
Managers' objectives

	Managers of private firms	Managers of public enterprises
Constrained objectives	Maximization of shareholders' wealth	1.Maximization of taxpayers' wealth
		2. Maximization of government policy objectives (e.g. employment and regional development)
Discretionary objectives	Maximization of personal benefits	1.Maximization of personal benefits
		2. Maximization of party-political objectives (collusion with politicians)

The equivalent for public firms of the pursuit of private firms managers' own objectives is again more complex and made up of two discretionary components. The first is the pursuit of managers' personal perquisites, again the same as for private firms. The second, most important for this paper, is the pursuit of what we call 'party political objectives' (which should not be confused with the policy objectives above). These are the objectives driven by corruptive behaviour and leading to collusion between managers and politicians and to investment in vote-maximizing projects. They are the ones modelled, for example, in Shleifer and Vishny's (1994) work. Chart 1 summarizes the private and public managers' types of objectives.

Two points are worth noting: First, due to the multiple and often partly conflicting objectives, the maximization of social welfare is more than a simple extension of the maximization of shareholders' wealth. The relevant consequence for this study is that agency problems here are, therefore, more complex than those of private firms (Prendergast 2000) and the discretion in the hand of public firms' managers has more dimensions than that of private firm managers. Multiple and unclear objectives, complicated performance measurements, greater choice of determining primary and secondary goals, all allow more room for manoeuvre and a greater temptation to pursue party political aims and collusion.

Second, because of the extreme form of dispersed ownership of public firms, their managers, exactly like managers of widely-held firms with free riding problems, enjoy little direct monitoring by shareholders. The ultimate financial owners of public firms in their chain of principals are the taxpayers, in the interest of whom social welfare and wealth should be maximized. However, taxpayers have no direct contractual property rights, only indirect influence through the election of a government which, itself, acts as principal for state-owned firms. Taxpayers do not have any direct control on management and have to leave monitoring to other institutions. The government's ownership rights are exercised, in turn, through multiple principals in the form of different ministries and this also exacerbates agency problems (see Tirole, 1994). All this, as for widely-held private firms with free riding problems, results in a greater likelihood of abuse of managerial discretion. Therefore, the discretion public managers enjoy—and the possibility of abusing it—is, in substance, similar to that of managers of widely-held private firms and the

hypothesis that agency problems affect public firms applies. However, given that their discretion arises from a more articulated set of objectives and a chain of principals and given the relevance of the budget regime for the financial behaviour of public firms, the predictions regarding its effect on the relationship between investment and cash flow need to be refined.

When a firm operates under a soft budget regime, the absence of bankruptcy and default risk and the relative financial freedom enhance the temptation for managers to collude with politicians and pursue discretionary objectives. Party political aims are easier to fulfil, monitoring of managers is more relaxed and, therefore, managerial discretion with respect to the allocation of funds is high. Therefore, under the 'managerial discretion/agency problems hypothesis', the *refined* prediction for state firms is that, under a *soft* budget constraint, the positive relationship between investment and internal finance should be strong independently of other sources of funding. On the other hand, if the budget constraint tightens, the new financial discipline would reduce the excessive managerial discretion of public managers. The *refined* prediction is that, when the budget constraint switches, the investment cash flow sensitivity should disappear or even reverse, as the shareholder/government monitors more carefully the firms' behaviour. It would require that cash flow is allocated to new financial priorities, for example the payout of dividends or, more plausibly, the reduction of debt.[8] Consistently with this, Bertero and Rondi (2000) find that, when public firms operate under a hard budget constraint regime, they *do* respond to financial pressure: they increase productivity and reduce employment.

3.   Italian public firms, managerial discretion and budget regimes

To understand managerial discretion and its possible abuse, we take a historical perspective and consider three distinct periods in the history of Italian public enterprises:[9] 1930s-60s, 1970-87, 1988 until now. Direct public intervention started in the 1930s with a number of rescue operations of distressed banks and of the manufacturing firms these banks owned (see De Cecco and Giavazzi, 1993 and Barca, 1997). The idea was to restructure firms and banks as parts of a new, diversified holding company (IRI, Institute for Industrial Reconstruction) and then, eventually, reinstate private ownership. After World War II, the original rescue plan was extended to promote reconstruction and to develop a full industrial policy plan of direct intervention. Two other holding companies were created, ENI (oil and gas sector) in 1953 and EFIM (mechanical engineering and mining sectors) in 1962. Saraceno (1977) makes the important point that

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[8] Although it may generate similar results, this discipline is intrinsically different from the financial distress experienced by private firms under creditors' pressure (Kaplan and Zingales, 1997) as the constraint here is the budgetary choice of the shareholder/government. The financial pressure here works because the government re-establishes its control function, motivating managers not to use cash flow for value destroying projects.

[9] As in other European countries, public enterprises in Italy played a major role in the economy accounting for around 15 percent of the non-agricultural labour force, 20 percent of value added and 25 percent of fixed investments (1991 data). The public sector controlled around 70 percent of banking assets and had a major presence in many industries, services and, of course, utilities. Parts of this section draw from the institutional analysis in Bertero and Rondi (2000) and are further developed in Bertero and Rondi (2002).

> …the political justification of this action was neither the intention to put a stop to private monopolies nor to give an impetus to certain industrial productions nor to develop depressed areas. Instead, the inability of the private sector to supply the risk capital required for controlling important industrial enterprises from sources other than commercial banks was the compelling factor for government intervention. … Thus, a certain pragmatism became associated with the state-held enterprises that was to remain for the life of the system.

The state holdings system makes Italian public enterprises particularly interesting for the study of managerial discretion and of the relationship between public managers and politicians. Whereas a nationalized industry is a direct instrument of government policy operating outside market rules, Italian state holdings were meant to operate within market conditions, in competitive sectors, in some cases with the equity participation of private shareholders, with the aim of safeguarding the independence of managers from the political system. Managers were outsiders with respect to political circles and were allowed to concern themselves primarily with profitability and efficiency (Barca, 1997:548). The economic and public policy objectives were added by the government and had to be incorporated into final decisions (Saraceno, 1977). The interaction between managers' and government objectives is summarized by Grassini (1981): 'In general, Parliament decides a policy, provides funds and sets a limit on the extent to which a state-owned firm can try to maximize its profits'. In this initial setup period, 1930s to 1960s, the scope for abuse of managerial discretion and related collusion with politicians was limited.

The legal setup of state holdings reflected these principles. Italian public ownership is organized in state-owned holding companies, in turn with controlling interests in diversified subholdings. These own individual enterprises, in some cases with minority private shareholders (see Chart 2). The subholdings are mostly incorporated as private joint-stock corporations, are governed by private commercial law, follow a private accounting system and operate in a variety of competitive industries. The database for the empirical investigation of public enterprises in this study is constructed from the balance sheets of a sample of these individual firms.

Chart 2
Corporate governance of Italian public enterprises
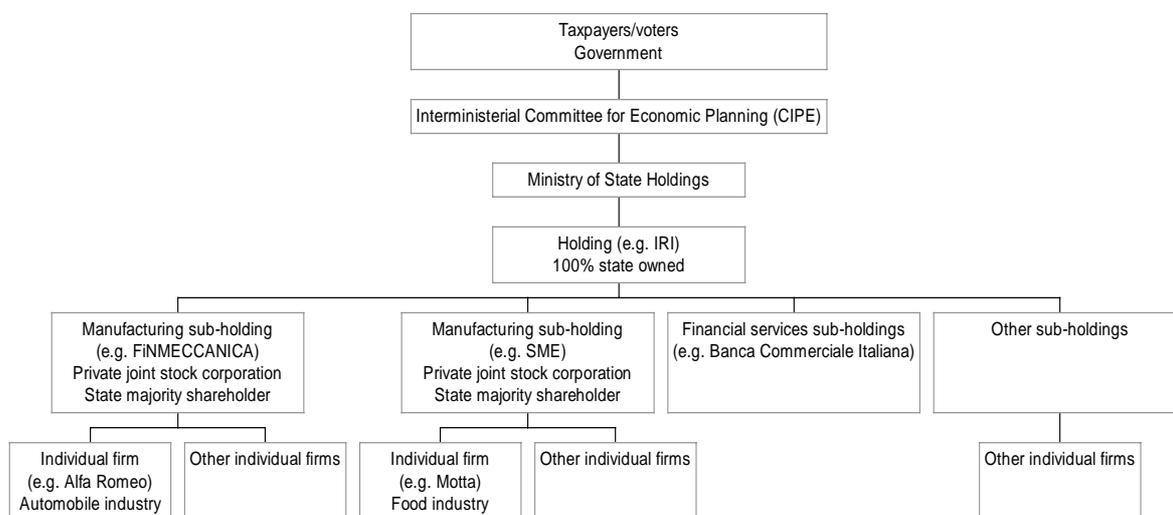
During the first period (1930s-60s) public firms were, by and large, profitable and operated as described above. Abuse of the discretionary managerial objectives (see Chart 1) was rare. An extensive literature, particularly by British scholars, such as Shonfield (1965), Posner and Wolf (1967) and Holland (1972), praised the management of these firms for their substantial contribution to the recovery of the Italian economy after World War II and also, paradoxically, for reinforcing competition (Martinelli, 1981). The establishment in 1956 of a Ministry for State Holdings with the mandate of spelling out the political objectives for public enterprises, was meant to separate the political from the profitability objectives. The idea was to create a filter between politicians and firms to preserve the independence of the latter (Saraceno, 1977:426; Scognamiglio, 1981).

During the second period (1970s-80s) things changed. Other institutions set up in the late 1960s to reinforce that filter, did not produce the outcome for which they were intended. For example, in 1967 an Interministerial Committee for Economic Planning (CIPE) was established, with the mandate to set economic and social objectives and determine investment policy for public enterprises. The Ministry for State Holdings, in turn, would translate these strategic guidelines into operational objectives for the public holdings.

However, the governance of public enterprises became excessively complicated (see Chart 2) and whereas the institutional mechanisms through which the government/shareholder communicated its objectives to firms became more transparent, a party political 'hidden shareholder' emerged (Scognamiglio, 1981). This, together with a deteriorating world economy and other factors,[10] resulted in a period, between 1970 and 1987, of party political interference in the management of public enterprises (Grassini, 1981). Political influence deeply affected strategic decisions, such as the location of new plants and appointment of top management. The 1978 law (L.14/78) formally gave a parliamentary committee the role of appointing the chairmen and vice-chairmen of public enterprises. This implicitly legitimated the nomination of top management on the basis of an equal allocation to the relevant political parties, rather than on the basis of competence (Grassini, 1981); for example, by tradition, IRI and ENI, the two major state holdings used to be 'controlled' by Christian Democrats and Socialists, respectively. All this made also the removal of top management a rather complicated political battle: for example, between 1965 and 1980 only three presidents were appointed at IRI.

The interaction of the above institutional changes and of two important characteristics of the postwar Italian political system—the high stability of the governing party and the high instability of governments themselves—favoured a climate of corruption and collusion. The succession of short-lived coalition governments, made of permutations of the same politicians belonging to the same large party (Christian Democrats) and a few small ones, eased the transfer of economic policy decisions from the elected government to the chairman of political parties and, more importantly, to the heads of party factions bargaining over the formation of coalitions (Filippi, 1975). All this brought about wide abuse of managerial discretion in public firms, particularly in the form of vote-maximizing investment decisions to satisfy party and party factions political objectives. Moreover, in 1974, a new law for the financing of political parties made illegal the direct and explicit

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[10] For example, following the first oil shock, political and social pressures pushed state holding companies into acquiring further collapsing private companies, a procedure which contributed to fostering direct political interference and collusion.

financing of political parties and factions by public enterprises. Although the law aimed at preventing collusive behaviour, its effect was to eliminate the transparency of party financing and to encourage indirect and hidden contributions by managers to politicians in exchange of favours.

By the end of the 1970s, which is when our database starts, public firms' performance was characterized by poor profitability (in some cases huge losses), low productivity and high debt. In order to keep these firms in business, government funds were made available to state holdings, and redistributed to individual firms, through various sources. Among these were endowment funds (*fondi di dotazione)*, which were used to recapitalize equity of the holding company. Losses were also financed with new bank debt, often provided by banks publicly owned themselves. In addition, the effects of a number of ill-conceived laws became apparent. An example is the 1977 law (L.675/77) which required state firms to estimate the shadow costs (*oneri impliciti*) they incurred by implementing 'non-economic objectives'. These costs were then subsidized by the treasury, a procedure which lent itself to abuse. It is easy to see how, during the second period (1970-87), given these circumstances, the budget constraint under which public enterprises operated became soft. Accommodating endowment funds, high debt, political interference and collusion between public managers and politicians, all contributed to creating an environment that fits Kornai's definition of a soft budget constraint regime in a mixed economy (see Introduction).

That soft budget regime was put under pressure in the third period (1987-90s) by a number of economic and political factors. In particular, a determinant role was played by the pressures of the EMS and the process towards European economic integration. With a mounting level of public debt, the EU pressure to reduce state aids and to foster privatizations—in order to enhance competition in the upcoming single market—and the attempt of Italy to qualify for the European Monetary Union triggered major changes and contributed to new and strong financial pressure on public enterprises and their managers. On the political side, during the second half of the 1980s, public opinion (and later a few courageous judges) started to turn against the unacceptable level of widespread corruption in the overall political system.[11] In the early 1990s this led to a reform of the voting system and to a revolution in the Italian political system and affected also the relationship between public managers and politicians.[12] More stringent monitoring of public managers resulted, during the 1990s, in new management structures and new procedures for the replacement of top management, based on performance and related criteria.[13]

As discussed in detail in Bertero and Rondi (2000 and 2001), an analysis of these changes allows us to identify a switch from a soft to a hard budget regime in 1987. This is the first year in which the restructuring of Italian public enterprises included the closure of plants and lines of production and even the dismissal of management. The drastic reorganization

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[11] See Mauro (1995) for data on corruption indices for early 1980s and Triesman (2000) for 1990s.

[12] Another political factor to consider is that, in the case of Italy, excessive government spending gave rise to an anti-central government federal movement particularly vociferous in its complaints of allegedly unfair distribution of government funds between north and south. This kind of phenomenon may be related to the pressures towards decentralization described by Qian and Roland (1998), which contribute to a hardening of the budget constraint for public organizations.

[13] See Lo Passo and Macchiati (1998) for evidence on management turnover in individual holdings.

of FINSIDER (an IRI subholding and sector holding itself of the steel industry) and the liquidation of EFIM (the third largest state holding) finalized in 1991, are example of this new policy which made public enterprises' managers experience for the first time a threat similar to that of bankruptcy or takeover. Nineteen-eighty-seven was is also the year in which an appropriate quantitative measure of government easy financing of public enterprises, i.e. total endowment funds, collapsed. After reaching a peak of 1.08 percent of GDP in 1983, endowment funds shrank to 0.46 percent of GDP in 1985 and then collapsed to 0.09 percent of GDP in 1987. Finally, 1987 is the first year of implementation of the single market programme.[14] Our empirical work exploits the 1987 structural break, which provides an instrument for a new natural experiment.

4.   The investment models

4.1   An accelerator specification

For our empirical investigation of the role of financial factors in the investment decisions of public enterprises we choose an accelerator model.[15] The simplicity of this model makes it, possibly counterintuitively, appropriate given the complexities of public firms discussed above.[16] In Section 6.1 we report the results. We also check the robustness of these results by estimating a number of alternative specifications, although these alternatives present a number of drawbacks (see Section 4.2).[17] In Section 6.2 we report the related results.

The accelerator model is derived from the solution of the profit maximization problem of the firm, in the absence of adjustment costs on the production factors (labour, L and capital stock, K). Following Jorgenson (1963), we derive an investment equation by maximizing net worth and calculating the marginal productivity of capital. We find that the equilibrium condition for profit maximization requires that the marginal productivity of capital stock equals the real user cost of capital, J_{it}. In particular, in the profit maximization equation we use the following constant elasticity of substitution (CES) production function:

$$Y_{it} = F\left(L_{it}, K_{it}\right) = \gamma\left[\alpha L_{it}^{\frac{\sigma-1}{\sigma}} + \beta K_{it}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma v}{\sigma-1}} \tag{1}$$

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[14] Interestingly, 1987 is the year in which, for the first time, a political party advocating particular federalist views to have candidates in the parliamentary elections.

[15] In using this widely tested model, we follow the approach of Bond, Elston, Mairesse and Mulkay (1997). See also Rondi and Sembenelli (1999).

[16] It can be argued that one peculiarity of state-owned firms is that they are not profit maximizers and that therefore the use of neoclassical investment models based on the assumption of profit maximization is not appropriate. However it has to be noted that even among private firms that assumption can be unsafe. Many types of 'private firms', for example those assumed to have conflict of interests between managers and shareholders (growth maximizing 'public companies') or those originating from countries where firms are supposed to behave according to a 'stakeholders' model', do not satisfy it.

[17] The thorough approach of testing the robustness of results by estimating a battery of alternative investment models is along the lines of Bond et al. (1997) and Mairesse, Hall, Mulkay (1999).

where Y is the firm's output, σ is the elasticity of substitution and ν is the returns to scale parameter. Taking logs and finding the first order condition for K_t, we obtain the following long run equilibrium condition for the desired capital stock as a function of real output and cost of capital:

$$k_{it} = \theta + \left(\sigma + \frac{1-\sigma}{\nu}\right) y_{it} - \sigma j_{it} \tag{2}$$

with:

$$\theta = \sigma \log \frac{\beta \nu}{\gamma^{-\frac{\sigma-1}{\sigma\nu}}}$$

where k_{it} is the log of capital stock, y_{it} is the log of real output and j_{it} is the log of real cost of capital .

To ensure proportionality between capital stock and demand, we must either assume $\nu=1$ (constant returns to scale) or $\sigma=1$ (unit elasticity of substitution). If we assume constant returns to scale and $\sigma=0$, we obtain a Leontief production function and a simple accelerator model, where the capital is not affected by the user cost of capital. If we assume $\sigma=1$, the CES production function is not defined due to the zero in the denominator of the exponent. However as $\sigma \to 1$ the CES function approximates a Cobb-Douglas production function. In this case the capital stock depends positively on demand and negatively on the cost of capital. Taking first differences, and assuming that Δk_{it} can be approximated by the investment rate I_{it}/K_{it}, we obtain the basic investment equation

$$\frac{I_{it}}{K_{it}} = \Delta y_{it} - \sigma \Delta j_{it} \tag{3}$$

To account for slow adjustment of the actual capital stock to the desired capital stock, we then add dynamics to the basic equation in the form of lagged investment rate (I/K) and lagged growth rate of real sales (Δy_i). We assume that the variation in the user cost of capital as well as firm specific trends in the capital and output growth rates are captured by time-specific, α_t, and firm-specific, α_i, effects. ε_{it} is the error term. The basic specification becomes:

$$\frac{I_{it}}{K_{it}} = \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 \Delta y_{it-2} + \alpha_i + \alpha_t + \varepsilon_{it} \tag{4}$$

To test for the presence of financial factors, we add to the basic specification the current and lagged cash flow to capital ratios (C_{it}/K_{it}).

Much of the debate over the role of cash flow in determining investment is about the fact that cash flow may also be a forecasting variable for future investment opportunities.[18] In the absence of controls for expectations, the significance of a cash flow term is difficult to interpret. The positive correlation between investment and cash flow may occur because of the effect of financial factors on investment or simply because information on cash flow helps to forecast output and therefore capital spending. In the empirical literature, the difficulty is to construct a proxy for the firm's investment opportunities.

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[18] See Schiantarelli (1996) and Hubbard (1998) for a thorough discussion of this issue.

To control for these opportunities, in other words for the possibility that information on cash flow helps to forecast output and, hence, investment, we add to equation (4) the future growth rates of real demand, measured by the first and second lead of the log difference of production in two-digit NACE industries, Δy_{jt+1}, Δy_{jt+2}. Therefore, including the above additions, our final specification is:

$$\frac{I_{it}}{K_{it}} = \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 \Delta y_{it-2} + \beta_5 \Delta y_{jt+1} + \beta_6 \Delta y_{jt+2} +$$
$$\beta_7 \frac{C_{it}}{K_{it}} + \beta_8 \frac{C_{it-1}}{K_{it-1}} + \alpha_i + \alpha_t + \varepsilon_{it}$$

(5)

where C_t/K_t and C_{t-1}/K_{t-1} are the current and lagged cash flow to capital ratio. Cash flow is defined as value added less labour cost, taxes and interest expenses.

4.2 Other investment models

The alternative specifications we use are: an Euler equation model, an error correction model and a modified version of the accelerator model. The standard approach to isolate the information content of cash flow would involve using Tobin's Q. However, apart from the common criticism of this approach, that the average observed Q may be a poor proxy for marginal Q, a more basic problem makes it unsuitable for our sample of state-owned firms: these firms are mostly unquoted.[19]

The Euler equation model, which does not require stock market data, describes the firm's choice of optimal capital stock, under the assumption of perfect capital markets (see, for example, Bond and Meghir, 1994). We follow the specification outlined in Bond and Meghir (1994):[20]

$$\left(\frac{I}{K}\right)_{it+1} = \beta_1 \left(\frac{I}{K}\right)_{it} - \beta_2 \left(\frac{I}{K}\right)_{it}^2 - \beta_3 \left(\frac{\Pi}{K}\right)_{it} + \beta_4 \left(\frac{Y}{K}\right)_{it} + \alpha_i + \alpha_t + \varepsilon_{it+1}$$

(6)

Π_i is the gross operating profits (value added—labour costs). Y_i is the firm's output and ε_{it+1} is the forecast error. The derivation of the model shows that, in the absence of financial constraints, $\beta_1 \geq 1$, $\beta_2 \geq 1$, $\beta_3 > 0$ and (under constant returns to scale) $\beta_4 \geq 0$.

In so far as it controls for the relevant expectational influences, this approach is the one that better accounts for the lack of stock market based information. A further advantage is that the rejection by the data of the standard Euler equation can be reconciled with the presence of financing constraints when proxies for changes in net worth have a role in the investment decision. However, several authors have pointed out a number of drawbacks,

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[19] For a recent discussion on the Q model of investment, see Erickson and Whited (2000). For an alternative methodology that does not require stockprices see also the 'Fundamental Q' approach (Gilchrist and Himmelberg, 1995) which constructs a measure for investment fundamentals based on forecasted profitability using VAR forecasts. By including the 'Fundamental Q' in the investment equation, one can find whether the added cash flow term is an independent 'fundamental' variable which explains investment. Although appealing in terms of not requiring market data, this approach is unsuitable for public firms because of their wide-ranging objectives, including non-profit, and, particularly, countercyclical ones. An attempt to construct this measure for our sample of public enterprises has indeed proved unsuccessful as the 'Q' variable appears with a negative sign in the investment equation.

[20] See also Rondi, Sembenelli and Zanetti (1994) for an application to Italian company data.

for example, the difficult comparability of results with the reduced form literature, the poor small samples properties and the high sensitivity of the results to the specification. In addition, as it is based on the firm's intertemporal first-order conditions, the Euler equation may fail to detect violations of the frictionless model for classes of firms for which the overall level of investment is constrained by internal finance throughout the period (and not period-by-period).[21] Its set of fragile assumptions, often too restrictive even for private firms, therefore makes us cautious in using it for state-owned firms.

The error correction model of investment has the advantage of retaining (long run) information in the levels of output and capital stock. Conversely, a disadvantage is that, when financial terms are included, the model does not control for the possibility that cash flow may be a forecasting variable for the firm's investment opportunities. For an empirical specification, we follow Bond et al. (1997) and use a model of the form:

$$
\frac{I_{it}}{K_{it}} = \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 (k_{it-2} - y_{it-2}) + \beta_5 y_{it-2} +
$$
$$
\beta_6 \frac{C_{it}}{K_{it}} + \beta_7 \frac{C_{it-1}}{K_{it-1}} + \alpha_i + \alpha_t + \varepsilon_{it}
$$

(7)

Finally, we estimate a modified version of the accelerator model of equation (5). In order to control for future investment opportunities, the modified model includes the leads of firms' real sales growth instead of the leads of industry production growth.

5.   Data and descriptive statistics

The database is an unbalanced panel constructed from the balance sheet data of manufacturing firms, both state and privately owned, for the period 1977-93. The panel was constructed at CERIS using data collected by Mediobanca investment bank.[22] Reflecting the standard ownership pattern of Italian firms, most of these firms are not quoted, which, as discussed, prevents us from using the Q model of investment. The panel includes only firms with at least five consecutive observations, so that each firm has a time series of at least five, and at most seventeen, years. The five-year requirement is appropriate for the dynamic specification we use in the econometric section, which, for most variables, involves first-differencing as well as lagging.

Firms are classified according to their ownership, which can change over time in either direction, from state-owned to private or vice versa (i.e. firms are allowed to transit between private and public ownership). Moreover, each firm is allocated to its primary industry defined according to the three-digit NACE-REV 0 classification. Finally, whenever a major operation occurs such as mergers, acquisitions, or divestures, by

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[21] See Schiantarelli (1996), Oliner, Rudebusch and Sichel (1996), and Hubbard (1998).

[22] Firms are included in the yearly directory *Le Principali Società Italiane* (Mediobanca) on the basis of their size. Between 1977 and 1984, firms with sales greater than Lit.10bn (£3.3mn) were included, between 1985 and 1986, firms with sales of at least Lit.20bn (£6.6mn) and between 1987 and 1993, firms with sales of at least Lit.25bn (£8.3mn). Firm level data on fixed capital investment is not directly available in this dataset. Therefore investment is calculated as the difference in fixed capital assets. In turn, the replacement value capital stock series is calculated using the perpetual inventory method. 1982 was chosen as the benchmark year because in this year the 'Visentini Bis Accounting Law' required firms to evaluate the capital stock at replacement prices. For a complete description of the methodology and the database see Margon et al. (1995).

construction the panel drops the observation for that year and breaks up the time series because that observation is unlikely to be comparable with the previous and following one.

For our empirical work, we separate the original panel into two subsamples of state and private enterprises. The subsamples consist of 150 state companies and 1,168 private companies with 1,278 and 9,877 firm-year observations, respectively. On average, state-owned firms are larger that private firms. The median public firm has Lit.49.2bn (£16.4mn) of real sales when it enters the sample, whereas the media private firms has Lit.36.5 (£12.2mn) in 1980. Measured in terms of employees, the median state firm has 884 workers (upon entry) and the private firm has 413. As described in Section 3, we choose 1987 as the turning point for the shift from soft to hard budget regimes. On the basis of these definitions we construct two time dummy variables to be used in the econometric analysis, $SOFT_t$ and $HARD_t$.

Table 1a presents the descriptive statistics for the main variables for the panel of public firms for the entire period and for the soft and hard budget constraint periods. It includes the statistics for the investment to capital stock ratio (I/K), the cash flow to capital stock ratio (C/K) and the debt to capital stock ratio (D/K).[23] For comparative purposes, Table 1b reports statistics for the panel of private firms.

Table 1a
Summary statistics for firm characteristics: 150 state-owned firms

	Full Period	Soft Budget Period	Hard Budget Period
Total sample (1977-93) observations	1278	924	354
I/K			
I Quartile	0.058	0.059	0.056
Median	0.095	0.096	0.095
III Quartile	0.156	0.164	0.141
C/K			
I Quartile	-0.123	-0.154	-0.041
Median	0.023	0.006	0.050
III Quartile	0.095	0.092	0.101
D/K			
I Quartile	0.368	0.412	0.259
Median	0.738	0.814	0.573
III Quartile	1.375	1.432	1.168

Source: see text.

All cash flow ratios for public firms are lower—negative for the first quartile of all subperiods—than those for private firms for all quartiles and for all subperiods, confirming the generally poorer performance of state-owned firms. However, the cash flow ratios for the third quartile, compared to private firms' median profitability, are satisfactory. Also, the cash flow ratios for public firms show an improvement of performance in the hard constraint period compared with the soft period for all quartiles.

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[23] We use end of period capital stock as a scale, as is done in other studies using Italian data. This is done to minimize the distortion caused by the high and variable Italian inflation of the 1970s and early 1980s.

Table 1b
Summary statistics for firm characteristics: 1168 private firms

	Full Period	Soft Budget Period	Hard Budget Period
Total sample (1977-93) observations	9877	5611	4266
I/K			
I Quartile	0.055	0.056	0.053
Median	0.094	0.096	0.092
III Quartile	0.146	0.150	0.141
C/K			
I Quartile	0.036	0.043	0.031
Median	0.100	0.113	0.087
III Quartile	0.176	0.198	0.151
D/K			
I Quartile	0.202	0.230	0.173
Median	0.415	0.447	0.377
III Quartile	0.766	0.820	0.707

Source: see text.

Note: I/K: Investment to capital stock ratio. C/K: Cash flow to capital stock ratio. D/K: Long and short term financial debt to capital stock ratio. Soft Budget Period: 1977-87. Hard Budget Period: 1988-93.

The long and short term financial debt to capital stock ratios show that Italian public firms are, not surprisingly, more highly leveraged than private firms, with the median for public firms at 73.8 percent and 41.5 percent for private firms. It is notable, however, the effort to reduce the leverage of public firms between soft and hard budget years for all quartiles. The less leveraged firms of the first quartile decrease their debt ratios during the hard budget years from 41.2 percent to 25.9 percent, which leaves them only eight percentage points higher than private firms in the same quartile. The investment to capital stock ratios, on the other hand, show slightly greater investment by public firms than by private firms in all subperiods and quartiles, reflecting a pattern common to other countries.

6. Empirical investigation and results

6.1 The accelerator model specification

In this section we test for the importance of agency problems and managerial discretion effects on the investment decisions of public enterprises. We contribute to the debate on the effects of hardening the budget constraint by developing a methodology that allows us to test for the impact of a shift from soft to hard regimes on public firms' managerial discretion and investment. We explore the *cross-time* variation of investment behaviour by exploiting a natural experiment generated by the structural break in the financial regime of Italian public firms in 1987. Our empirical strategy consists in estimating an investment model with added cash flow terms, allowing the cash flow coefficient to vary *across the two financial regimes* under which these firms operated, a soft and a hard budget constraint. We then test whether the sensitivity of investment to cash flow is statistically different across the soft and the hard budget regimes and check the consistency of the econometric results with the predictions of the 'agency problems/free cash flow'

hypothesis adjusted for public enterprises. Under a soft budget constraint, when monitoring by shareholder/government is relaxed and managers and politicians collude to pursue party political objectives, the hypothesis predicts that the high managerial discretion to allocate internal funds would result in a high sensitivity of investment to cash flow. Under a hard budget constraint, in contrast, when monitoring tightens and managers' power to allocate funds to vote-seeking, wasteful projects is curbed, the hypothesis predicts that the relationship between investment and cash flow would disappear or even reverse, as the shareholder/government requires that cash flow is allocated to new financial priorities, e.g. dividend payout or debt reduction (see Section 2).

The empirical tests in this paper focus mainly on the hypothesis that the change in regime that transformed the budget constraint faced by public firms from soft to hard was successful in disciplining the abuse of managerial discretion with respect to investment spending. In order to check that the change in investment behaviour driven by the change in regime only concerns public enterprises and is not due to macroeconomic factors, we present evidence also for a large sample of private firms. As the regime switch was intended to discipline public firms, the cash flow results for private firms should hardly change across the two time periods.

For estimation we use the DPD programme by Arellano and Bond (1991, 1998), designed for dynamic panel data. Table 2 reports the results from the Generalized Method of Moments (GMM) first-differences one-step estimator, which eliminates the firm-specific effects by first-differencing the equations, and then uses lagged values of endogenous variables as instruments.[24] To check for absence of serial correlation in the residuals, we use the M_1 and M_2 tests for first- and second-order correlation (Arellano and Bond, 1991) and report them for all equations. If the error term in levels is serially uncorrelated, after first-differencing, first-order, but not second-order serial correlation, is to be expected and instruments dated t-2 and earlier should be valid. If we find second-order serial correlation, then only instruments dated t-3 are valid. To control for correlation between the instruments and the error term, we also report a Sargan test of overidentifying restrictions (Sargan, 1958 and Hansen, 1982). In all equations we add time dummies to capture, among other things, the variation in the user cost of capital (see Section 4).

In Table 2 we present the results for public firms and in Table 3 those for private firms, as control. Column 1 of both tables reports the estimated coefficients for the basic accelerator model specification, as outlined in Section 4, equation 5. For both public and private firms, lagged investment is positive, significant and of similar magnitude; real sales growth is consistent with accelerator effects. As noted in Section 4, we include future growth rates of two-digit industry production as a control for ex post realizations of investment opportunities. For public firms both leads of industry production enter positively. Overall, these results show an underlying robustness of the estimated accelerator specification. We now turn to the results concerning the effect of financial factors on investment.

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[24] We treat all right-hand side variables in the investment equation (1) as potentially endogenous. As instruments we use variables dated t-2 and t-3. Unreported OLS and Within Groups estimates suggest the presence of significant firm-specific effects.

Table 2
Investment equations: 150 state-owned firms
(GMM estimates in first differences, dependent variable $(I/K)_{it}$)

	(1)	(2)	(3)
$(I/K)_{it-1}$	0.139	0.148	0.214
	(1.796)	(1.917)	(2.727)
Δy_{it}	0.080	0.088	0.026
	(2.214)	(2.070)	(0.499)
Δy_{it-1}	-0.029	-0.022	-0.044
	(-1.211)	(-0.916)	(-1.451)
Δy_{it-2}	0.038	0.045	0.018
	(1.522)	(1.911)	(1.189)
Δy_{jt+1}	0.110	0.118	0.068
	(1.676)	(1.604)	(1.181)
Δy_{jt+2}	0.253	0.276	0.216
	(1.962)	(1.840)	(1.536)
$(C/K)_{it}$	0.020	-	-
	(0.907)	-	-
$(C/K)_{it-1}$	0.002	-	-
	(0.103)	-	-
$(C/K)_{it} \cdot SOFT_t$	-	0.039	0.092
	-	(2.345)	(2.549)
$(C/K)_{it} \cdot HARD_t$	-	-0.074	-0.096
	-	(-1.321)	(-1.293)
$(D/K)_{it-1} \cdot SOFT_{t-1}$	-	-	0.008
	-	-	(7.837)
$(D/K)_{it-1} \cdot HARD_{t-1}$	-	-	-0.019
	-	-	(-0.429)
M_1	-3.200 [113]	-3.215 [113]	-4.310 [113]
M_2	-0.925 [91]	-0.901 [91]	-0.597 [91]
Sargan	95.7 [100]	79.4 [80]	59.7 [56]
p value	(0.60)	(0.50)	(0.34)

Source: see text.

Instruments for col. (1): Gmm I/K_i (2,3) Gmm C/K_i (2,3) Gmm K_i (2,3) Gmm D/K_i (2,3) Δy_{it-2}, Δy_{it-3}, Δy_{jt-2}, Δy_{jt-3}. Instruments for col. (2): Gmm I/K_i (2,3) Gmm K_i (2,3) Gmm D/K_i (2,3) $\Delta C/K_{t-2} \cdot SOFT_t$, $\Delta C/K_{t-3} \cdot SOFT_t$, $\Delta C/K_{t-2} \cdot HARD_t$, $\Delta C/K_{t-3} \cdot HARD_t$, $C/K_{t-2} \cdot SOFT_t$, $C/K_{t-2} \cdot HARD_t$, Δy_{it-2}, Δy_{it-3}, Δy_{jt-2}, Δy_{jt-3}

Instruments for col. (3): Gmm I/K_i (2,3) Gmm K_i (2,3) $\Delta C/K_{t-2} \cdot SOFT_t$, $\Delta C/K_{t-3} \cdot SOFT_t$, $\Delta C/K_{t-2} \cdot HARD_t$, $\Delta C/K_{t-3} \cdot HARD_t$, $C/K_{t-2} \cdot SOFT_t$, $C/K_{t-2} \cdot HARD_t$, $D/K_{t-2} \cdot SOFT_t$, $D/K_{t-2} \cdot HARD_t$, $D/K_{t-3} \cdot SOFT_t$, $D/K_{t-3} \cdot HARD_t$, Δy_{it-2}, Δy_{it-3}, Δy_{jt-2}, Δy_{jt-3}

Note: One-step estimates. T-statistics in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

M_1 = Test for first order correlation in the residuals (normal distribution).

M_2 = Test for second order correlation in the residuals (normal distribution). Sargan = Sargan test of the correlation of the instruments with the error term (χ^2 distribution). Degrees of freedom in square brackets.

In column 1 of Table 2, the estimated coefficient on the current cash flow to capital stock ratio is positive, quite small and not significant, motivating further investigation. In column (2), the cash flow term is interacted with two year dummies, one for the soft and one for the hard budget regime. The former takes value one from 1977 to 1987 and the latter takes value one from 1988 onwards. The results in column 2 show that the cash flow coefficient for the soft budget years, C/K_{it} $SOFT_t$, is positive (0.039) and highly significant (p value = 0.019): this provides evidence of investment cash flow sensitivity during the *soft* years. The cash flow coefficient for the hard budget years, C/K_{it} $HARD_t$, is negative (-0.074) and not statistically significant. Most importantly, the difference between C/K_{it} $SOFT_t$ and C/K_{it} $HARD_t$ is significantly different from zero (t=2.01).

One objection that can be raised to these results so far is that, since a soft budget constraint implies easy access to substantial government lending/funding, investment should not be sensitive to cash flow. To address this issue, we introduce a further empirical specification in column 3 with an added debt term (the short and long term financial debt to capital stock ratio) interacted with the soft and hard time dummies. If external funds provided by the government through banks or financial holdings were the major source for investment projects, the importance of the cash flow effects would be reduced.[25] The empirical results in column 3 show that the cash flow effects are robust to the inclusion of the debt terms. This suggests that during the soft period, investment is sensitive to cash flow regardless of the availability of government/bank funds. The cash flow coefficient is positive and significant in the soft years (its size even increases) and negative and insignificant in the hard years. The difference between the two coefficients remains significant (t = 2.02). Finally, the coefficient for the debt ratio is positive and significant in the soft period and turns negative and not significant in the hard period. This latter result provides additional evidence of the impact of the change in budget regime on the financing policy of public enterprises.

A positive and significant relationship between investment and cash flow during the soft years and the disappearance of that relationship during the hard years is consistent with the predictions of the managerial discretion/agency problem hypothesis adjusted for public enterprises.[26] In a soft budget regime managers have the widest discretion on the allocation of cash flow and can use it to fund projects that maximize discretionary objectives (personal benefits and party political objectives, see Chart 1). When the regime toughens, the managers lose room for manoeuvre and are forced to allocate internal funds to other financial priorities. In our results the relationship between cash flow and investment in the hard years, although not statistically significant, is negative. This may indicate that when these firms faced a harder budget constraint they had to divert internally generated funds to uses that would improve the financial conditions of the firm, for example reduce indebtedness. Our interpretation of these results is supported by the

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[25] Although we lag the debt variable for one year and we use standard lagged instruments, reverse causality is likely to persist. The inclusion of the debt term is mainly for control purposes.

[26] It may be noted that our results are not consistent with the alternative explanation of the investment cash flow sensitivity, the 'financing constraints' hypothesis (see the Introduction). On the one hand, as public firms tend to have government financial support, they are not likely to face capital market constraints. On the other hand, under the financing constraint hypothesis, we ought to find a positive and significant cash flow coefficient during the hard budget regime and not, as our results show, in the soft budget constraint period.

Table 3
Investment equations: 1168 private firms
GMM estimates in first differences
Dependent variable $(I/K)_{it}$

	(1)	(2)
$(I/K)_{it-1}$	0.150	0.158
	(2.885)	(3.201)
Δy_{it}	0.183	0.271
	(2.085)	(2.815)
Δy_{it-1}	0.046	0.042
	(2.447)	(2.121)
Δy_{it-2}	0.040	0.039
	(2.363)	(2.201)
Δy_{jt+1}	-0.032	-0.026
	(-0.832)	(-0.638)
Δy_{jt+2}	0.027	0.053
	(0.674)	(1.176)
$(C/K)_{it}$	0.035	-
	(8.146)	-
$(C/K)_{it-1}$	-0.002	-
	(-9.978)	-
$(C/K)_{it} \cdot SOFT_t$	-	0.052
	-	(1.954)
$(C/K)_{it} \cdot HARD_t$	-	0.035
	-	(14.345)
M_1	-6.610 [926]	-6.735 [926]
M_2	1.754 [745]	1.798 [745]
Sargan	121.4 [101]	94.1 [81]
p value	(0.08)	(0.15)

Source: see text.

Note: Instruments for col. (1): Gmm I/K_i (2,3) Gmm C/K_i (2,3) Gmm K_i (2,3) Gmm D/K_i (2,3) Δy_{it-2}, Δy_{it-3}, Δy_{jt-1}, Δy_{jt-2}, Δy_{jt-3}. Instruments for col. (2): Gmm I/K_i (2,3) Gmm K_i (2,3) Gmm D/K_i (2,3) $\Delta C/K_{t-2} \cdot SOFT_t$, $\Delta C/K_{t-3} \cdot SOFT_t$, $\Delta CF/K_{t-2} \cdot HARD_t$, $\Delta C/K_{t-3} \cdot HARD_t$, $C/K_{t-2} \cdot SOFT_t$, C/K_{t-2} $HARD_t$, Δy_{it-2}, Δy_{it-3}, Δy_{jt-1}, Δy_{jt-2}, Δy_{jt-3}

One-step estimates. T-statistics in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity. M_1 = Test for first order correlation in the residuals (normal distribution). M_2 = Test for second order correlation in the residuals (normal distribution). Sargan = Sargan test of the correlation of the instruments with the error term (χ^2 distribution). Degrees of freedom in square brackets.

descriptive statistics in Table 1a, which report both an increase in cash flow and a reduction in debt during the hard budget years, and by the regression results in column (3), which report a change in the sign of the debt coefficient, from positive to negative, across the budget regimes.

The relevance of the *shift* of regime for public enterprises is confirmed by the results on the control sample of private firms reported in Table 3. It is often argued that the meaning of different results across time periods is difficult to interpret because the macroeconomic conditions are likely to change between sample periods. The private firm sample provides a control for the results obtained for the public firms. In column (1) the cash flow variable for the entire period has a positive and significant coefficient, consistently with the evidence for other countries of high sensitivity of investment to cash flow.[27] Noticeably, the split into two subperiods, constructed to reflect the two budget regimes for public enterprises, is irrelevant for private firms. In column (2) both cash flow coefficients (C/K_{it} $SOFT_t$ and C/K_{it} $HARD_t$) are still both positive and significant and, most importantly, not significantly different from each other. This clearly indicates that the statistically significant difference found for the public firms sample across time periods is due to the institutional regime switch for the state-owned corporate sector that we emphasised in Section 2.

Our regression results show that the abuse of managerial discretion of public managers and their collusion with politicians, is a plausible explanation for the excess sensitivity of investment to cash flow for public enterprises operating under a soft budget regime. Consistently with this interpretation, we find that the *switch* from a soft to a hard budget constraint leads to the disappearance of the relationship between cash flow and investment, suggesting that public managers become more cautious in their investment decisions.

6.2 Alternative model specifications

In this section we test the robustness of the above results by estimating the alternative econometric models outlined in Section 4.2. Tables A1, A2, A3 in the appendix report the results. All equations use the GMM first-differences estimator. We discuss here the results for the specification that investigates investment behaviour across budget regimes (column 2 in Tables A1, A2 and A3).

We start with a modified version of the accelerator model of equation (5) in which, to control for future investment opportunities, we use the leads of firm real sales growth, instead of the leads of industry production growth. In order to include two leads of sales growth in our model, we have to drop from the panel firms that do not match the appropriate requirement for a dynamic specification (see section 5). We are therefore left with 91 state-owned firms, those with at least seven consecutive observations. Table A1 shows that in the first specification our previous results are confirmed. The cash flow term is positive and highly significant during the *soft* budget constraint period, whereas the sign is reversed and the significance disappears when the budget constraint is hard.

The second model we estimate is an error correction model of investment. Table A2 reports the GMM results. The results in column (2) show that the error correction mechanism works as expected. The coefficient for (k_{it-2}-y_{it-2}) is negative and significant, suggesting that when the capital stock is greater than the desired level, the firm reduces its investment rate in the future (and vice versa). Constant returns to scale are rejected, as

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[27] The size of the cash flow coefficient, although small compared to the empirical results for the US and UK firms, is of this same order of magnitude in most studies of Italian firms.

shown by the significant coefficient on the level of y_{it-2}.[28] Again, for this second specification as well, the results for the role of cash flow across budget regimes hold. The coefficient for cash flow in the soft period is positive and highly significant and the one for the hard period not significantly different from zero, although positive this time.

Finally, we estimate an Euler equation model. The derivation of the model, in the absence of financial constraints, implies that $\beta_1 \geq 1$, $\beta_2 \geq 1$, $\beta_3 > 0$ and, under constant returns to scale, $\beta_4 \geq 0$. Table A3 presents the empirical results obtained using the GMM SYSTEM estimator available in DPD98 (Arellano and Bond, 1998).[29] The results show that the coefficients on the lagged investment terms are correctly signed and significant, though smaller, in absolute value, than predicted by the theory. In this third specification, as well, the evidence on cash flow and budget regimes is confirmed. The coefficient on the gross operating profits term, when interacted with the soft budget period dummy as it is done in column (2), is positive and approaching significance, and its point estimate is much larger than the coefficient for the hard period.

In conclusion, the empirical evidence in this section confirms that the positive correlation between cash flow and investment during the soft budget years and the disappearance of that relationship during the hard years is a result robust across the main investment models in the literature.

7.   Conclusions

A distinctive element of the financial environment of public firms is the budget regime under which they operate. By analysing Italian institutions and how they were affected by European economic policies, we identify a shift of budget regimes, from soft to hard, for Italian public enterprises in 1987. This paper contributes to the literature that examines firms' reactions to a change in budget regime by investigating the investment behaviour of Italian public enterprises. We draw from financial economics the theoretical framework for the study of investment in imperfect capital markets and we adjust it to account for the different institutional context in which public firms operate. We focus on the managerial discretion hypothesis, which emphasises the agency problems arising from the conflict of interests between managers and shareholders, when ownership is separated from control and highly fragmented.

Agency problems are particularly severe for public firms. We discuss how they originate in the multiplicity of principals, the related different context in which public managers operate and the multiple objectives they face. We differentiate between what we call

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[28] These results are similar to those reported for the UK in the cross-country comparison by Bond et al. (1997).

[29] As shown in Blundell and Bond (1998), the GMM SYSTEM estimator helps to mitigate the weak instrument problem that may arise when lagged levels of the endogenous variable are used as instruments for an equation in first-differences (as in the standard GMM). By estimating a system of equations in first differences and in levels (where lags of variables in levels and in first-differences are used as instruments, respectively) it is shown that efficiency gains can be obtained, particularly with short sample periods and persistent series. We have used the GMM SYSTEM estimator on other specifications in this paper and found improvements in precision on the coefficient of the lagged dependent variable in most cases, but particularly in the estimation of the Euler equation.

constrained and discretionary objectives. Among the discretionary objectives, the pursuit of party political aims leads to collusion between public managers and politicians and we interpret collusion and corruption as an abuse of managerial discretion. So, the excessive managerial discretion enjoyed by managers of public firms is similar, although with more dimensions, to that of managers of widely-held quoted corporations.

Bureaucratic corruption and collusion between managers and politicians are facilitated by the soft financial regime in which these firms operate. Insofar as managerial discretion extends to fund allocation and investment decisions, an important consequence of this collusion is suboptimal, public, overinvestment. The literature on the disciplining role of debt and related moral hazard is rooted in the soft budget constraint syndrome. The managerial discretion hypothesis predicts an excess sensitivity of investment to cash flow for firms with agency problems, little monitoring of managers and relative financial freedom. We test this prediction against a sample of public firms that face a radical change in budget regime. Our research strategy is based on the natural experiment made possible by the identified shift in their budget regime. We allow the cash flow coefficient to vary *across the two budget regimes* and test the responsiveness of investment to the financial factors across the two regimes.

The empirical methodology consists in estimating an accelerator investment model with additional cash flow terms, using an unbalanced panel of 150 Italian state-owned firms, operating in competitive industries, over the period 1977-93. The sample period is split into a soft budget constraint period (1977-87) and a hard budget constraint period (1988-93) and we test for parameter constancy of the financial factors across the two subperiods. We test the robustness of our results with respect to alternative investment models. The refined predictions for public enterprises of the managerial discretion/budget regimes hypothesis are that, under a soft budget constraint, the relationship between cash flow and investment should be positive and significant *and*, under a hard budget constraint, it should disappear. The results we obtain are consistent with these predictions and are robust across all estimated specifications. We find that the correlation between cash flow and investment is strong and positive during the soft budget years and that the link disappears when the financial budget regime becomes more binding. The shift from a soft to a hard budget regime brings about an important change in the investment decisions of public enterprises, with managers losing the discretion necessary to indulge in collusion, empire building and wasteful investment.

We conclude by mentioning three possible policy areas for which this paper is relevant. First, understanding the interaction between financial factors and *public* firms' investment—and in what way it differs from private firms—is important for identifying the motivating force to make such organizations more efficient, for improving regulatory mechanisms for privatized utilities and for assessing the potential effects of privatization. This is particularly relevant for developing, transition and EU accession countries, given the dynamics and constraints of development and growth. Second, understanding the relationship between soft budget constraint and collusion between managers and politicians is of great relevance for any initiative aimed at reducing corruption in governmental organizations (Huther and Shah, 2000). Finally, understanding the role of supranational economic policies (in this paper, the economic policies of European integration, in particular the requirements for participating in the European single market programme and for entering the European Monetary Union) in disciplining domestic agents (in this paper, Italian public firms and the Italian government) has become very important in a world of

economically interdependent national economies. The case of Italy, for which we document on the positive, efficiency enhancing effects of this supranational pressure, provides a valuable benchmark to assess and measure the progress in enterprise restructuring in countries in transition either towards EU accession and, more generally, to market-based systems.

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Appendix

Table A1
Investment equations: 91 state-owned firms
(leads of real sales growth)
Sample period 1983-93
GMM estimates in first differences
Dependent variable $(I/K)_{it}$

	(1)	(2)
$(I/K)_{it-1}$	0.070	0.079
	(0.848)	(0.939)
Δy_{it}	0.110	0.090
	(2.651)	(1.593)
Δy_{it-1}	-0.035	-0.030
	(-0.978)	(-0.828)
Δy_{it-2}	0.039	0.039
	(1.497)	(1.511)
Δy_{it+1}	0.037	0.065
	(0.813)	(0.880)
Δy_{it+2}	0.009	-0.021
	(0.184)	(-0.302)
$(C/K)_{it}$	0.035	-
	(2.682)	-
$(C/K)_{it-1}$	-0.006	-
	(-0.213)	-
$(C/K)_{it} \cdot SOFT_t$	-	0.051
	-	(2.921)
$(C/K)_{it} \cdot HARD_t$	-	-0.048
	-	(-0.351)
M_1	-2.267 [71]	-1.947 [71]
M_2	-1.302 [61]	-1.452 [61]
Sargan	65.2 [66]	52.8 [50]
p value	(0.51)	(0.37)

Source: see text.

Note: Instruments for col. *(1)*: Gmm I/K$_i$ (2,3) Gmm k$_i$ (2,3) C/K$_{it-2}$, C/K$_{it-3}$, D/K$_{it-2}$, D/K$_{it-3}$, Δy_{jt-1}, Δy_{jt-2}, Δy_{jt-3}, Δy_{it-2}, Δy_{it-3}. Instruments for col. *(2)*: Gmm I/K$_i$ (2,3) Gmm k$_i$, (2,3) ΔC/K$_{t-2}$ · SOFT$_t$, ΔC/K$_{t-3}$ · SOFT$_t$, ΔC/K$_{t-2}$ · HARD$_t$, ΔC/K$_{t-3}$ · HARD$_t$, C/K$_{t-2}$ · SOFT$_t$, C/K$_{t-3}$ · SOFT$_t$, C$_{t-2}$ · HARD$_t$, C$_{t-3}$ · HARD$_{t-1}$, D/K$_{it-2}$, D/K$_{it-3}$, Δy_{jt-1}, Δy_{jt-2}, Δy_{jt-3}, Δy_{it-2}, Δy_{it-3}

Legend: One-step estimates. T-statistics in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

M_1 = Test for first order correlation in the residuals (normal distribution). M_2 = Test for second order correlation in the residuals (normal distribution). Sargan = Sargan test of the correlation of the instruments with the error term (χ^2 distribution).

Degrees of freedom in square brackets.

Table A2
Investment equations: 150 state-owned firms
(error correction models)
GMM estimates in first differences
Dependent variable $(I/K)_{it}$

	(1)	*(2)*
$(I/K)_{it-1}$	-0.146	-0.107
	(-1.607)	*(-1.089)*
Δy_{it}	-0.006	0.007
	(-0.118)	*(0.110)*
Δy_{it-1}	-0.184	-0.114
	(-1.879)	*(-1.744)*
$k_{it-2} - y_{it-2}$	-0.217	-0.197
	(-4.137)	*(-3.854)*
y_{it-2}	-0.332	-0.234
	(-2.772)	*(-2.986)*
$(C/K)_{it}$	0.038	-
	(3.159)	-
$(C/K)_{it-1}$	0.030	-
	(2.338)	-
$(C/K)_{it} \cdot SOFT_t$	-	0.081
	-	*(2.397)*
$(C/K)_{it} \cdot HARD_t$	-	0.041
	-	*(0.884)*
M_1	-2.980 [113]	-2.662 [113]
M_2	-0.896 [91]	-1.022 [91]
Sargan	68.1 [71]	48.0 [49]
p value	*(0.57)*	*(0.51)*

Source: see text.

Note: Instruments for col. *(1)*: Gmm I/K_i (2,3) Gmm $(k-y)_i$ (2,3) Gmm C/K_i (2,3). Instruments for col. *(2)*: Gmm I/K_i (2,3) Gmm $(k-y)_i$ (2,3) $C/K_{t-2} \cdot SOFT_t$, $C/K_{t-3} \cdot SOFT_t$, $C/K_{t-2} \cdot HARD_t$, $C/K_{t-3} \cdot HARD_t$

Legend: One-step estimates. T-statistics in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

M_1 = Test for first order correlation in the residuals (normal distribution). M_2 = Test for second order correlation in the residuals (normal distribution). Sargan = Sargan test of the correlation of the instruments with the error term (χ^2 distribution).

Degrees of freedom in square brackets.

Investment equations: 150 state-owned firms
(Euler equation models)
GMM SYSTEM estimates in first differences
Dependent variable $(I/K)_{it}$

	(1)	(2)
$(I/K)_{t-1}$	0.586	0.593
	(1.865)	(1.837)
$(I/K)^2_{t-1}$	-0.168	-0.171
	(-1.539)	(-1.521)
$(Y/K)_{t-1}$	0.000	0.000
	(0.111)	(0.087)
$(\Pi/K)_{t-1}$	0.032	-
	(1.251)	-
$(\Pi/K)_{t-1} \cdot SOFT_t$	-	0.033
	-	(1.293)
$(\Pi/K)_{t-1} \cdot HARD_t$	-	-0.031
	-	(-0.332)
M_1	-2.090 [113]	-2.098 [113]
M_2	-0.016 [91]	-0.007 [91]
Sargan	125.0 [109]	122.4 [108]
p value	(0.14)	(0.16)

Source: see text.

Instruments for col. (1): Equations in first differences: Gmm I/K_i (2,3) Gmm $(I/K)^2_i$ (2,3) Gmm Π/K_i (2,3) Y/K_{it-2}, Y/K_{it-3}, k_{it-2}, k_{it-3}, y_{it-2}, y_{it-3}. Equations in levels: $\Delta I/K_{it-1}$, $(I/K)^2_{it-1}$

Instruments for col. (2): Equations in first differences: Gmm I/K_i (2,3) Gmm $(I/K)^2_i$ (2,3) Gmm Π/K_i (2,3) Y/K_{it-2}, Y/K_{it-3}, k_{it-2}, k_{it-3}, y_{it-2}, y_{it-3}. Equations in levels: $\Delta I/K_{it-1}$, $(I/K)^2_{it-1}$

Legend: One-step estimates. T-statistics in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

M_1 = Test for first order correlation in the residuals (normal distribution). M_2 = Test for second order correlation in the residuals (normal distribution). Sargan = Sargan test of the correlation of the instruments with the error term (χ^2 distribution).

Degrees of freedom in square brackets.