

**MANAGERIAL DISCRETION AND INVESTMENT  
DECISIONS OF STATE-OWNED FIRMS:  
EVIDENCE FROM A PANEL OF ITALIAN COMPANIES**

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10 December 1998

**Abstract**

In this paper we investigate the role of capital markets imperfections for the investment decisions of a panel of Italian manufacturing state-owned enterprises over the period 1977-1993. We explore whether asymmetric information and financing constraints or managerial discretion are the source of excess sensitivity of investment to cash flow. We estimate an accelerator model with additional cash flow terms and test for parameter constancy across soft and hard budget constraint periods as well as across the business cycle. We find that managerial discretion is responsible for the investment cash flow correlation, especially during the soft budget period. The evidence also suggests that the change in budget regime has an important impact on the investment decisions of this panel of public enterprises.

Keywords: Capital Markets Imperfections, Public enterprises, Investment and Cash Flow, Soft-Budget Constraint, Business Cycle.

JEL: G32, L32, G31, E32, M40.

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## **1. Introduction**

The positive contribution of public enterprises to the post-war development of some European economies, such as France and Italy, is well documented (see, for example, Kumar, 1990, Vernon and Aharoni 1981 and Prodi 1976). This is in contrast to the equally well-documented poor performance of state-owned firms in the last decades, not only in those economies, but also in transition and developing ones. One important element contributing to these poor results is the possible collusion, perceived on the increase in the last decades, between public managers and politicians (see, for example, Shleifer and Vishny, 1994).

In this paper we look at collusion as an abuse of managerial discretion<sup>1</sup> on the part of public enterprises' managers and we investigate its impact on public firms' investment. If managers and politicians collude, vote-maximising objectives rather than the maximisation of social welfare drive public investment. Therefore, collusion (or corruption) result in wasteful, sub-optimal investment<sup>2</sup>. From a policy perspective, understanding what affects public firms' investment is important for two reasons. On one side, the dynamics and constraints of public investment play a crucial role in development and growth, especially in developing and transition economies. On the other, investigating how financial factors affect public firms' investment - and in what they differ from private firms' - is relevant for an understanding of what incentives could improve their performance, of the regulatory mechanisms for privatized utilities and the potential effects of privatization.

The aim of this study is to provide an empirical analysis of the effects of managerial discretion on investment decisions by analysing the sensitivity of investment to cash flow for a panel of Italian public firms. The study is, therefore, a contribution to the debate on the source of capital market imperfections that might be responsible for the well-documented evidence of a positive correlation between investment and cash flows, holding constant investment opportunities. To our knowledge this is the first study that enlarges that debate to public enterprises. And the study of public enterprises is of great interest since, as discussed in La Porta, Lopez-de-Silanes and Shleifer (1998), the State is, after individual families, the most important large shareholder in most economies.

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<sup>1</sup> "Managerial discretion is the ability of managers to choose and pursue objectives and strategies that differ from those of the owners" (Aharoni, 1981, p.184). We consider taxpayers to be the owners of public firms (see Section 3).

<sup>2</sup> See Stultz (1990) for wasteful investment in private firms.

Our methodology consists in drawing from financial economics the framework in which to study the financing of investment and the relationship between investment and cash flow. We then complement that approach with a discussion of how to think of the peculiarities of the investment decisions and managerial discretion of public enterprises. We also discuss the importance of the budget regime in which public enterprises operate. In the empirical work we identify a switch from a soft to a hard budget regime in 1987, which allows us to carry out a natural experiment. Moreover we analyse the interactions of the two budget regimes with different stages of the business cycle. The econometric investigation is carried out using a new dataset and a detailed analysis of the relevant Italian institutions.

The paper is divided into eight sections. Section 2 describes the theoretical framework for analysis of the correlation between investment and cash flows of private firms. Section 3 investigates how investment decisions and managerial discretion differ between private and public firms. Section 4 puts these differences in the context of Italian institutions and discusses soft and hard budget constraints. Section 5 includes our empirical model and Section 6 a description of the dataset. Section 7 presents the empirical results. Section 8 concludes the paper.

## **2. The theoretical framework for the analysis of company investment**

Recent microeconomic literature has refocused attention on the determinants of company investment decisions under the assumption of imperfect capital markets (see the seminal work by Fazzari, Hubbard and Petersen, 1988). Information economics and agency theory have provided the theoretical foundations to explain why investment turns out to be highly correlated with cash flow or other measures of internal finance, after controlling for future investment (profit) opportunities<sup>3</sup>.

The theoretical framework for this paper draws from three strands of this literature. The first explains the investment-cash flow relationship 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)

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<sup>3</sup> On the importance to control for future profit opportunities in investment equations, see Nickell (1978), Schiantarelli (1996) and Hubbard (1998).

perfect markets cost of capital, and internal and external funds are no longer perfect substitutes. By signalling a decrease in internal net worth, a decrease in current cash flow raises the shadow cost of capital, tightening the financing constraints. This discourages investment and leads to under-investment. The implied prediction of this framework is a positive relationship between investment and internal finance. So far, most of the empirical work in this area has found supporting evidence for this positive relationship by investigating the investment behaviour of sub-samples of firms selected to be a priori more likely to face capital-market frictions<sup>4</sup>. In general, empirical findings are consistent with the idea that financing constraints are more binding (revealing a higher correlation between investment and internal finance) for firms which tend to be relatively smaller, younger, with lower dividend pay-out, independent (i.e. not affiliated with business groups or banks), more technologically innovative, with less concentrated ownership<sup>5</sup>.

The second interpretation of the excess sensitivity of investment to cash flow highlights the agency problems arising from the misalignment of managers' interests and shareholders' objectives (Jensen e Meckling, 1976; Grossman and Hart, 1982). As suggested by Jensen (1986)'s "free cash flow theory", if managers are more interested in growth, empire building and private benefits, they invest cash flow in excess of what is needed to finance positive net present value projects rather than paying out dividends to shareholders. In this framework, for firms where the agency problems are most severe, the observed positive correlation between investment and cash flow "could reflect managers' decisions to ignore signals from market valuation in favour of over-investment in growth"<sup>6</sup> (Hubbard, Kashyap and Whited, 1995, p. 685).

Interestingly, both theories share the view that internal and external finance are imperfect substitutes. Both predict that changes in internal resources forecast changes in investment spending, holding constant firm opportunity. Both assume that higher leverage implies more risk of financial distress and more risk of bankruptcy. However, they differ on

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<sup>4</sup> For a critical assessment of the methodology of splitting the sample according to ex-ante criteria, see Schiantarelli (1996) and Hubbard (1998). See also Kaplan and Zingales (1997) who criticise the dividend pay-out criteria used by Fazzari, Hubbard and Petersen (1988), and Fazzari, Hubbard and Petersen (1996) for a reply.

<sup>5</sup> See Bond, Elston, Mairesse and Mulkay (1997), Mulkay (1997), Schiantarelli and Sembenelli (1996), Chirinko and Schaller (1995), for recent empirical evidence.

<sup>6</sup> This argument has been used by Kaplan and Zingales (1997) to describe the investment decisions of "financially unconstrained" companies. See also Hubbard, Kashyap and Whited (1995), Carpenter (1995) and Gugler (1997) for other attempts to discriminate between the two hypotheses.

the source of the capital markets imperfections. The “financing constraints/asymmetric information” hypothesis focuses on hidden information problems, whereas the “managerial discretion” view focuses on agency/incentive problems resulting from the separation of ownership and control. As a consequence, although they both predict a wedge between the cost of internal and external funds, the cost of external finance is too high for the asymmetric information view, whereas the cost of internal finance is too low for the managerial discretion/agency cost explanation<sup>7</sup>. Hence, from the observed excess sensitivity of investment to cash flow, the former predicts under-investment and the latter over-investment and possibly waste.

The third approach to the study of the correlation of investment and cash flow is rooted in the recent literature on the micro-foundations of macroeconomics that has investigated the role of imperfect capital markets for investment over the business cycle (see Gertler and Hubbard, 1988; Bernanke, Gertler and Gilchrist, 1996). The main purpose of this literature is to analyse the channels of transmission of monetary policy. Whenever, following a monetary tightening or a downturn of the business cycle, a negative shock to the firm’s future prospects reduces its internal net worth, the terms of credit deteriorate and the firm cuts back on investment spending. As in the financial constraints framework, this pattern is more pronounced for firms which find it more difficult to credibly communicate private information<sup>8</sup>. The financial accelerator propagation mechanism predicts that the impact of financing constraints on company investment decisions is more severe during recessions, exacerbating and prolonging the economic downturn. In other words, the prediction here is that the relationship between investment and cash flow should also be positive, but the novelty is that it should be stronger during recessions. Within this macroeconomic approach, tests for the existence of a financial accelerator mechanism increasingly tend to combine the cross-section and time-series implications of the theory. This leads to compare the investment behaviour both across sub-samples of firms and across recessions and expansions, under the assumption that the investment cash flow relationship is (more) counter-cyclical for companies with (more) information and incentive problems<sup>9</sup>.

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<sup>7</sup> See Kathuria and Mueller (1995) on this point.

<sup>8</sup> The “flight to quality” of credit extended refers to the reallocation of credit from low-net-worth to high-net-worth borrowers, in downturns. See Bernanke, Gertler and Gilchrist (1996).

<sup>9</sup> See, for the U.S., Gertler and Gilchrist (1994), Kashyap, Lamont and Stein (1994), Kashyap, Stein and Wilcox (1993), and, for Italy, Rondi, Sack, Schiantarelli and Sembenelli (1998) and Rondi and Sembenelli (1998) respectively on aggregate data and panel data.

Whereas the predictions of the financial accelerator and financial constraints are both based on the same rationale, the managerial discretion seems to predict the opposite, that the correlation between investment and internal finance should be stronger during booms. However, as noted by Bernanke, Gertler and Gilchrist (1996, p.5), “Jensen’s theory is consistent with the financial accelerator in a positive sense, as it also implies that reduced internal finance constraints firm spending”. In this case, insofar as the degree of managerial discretion is pro-cyclical, the investment-cash flow relationship should also be pro-cyclical, with firms reducing wasteful investment in downturns. In this respect, recessions might be claimed to play a disciplinary role for firms suffering from conflicts of interest between managers and shareholders.

### **3. Investment decisions, managerial discretion and financing constraints in public firms**

In a world of *imperfect* capital markets with asymmetric information and agency costs, the literature has shown important consequences in investment decision processes, leading to a different pattern of predictions depending on whether firms are thought to be more afflicted by asymmetric information/financing constraints problems or by agency costs/managerial discretion problems. This section explores how these problems apply to public enterprises.

Although it has to be expected that even state firms have a pecking order in terms of cost of funds, they are generally considered “financially unconstrained” and independent of the availability of internal resources. External finance for public enterprises is dominated by state grants and guaranteed loans, with no risk of default and no risk of bankruptcy. In Italy, and other countries, they are not even compelled to pay-out dividends by law. Within the asymmetric information/financing constraints framework (Fazzari et al., 1988), public enterprises could therefore be seen as the ultimate unconstrained firms (see Kaplan and Zingales, 1997). And, if that paradigm holds, we should find that their investment is independent of cash flow. However, in Bertero and Rondi (1997) we show that when the budget regime is “hard”, public firms do respond to financial incentives. An important consequence of that result is that public firms can only be considered financially unconstrained in a *soft* budget constraint environment.

The finance literature shows that, 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 maximising shareholders' wealth. But, as discussed in Section 2, when ownership and control are separated, private firms' managers are able to overlook equity holders' wealth and take advantage of their freedom (Jensen and Meckling, 1976). The consequent managerial discretion enables them to use cash flows to maximise, for example, their personal reputation and perquisites through empire-building (Jensen 1986). And in a world of not only separation of ownership and control, but also of *dispersed* ownership - i.e. widely held quoted firms - the literature shows that free riding shareholders exacerbate managers' discretion. "The individual shareholder does not have an incentive to monitor the management, since the gains from improved management are enjoyed by all shareholders whereas the costs are born only by those who are active. Because of this free-rider problem, the managers of a public [*quoted*] company have a fairly free hand to pursue their own goals: these might include empire-building or the enjoyment of perquisites"<sup>10</sup>.

This framework, once the equivalent mechanisms are identified, is of great relevance for public enterprises. The equivalent for public firms of the shareholders' maximisation objective is more complex and includes the combination of *two* objectives, which, together, maximise a social welfare function. The first is exactly the same as for private firms and is the *profit and efficiency motive*. The second, a direct consequence of the mandate of public firms (Sappington and Stiglitz, 1989), is compliance to the *industrial or economic policy objectives* - set by the government - of growth and employment maximisation and regional development. An important implication of this objective, to which we come back in the next section, is that public investment is likely to be counter-cyclical.

The equivalent for public firms of the pursuit of private firms managers' own objectives is again more complex and made up of two 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 that are driven by collusion between managers and politicians and are motivated by vote-maximising. They are the ones modelled in Shleifer and Vishny (1994)'s work.. Chart 1 summarises the private and public managers' types of objectives.

#### Chart 1. **Managers' objectives**

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<sup>10</sup> Hart (1995), p.10.

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

Two points are worth noting. Due to the multiplicity and often partly-conflicting objectives that it entails, the maximisation of social welfare is more complex than the maximisation of shareholders' wealth. The interesting consequence, from this study's perspective, is that the discretion in the hand of public firms' managers has more dimensions than that of private firms managers<sup>11</sup>. Multiple and unclear objectives, complex 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. To counterbalance this, it should be pointed out, however, that public managers' discretion is greater in setting goals, but more limited in choosing strategies (Aharoni, 1981). Unions pressures, price controls, compulsory choice of domestic suppliers - often other state-owned firms - constraints in expanding in certain sectors and in the location of investments, reduce their strategic discretion.

<sup>11</sup> For example, it is interesting to notice that the maximisation of growth satisfies different objectives for managers of private and public firms. Whereas for private firms' managers, in the standard finance literature, growth maximisation is only equated with empire building and excessive managerial discretion, the pursuit of growth for public firms managers is often part of the maximisation of social welfare. So, it is sometimes difficult to disentangle when growth for state firms maximises taxpayers' wealth or managers' private benefits and when these two objectives are in conflict.



A second point worth noting is that public firms' managers, exactly like managers of widely held firms with free riding problems, also enjoy little direct monitoring by the owners of the firm. However, this is due to an extreme form of dispersed ownership, to the fact that taxpayers, the ultimate owners in the chain of principals of state-owned firms, are unable to exercise directly their ownership rights (see Tirole 1994). Although taxpayers are the ultimate financial owners of public firms, in the interest of whom social welfare and wealth are maximised, they can have a say on public firms choices only indirectly, by electing a government which, itself, acts as principal for state-owned firms<sup>12</sup>. Given the lack of contractual property rights, taxpayers therefore do not exercise any direct control on management and have to leave monitoring to other institutions. This, as in the case of widely held private firms with free riding problems, results in a greater likelihood of abuse of managerial discretion<sup>13</sup>.

In conclusion, although public firms operate under a more complex set of objectives, the discretion managers enjoy - and the possibility of abusing it - is, in substance, similar to that of private firms' managers.

#### **4. Italian public firms, managerial discretion, financing constraints and budget regimes**

Italian public enterprises<sup>14</sup> are of particular interest for the study of managerial discretion and collusion between public managers and politicians. Indeed, Italian public enterprises were set up as a system of state holdings, as opposed to being the outcome of sweeping nationalisations. This was done partly to guarantee independence of managers from the political system and to protect the quality and degree of managerial discretion. Whereas a nationalised industry is a direct instrument of government policy operating outside market

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<sup>12</sup> Although, to be precise, the government ownership rights are exercised, in turn, through multiple principals in the form of different ministries (see Tirole 1994).

<sup>13</sup> See Bertero (1998).

<sup>14</sup> As in other European countries, public enterprises in Italy play 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 controls around 70 percent of banking assets and has a major

rules, Italian state holdings were meant to operate within market conditions, in competitive sectors and (in some cases) with the equity participation of private shareholders. Consequently, managers were outsiders with respect to political circles and meant to concern themselves primarily with profitability and efficiency (Barca, 1997, p. 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 summarised 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 maximise its profits". In this initial setup, the scope for abuse of managerial discretion and related collusion with politicians was limited.

The legal setup of state holdings reflects these principles. Italian public ownership is organised in state-owned holding companies, in turn with controlling interests in diversified sub-holdings. These own individual enterprises, in some cases with minority private shareholders (see Chart 2). The sub-holdings 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 empirical investigation is put together from the balance sheets of a sample of these individual firms.

From the point of view of the quality and quantity of abuse of managerial discretion, we split the history of Italian public enterprises into three distinct periods: 1930s-1960s, 1970-1987, 1988 until now. During the first period public firms were by and large profitable and operated as described above. Abuse of managerial discretion, either as pursuit of private benefits or as pursuit of party political objectives, was rare. 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. Saraceno (1977) makes the important point that "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

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presence in many industries, services and, of course, utilities. Parts of this section draw from the institutional analysis in Bertero and Rondi (1997).

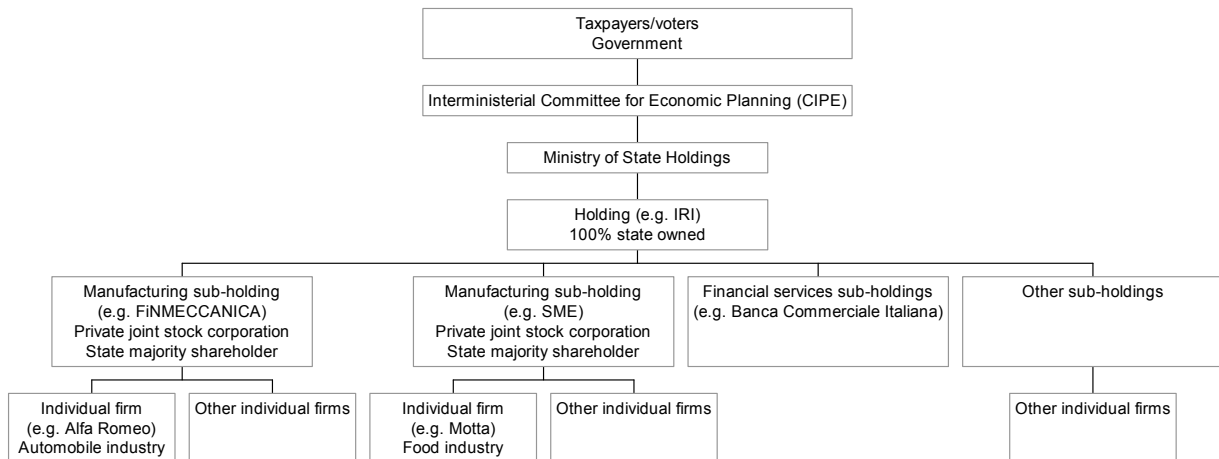
other than commercial banks was the compelling factor for government intervention. (...) Thus, a certain pragmatism became associated with the state-held enterprises that was to remain for the life of the system". After World War II, the original rescue plan was extended to promote reconstruction and to 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. 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, p. 426; Scognamiglio, 1981).

In the 1970s and 1980s things changed. In the late 1960s other institutions were set up to reinforce that filter, but the outcome was not the one intended. For example, in 1967 an Inter-ministerial 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.

The governance of public enterprises became excessively complicated (see Chart2) 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<sup>15</sup>, resulted in a period, between 1970 and 1987, of party-political interference in the management of public enterprises (Nankani, 1988 and Bianchi, 1990). 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 an equal allocation of the various posts to the relevant political parties as the criterion for the nomination of top management (Grassini, 1980); for example,

by tradition, IRI and ENI, the two major state holding used to be “controlled” by Christian Democrats and Socialists, respectively. All this made also the removal of top management a rather complicated political battle. Consequently, between 1965 and 1980, for example, only three President were appointed at IRI.

**Chart 2. Corporate governance of Italian public enterprises**



The interaction of the above institutional changes and of two important characteristics of the post-war 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 chair 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, particularly in the form of vote-maximising 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 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 the financing and encourage indirect and hidden contributions by managers to politicians in exchange of favours.

<sup>15</sup> For example, following the first oil shock, political and social pressure favoured the acquisitions of further collapsing private companies by the holding companies, a procedure which could foster direct political interference and collusion.

By the end of the 1970s, which is when our database starts, public firms' performance was characterised 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 recapitalise equity or for new investment. Losses were also financed with new debt. This debt was provided by banks, mostly publicly-owned themselves. In addition, the effects of a number of ill-conceived laws became apparent. An example is the 1977 law (L. n. 675/77) which required state firms to estimate the shadow costs (*oneri impliciti*) they incurred by implementing "non-economic objectives". These costs were then subsidised by the Treasury, a procedure which lent itself to abuse.

It is easy to see how, during the 1970s and 1980s, 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 create an environment that fits the Kornai (1980) definition of a soft budget constraint regime in a mixed economy.

However, that soft budget regime was later put under pressure by a number of economic and political factors, some completely exogenous to Italian government policy. The mounting level of public debt, the attempt of Italy to qualify for the European Monetary Union and the EU pressure to reduce state aid and to accelerate the privatization programme triggered major changes and contributed to new and strong financial pressure on public enterprises. They also led to changes in the relationship between public managers and politicians<sup>16</sup>.

As discussed in detail in Bertero and Rondi (1997), an analysis of these changes leads us to identify a switch 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<sup>17</sup>. The drastic reorganization of FINSIDER - an IRI sub-holding and sector holding itself of the steel industry - and the

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<sup>16</sup> A combination of these factors and the unacceptable level of corruption in the overall political system, widely reported in the international press, led in the early 1990s to a reform of the voting system and to a revolution in the Italian political system.

<sup>17</sup> These policies, started at the end of the 1980s, resulted, during the 1990s, in new management structures and new procedures for the replacement of top management, based on performance and other related criteria (see Lo Passo and Macchiati, 1997 for evidence on management turnover in individual holdings).

liquidation of EFIM - the third largest state holding – finalised 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 take-over. 1987 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<sup>18</sup>. Our empirical work exploits the identified 1987 structural break, which provides an instrument for a unique natural experiment.

## 5. The empirical methodology

The purpose of this paper is to investigate the role of financial factors in investment decisions of a panel of Italian state-owned firms over the period 1977-1993. This period not only includes the above-mentioned structural break, but also an entire business cycle, with the first recession occurring during the soft budget period and the second during the hard regime years. Our methodology consists in estimating an empirical model of investment with added cash flow terms and in investigating the correlation between investment and cash flow. We then explore how this correlation varies over the business cycle and across the soft and hard budget periods.

For an empirical model of company investment we use an accelerator model, as derived from the solution of the profit maximisation problem of the firm, in the absence of adjustment costs on the production factors (labour, L and capital stock, K). We also start from a constant elasticity of substitution production function<sup>19</sup>:

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

where Y is the firm's output,  $\sigma$  is the elasticity of substitution and  $\nu$  is the returns to scale parameter. Following Jorgenson (1963), the equilibrium condition for profit maximisation requires that the marginal productivity of capital stock equals the real user cost of capital,  $J_{it}$ .

<sup>18</sup> Although in 1991 and 1992 endowment funds were increased and reached about 0.13 percent of GDP, they never came close again to previous levels (own calculations from data in CER/IRS 1993).

<sup>19</sup> This approach follows Bond, Elston, Mairesse and Mulkay (1997) and Mulkay (1997). See also Rondi and Sembenelli (1998) for an application on Italian private companies.

Solving for  $K_t$  and taking logs, we obtain the long run equilibrium condition for the desired capital stock as a function of real output and cost of capital:

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

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). With constant returns to scale and  $\sigma=0$ , (a Leontief type production function), we have the simple accelerator model, where the capital is not affected by the user cost of capital. With unitary elasticity of substitution, the CES production function approximates a Cobb-Douglas production function and the capital stock depends positively on demand and negatively on the cost of capital. Taking first differences, and assuming that  $\Delta k_{it}$  can be approximated by the investment rate  $I_{it}/K_{it}$ , we obtain the basic investment equation

$$\frac{I_{it}}{K_{it}} = \Delta y_{it} - \sigma \Delta j_{it} \quad (3)$$

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 ( $I_t/K_t$ ) and lagged growth rate of real sales ( $\Delta y_{it}$ ), and assume that the variation in the user cost of capital is captured by time-specific,  $\alpha_t$ , and firm-specific,  $\alpha_i$ , effects. The basic specification is then:

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

to which we add the current and lagged cash flow to capital ratios ( $C_{it}/K_{it}$ ) to test for the presence of financial effects, and future levels of real demand (proxied by the log difference of production in two-digit NACE industries,  $\Delta y_{jt}$ ) to control for the firm's investment opportunities<sup>20</sup>:

<sup>20</sup> As it is well known, much of the debate over the role of cash flow for investment is about the fact that cash flow may also be a forecasting variable for future investment opportunities. The standard approaches to isolate the role of cash flow are to use the Tobin's Q (but only for quoted firms) or directly estimating the

$$\frac{I_{it}}{K_{it}} = \beta_1 \frac{I_{it-1}}{K_{it-1}} + \beta_2 \Delta y_{it} + \beta_3 \Delta y_{it-1} + \beta_4 \Delta y_{it-2} + \beta_5 \Delta y_{jt+1} + \beta_6 \Delta y_{jt+2} + \beta_7 \frac{C_{it}}{K_{it}} + \beta_8 \frac{C_{it-1}}{K_{it-1}} + \alpha_i + \alpha_t + \varepsilon_{it} \quad (5)$$

In the econometric section we use this adjusted accelerator model allowing the coefficient on cash flow to vary across the soft and hard budget regime periods described in Section 4. Moreover, as public enterprises are often required to undertake counter-cyclical investment projects, we also test for parameter constancy across the business cycle. This enables us to check whether the financial accelerator's prediction – that in the presence of financial constraints the investment/cash flow relationship is counter-cyclical - holds for state-owned firms.

## 6. Data and descriptive statistics

The database we use for estimation purposes is an unbalanced panel constructed at CERIS using the balance sheet data collected by Mediobanca investment bank<sup>21</sup>. The original panel includes 1318 manufacturing companies, 150 state-owned and 1168 privately owned, over the period 1977-1993, for a total of 1300 and 9927 firm-year observation, respectively. It 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.

Firms are classified according to their ownership, which can change over time in either direction, from state-owned to private or viceversa (i.e. the 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-CLIO classification. Finally, whenever a major operation occurs such as mergers, acquisitions, or divestures, by 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. It is therefore reasonable to assume that changes in output, employment and fixed capital are not artificially affected by these factors.

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Euler equation for capital stock. See also Gilchrist and Himmelberg (1995) for a methodology which constructs an alternative measure of Q, called "fundamental Q" by using VAR forecasts.

<sup>21</sup> For a complete description of the database see Margon et al. (1995).



For our empirical work, we separate a sub-sample of state-owned enterprises from this database. The sub-sample consists of 146 companies and 1256 firm-year observations<sup>22</sup>. Table A1 reports the number of state firms by years of observation.

Table 1 contains the descriptive statistics for the main variables for this panel of firms for the entire period, for each sub-period (soft and hard budget constraint periods) and for the upturns and downturns of the business cycle.

As described in Section 4, we choose 1987 as the turning point for the shift from soft to hard budget regimes. We define a recession as the period in which the annual rate of change of the industrial production in Italy is negative. As mentioned in Section 5, our sample includes two recessions, in years 1981-1982 and 1991-1993. We define the remaining years as expansion years. On the basis of these definitions we construct the time dummies to be used in the econometric analysis:  $SOFT_t$ ,  $HARD_t$ ,  $REC_t$ ,  $EXP_t$ ,  $REC1_t$ ,  $REC2_t$ .

Table 1 reports the descriptive statistics for the investment to capital stock ratio ( $I/K$ ), the cash flow to capital stock ratio ( $CF/K$ ) and the short and long term financial debt to capital stock ratio ( $D/K$ ). A comparison of investment ratios across different periods shows that the requirement for public firms to invest counter-cyclically (see Section 3) is confirmed by the data. Except for firms in the first quartile, the investment ratio is higher during the recession years, especially for highly investing companies. Differences between soft and hard regimes are not particularly informative, with the median increasing during the hard years, but the third quartile decreasing in the same period. More interestingly, the comparison between the earlier and the later recession (in the soft and in the hard years, respectively) shows that the investment rates were much lower in the second downturn. This suggests that the shift in regime had an important effect on the decision to pursue counter-cyclical investment policies, with public firms not performing their counter-cyclical role as they did before.

Turning to the cash flow to capital stock ratio we find that Italian state firms are in line with the well-documented, general poor performance of public enterprises. The median cash flow rates are low and the first quartile ones are negative in every sub-period. However the third quartile cash flow rates are satisfactory<sup>23</sup>. As expected, the cash flow rates decrease in the earlier recession, but, interestingly, not in the later recession. Finally, in the hard budget constraint period, state firms appear to perform better than in the soft period.

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<sup>22</sup> Four firms were dropped because, after the separation from private firms, they did not meet the five consecutive years requirement.

The debt to capital stock ratio for the entire period confirms that Italian public firms tend to be highly leveraged. The debt ratios are highest during the recessions, especially the first one. However, as mentioned above, the statistics show that the less leveraged firms of the first quartile, decrease their debt ratios during the hard budget years and even further during the second recession. This might indicate that restructured public firms used internal resources to repay debt.

## **7. Empirical results**

In this section we present the results of the estimation of the accelerator model of investment with additional cash flow terms. To control for future profit opportunities we also add future levels of real demand as proxied by the log difference of production in two-digit NACE industries (see Section 5, equation (5)).

For estimation we use the DPD program by Arellano and Bond (1988, 1991), designed for dynamic panel data. Table 2 reports the results from the Generalised 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<sup>24</sup>. 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 over-identifying 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 5).

In Table 2, column (1), we present the GMM one-step estimates for the basic specification, as outlined in equation (5). The lagged dependent variable and the contemporaneous accelerator term (real sales growth rate) are both positive and not far from

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<sup>23</sup> For a consistent comparison with the private firms in the same database see Rondi and Sembenelli (1998).

<sup>24</sup> We treated all right-hand side variables as potentially endogenous in the investment equation. As instruments we used variables dated  $t-2$  and  $t-3$ .

significance (p-values are 12% and 10% respectively). The future levels of demand are also positive, as expected.

From this paper point of view, the interesting result is that the estimated coefficient on the current cash flow to capital stock ratio is positive and significant (whereas the coefficient on the lagged cash flow term is positive but not significant). This shows that the sensitivity of investment to cash flow characterises not only private firms, but also public enterprises. As outlined in Section 2, the finding of a positive correlation between investment and cash flow is consistent with two explanations. On one hand, under the assumption of information asymmetries in the capital markets, the positive coefficient may reveal that state firms face financing constraints when they have to resort to external finance, leading them to under-invest. On the other hand, under the assumption of managerial discretion, it might suggest that state managers with ample discretion - obtaining their private benefits from both empire-building and collusion with politicians - are strongly motivated to over-invest in growth.

One way to distinguish between these two hypotheses is to investigate whether the role of financial factors for state companies' investment changes with macroeconomic and/or political conditions. Our research strategy consists in allowing the cash flow coefficient to vary over time and test ex-ante expectations on its sign and size over different periods. First, we test for changes over the business cycle. The fact that our sample period (1977-1993) covers a complete business cycle, including two recessions, enables us to test the predictions of the financial accelerator hypothesis, under the assumption of asymmetric information and financial constraints, i.e. that the relationship between investment and cash flow is counter-cyclical. We then consider that over the same period the budget constraint for state firms shifted from a soft to a hard regime (see Section 4). This allows us to test whether investment decisions were affected by the shift in the regime, possibly throwing some light over the nature of the capital markets imperfections for public enterprises in the two periods.

In column (2) we allow the current cash flow coefficient to vary over the business cycle. The cash flow term is thus interacted with two year dummies. The recession dummy,  $REC_t$ , takes the value one for the years 1981, 1982; 1991, 1992, 1993; the expansion dummy,  $EXP_t$ , is one in all other years. If the financial accelerator story holds, we should find that the cash flow coefficient is significantly larger in downturns. Our results show that the recession cash flow coefficient ( $CF/K_{it} REC_t$ ) is positive and larger than the one for the expansion years,

but not significantly larger ( $t = 0.07$ ). More importantly, our results also show that the coefficient for the expansion years ( $CF/K_{it} EXP_t$ ) is the only one to be positive and significant.

In column (3) the cash flow to capital stock ratio 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, the latter takes value one from 1988 onwards. Here we find that the cash flow coefficient for the soft-budget years,  $CF/K_{it} SOFT_t$ , is positive and significant whereas the one for the hard years is not significant and negative. Moreover,  $CF/K_{it} SOFT_t$  is significantly larger than  $CF/K_{it} HARD_t$  ( $t=1.7$ ). This shows a significant effect of the shift in the budget regime on the investment decision process of state-owned enterprises.

But what is the direction of the change? The result is just the opposite of what we would expect under the asymmetric information/financing constraints explanation of the investment cash flow relationship. That explanation would require that, as the budget constraint shifts from soft to hard, the financing constraints for public firms should become tighter and result in a significantly larger cash flow coefficient in the hard years.

In contrast, our findings show a larger coefficient in the soft years. This is consistent with the other explanation, the agency cost one, according to which state managers have a considerable degree of discretion over the allocation of internal finance when the budget constraint is soft. Consequently, they are likely to invest cash flow not only in positive net value projects, but also in party-politically motivated projects. According to this explanation and to our results, in the soft years, state firms behaved as they were “financially unconstrained”- investing both free cash flow and (abundant) state grants - and in the harder years they gradually underwent a new discipline.

The result that rejects the parameter constancy across the two regimes suggests a new perspective for the analysis of the impact of capital markets imperfections on state companies' investment decisions over the business cycle. We are in fact motivated to investigate further the financial accelerator, by introducing a year dummy for each of the two recessions ( $REC1_t$  for 1981-1982 and  $REC2_t$  for 1991-1993) to account for the fact that the former occurred during the soft budget regime whereas the latter occurred during the hard regime. Interestingly, this exercise also enables us to speculate on the possibility that public firms were not able to comply with the policy goal to invest counter-cyclically in the same way over the two recessions.

Column (4) reports the results when we allow the cash flow coefficient to vary across the two recessions and the upturn. Again we find that the coefficient for the cash flow in the economic upturn,  $CF/K_{it} EXP_t$ , is positive and significant. When we turn to the cash flow coefficients in downturns, however, we find an important difference between the recessions in the two regimes. The estimated coefficient for the earlier recession (under the soft regime),  $CF/K_{it} REC1_t$ , is positive and significant (but not significantly different from  $CF/K_{it} EXP_t$ ,  $t=1.35$ ). In contrast, the coefficient for the later recession,  $CF/K_{it} REC2_t$ , is now not significant, negatively signed, but significantly different from  $CF/K_{it} REC1_t$  ( $t = 2.3$ ) and from  $CF/K_{it} EXP_t$  ( $t = 2.0$ ). Again this pattern of results seems to be in contrast with the predictions of the financing constraints literature.

On the whole, the empirical findings suggest that the investment-cash flow relationship for this panel of state companies over time is likely to be revealing managerial discretion/incentive problems leading firms to over-invest during the years which we label as “soft”, years during which these firms were, on the whole, financially unconstrained (see Section 3). Consistently with this interpretation we find that the switch from a soft to a hard regime, results also in a change of the impact of cash flow over investment, suggesting a more cautious attitude of public managers towards investment decisions.

In so far as we provide some evidence that the investment/cash flow relationship is pro-cyclical (see the results for the expansion years and the recession in the 1990s) our findings are in contrast with the predictions of the financial accelerator. However, Bernanke, Gertler and Gilchrist (1996) themselves warn that “the mapping of the simple information-based theories to large, publicly-held firms is less direct”. Although they are not referring to state-owned firms, our discussion in Section 3 and 4 shows that large publicly-held firms have important characteristics in common with them.

Table 3 reports GMM results for the accelerator model of investment as described in equation 5, but with an additional term, the ratio of lagged debt to capital stock. As highlighted in Section 2, higher leverage implies more risk of default and, in turn, a higher premium on external finance. This is the prediction of both the asymmetric information/financing constraints view and the “free cash flow” theory, which envisages in high leverage the disciplining device for growth oriented managers. In columns from (1) to (4) we present the GMM first differences estimates for alternative specifications which allow

the coefficients on both the debt term and the cash flow to vary over different sub-periods, according to the same time pattern as in Table 2.

The first thing worth noting is that the inclusion of a debt term does not alter the pattern emerging from Table 2 of estimated coefficients on the cash flow to capital stock ratio in any specification. Second, contrary to theory prediction, we find that in almost all of the estimated equations, the leverage enters with a positive, albeit small, and significant coefficient<sup>25</sup>. This may support the idea that state firms are “financially unconstrained” (see columns 1 and 2). However, most interestingly, when we allow the debt coefficient to vary across the budget regimes (column 3), we find that the coefficient turns negative (though not significant) and larger in the hard period. This is consistent with the mainstream idea that higher leverage should have a negative impact on investment, under the assumption of agency or informational problems. This result also confirms the empirical finding that, for state firms under a hard budget constraint, higher leverage brings about a more efficient behaviour (see Bertero and Rondi, 1997).

When we turn to the specification that classifies the two recessions according to the budget regime (column 4), we find that the debt coefficients for the earlier recession and for the expansion years are positive and significant. In contrast the coefficient on the debt term interacted with the second recession dummy,  $REC2_t$ , is not different from zero. This confirms a change in investment decisions for state firms following the shift from a soft to a hard budget constraint.

## **8. Conclusions**

This paper extends the literature on the impact of financial factors on company investment to the case of public enterprises by carrying out an empirical investigation using a panel of Italian state-owned firms. We contribute to the current debate with econometric evidence on the source of the capital markets imperfections that might be responsible for the well-documented evidence of a positive correlation between investment and cash flow.

Drawing from the financial economics literature, we derive the theoretical framework for the analysis of company investment under the assumption of imperfect capital markets. In

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<sup>25</sup> Schiantarelli and Sembenelli (1996) find that leverage has a negative and significant impact on investment, for a panel of private Italian firms.

particular, we dwell on the two competing explanations of the source of the excess sensitivity of investment to cash flow, namely the asymmetric information/financing constraints hypothesis and the managerial discretion/free cash flow hypothesis. We then discuss the policy objectives at the basis of public firms' investment decisions and we emphasise the similarities between state-owned firms and public corporations with diffused ownership. We argue that, once identified the equivalent mechanisms, they could be both affected by excessive managerial discretion. We interpret collusion between state firms' managers and politicians as an abuse of managerial discretion and we investigate its impact on state firms' investment decisions.

Our empirical approach consists in the estimation of an accelerator model of investment, with additional cash flow terms, using an unbalanced panel of 146 state-owned firms, over the period 1977-1993. We allow the coefficient on cash flow to vary across different sub-periods, testing for parameter constancy. Following an analysis of the Italian institutional context, we split our sample period into a soft budget constraint period (1977-1987) and a hard budget constraint period (1988-1993). Moreover, we consider the impact of the business cycle on state firms' investment to test for the financial accelerator's prediction that the investment cash flow relationship is counter-cyclical. We also explore the interaction between budget regime and business cycle, exploiting the fact that our sample includes a full business cycle with the first recession falling during the soft budget years and the second during the hard budget years.

Our main results show that both the shift in the budget regime and the fluctuations in the business cycle have an important impact on state firms' investment decisions. They may be summarised as follows:

- i) we find that the established empirical finding for private firms that investment is positively related to cash flow, after controlling for future profit opportunities, holds for public enterprises as well;
- ii) we find a difference between soft and hard budget regimes in the investment-cash flow correlation: only the coefficient in the soft period is positive and significant and it is significantly larger than the cash flow coefficient in the hard period (when the financing constraints for public enterprises should become tighter);
- iii) we find no consistent empirical support for the financial accelerator hypothesis: the cash flow coefficient in the upturn is not significantly smaller than the cash flow coefficient in

the first recession, during the “soft” years, but is significantly larger than the coefficient in the second recession, during the hard years.

Overall, our findings suggests that the investment-cash flow relationship for this panel of state companies is more likely to be evidence of managerial discretion problems leading to over-investment (especially during the soft budget period), than asymmetric information problems leading to under-investment, as suggested by the financing constraints literature.



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**Table 1 - Summary statistics for firm characteristics: 146 state-owned firms**

	<i>Full Period</i>	<i>Expansion</i>	<i>Recessions</i>	<i>Soft Budget Period</i>	<i>Hard Budget Period</i>	<i>Recession 1981-82</i>	<i>Recession 1991-92-93</i>
Total Sample (1977-1993) n. obs	1110	812	298	778	332	169	129
Estimation Sample (1981-1993) n. obs	672	429	243	424	248	135	108
<b>I/K</b>							
I Quartile	0.053	0.057	0.045	0.054	0.049	0.054	0.040
Median	0.088	0.087	0.090	0.084	0.093	0.104	0.081
III Quartile	0.140	0.128	0.158	0.145	0.132	0.203	0.129
<b>CF/K</b>							
I Quartile	-0.095	-0.061	-0.169	-0.114	-0.050	-0.235	-0.093
Median	0.033	0.041	0.014	0.021	0.046	-0.039	0.046
III Quartile	0.096	0.097	0.089	0.098	0.093	0.092	0.088
<b>D/K</b>							
I Quartile	0.319	0.318	0.322	0.350	0.256	0.383	0.215
Median	0.614	0.586	0.712	0.637	0.569	0.762	0.620
III Quartile	1.141	1.053	1.422	1.147	1.112	1.498	1.313

Legend:

I/K: Investment to Capital Stock ratio.

CF/K: Cash Flow to Capital Stock ratio

D/K: (Long Term Financial Debt + Short Term Financial Debt)/ Capital Stock

Expansion: 1977, 1978, 1979, 1980, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990.

Recessions: 1981-82; 1991-92-93.

Soft Budget Period: 1977-1987.

Hard Budget Period: 1988-1993.

**Table 2: Investment equations: 146 state-owned firms**  
 GMM estimates in first differences  
 Dependent variable  $(I/K)_{it}$

	(1)	(2)	(3)	(4)
$(I/K)_{it-1}$	0.133 (0.086)	0.135 (0.089)	0.134 (0.087)	0.157 (0.095)
$\Delta y_{it}$	0.072 (0.044)	0.073 (0.042)	0.068 (0.045)	0.063 (0.043)
$\Delta y_{it-1}$	-0.043 (0.043)	-0.035 (0.049)	-0.036 (0.050)	-0.039 (0.045)
$\Delta y_{it-2}$	0.034 (0.036)	0.041 (0.036)	0.041 (0.036)	0.042 (0.036)
$\Delta y_{jt+1}$	0.077 (0.066)	0.074 (0.068)	0.078 (0.068)	0.101 (0.071)
$\Delta y_{jt+2}$	0.204 (0.143)	0.187 (0.156)	0.179 (0.153)	0.237 (0.154)
$(CF/K)_{it}$	0.040 (0.014)	-	-	-
$(CF/K)_{it-1}$	0.009 (0.015)	-	-	-
$(CF/K)_{it} \cdot EXP_t$	-	0.039 (0.012)	-	0.039 (0.013)
$(CF/K)_{it} \cdot REC_t$	-	0.044 (0.070)	-	-
$(CF/K)_{it} \cdot SOFT_t$	-	-	0.044 (0.015)	-
$(CF/K)_{it} \cdot HARD_t$	-	-	-0.073 (0.068)	-
$(CF/K)_{it} \cdot REC1_t$	-	-	-	0.167 (0.096)
$(CF/K)_{it} \cdot REC2_t$	-	-	-	-0.139 (0.090)
$M_1$	-3.242 [112]	-3.383 [112]	-3.345 [112]	-3.951 [112]
$M_2$	-0.964 [ 90]	-0.887 [ 90]	-0.887 [ 90]	-0.920 [ 90]
Sargan <i>p value</i>	73.036 [ 72] (0.444)	73.729 [ 72] (0.421)	74.517 [ 72] (0.396)	74.530 [ 71] (0.364)
Instruments: $I/K_i(2,3)$ , $y_i(2,3)$ , $C/K_i(2,3)$ , $y_j(2,3)$				

Legend:

One-step estimates. Standard errors 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 ( $\chi^2$  distribution).

Degrees of freedom in square brackets.

**Table 3: Investment equations with debt: 146 state-owned firms**

GMM estimates in first differences

Dependent variable  $(I/K)_{it}$ 

	(1)	(2)	(3)	(4)
$(I/K)_{it-1}$	0.212 (0.081)	0.211 (0.080)	0.211 (0.081)	0.237 (0.079)
$\Delta y_{it}$	0.025 (0.060)	0.030 (0.057)	0.013 (0.063)	0.019 (0.058)
$\Delta y_{it-1}$	-0.066 (0.059)	-0.033 (0.051)	-0.060 (0.065)	-0.039 (0.048)
$\Delta y_{it-2}$	-0.002 (0.046)	0.021 (0.045)	0.004 (0.051)	0.020 (0.043)
$\Delta y_{jt+1}$	0.055 (0.062)	0.032 (0.060)	0.044 (0.060)	0.062 (0.065)
$\Delta y_{jt+2}$	0.193 (0.154)	0.118 (0.151)	0.148 (0.165)	0.173 (0.152)
$(CF/K)_{it}$	0.064 (0.022)	-	-	-
$(CF/K)_{it-1}$	0.015 (0.011)	-	-	-
$(CF/K)_{it} \cdot EXP_t$	-	0.061 (0.020)	-	0.062 (0.020)
$(CF/K)_{it} \cdot REC_t$	-	0.055 (0.078)	-	-
$(CF/K)_{it} \cdot SOFT_t$	-	-	0.068 (0.024)	-
$(CF/K)_{it} \cdot HARD_t$	-	-	-0.029 (0.091)	-
$(CF/K)_{it} \cdot REC1_t$	-	-	-	0.191 (0.100)
$(CF/K)_{it} \cdot REC2_t$	-	-	-	-0.146 (0.121)
$(D/K)_{it-1}$	0.009 (0.001)	-	-	-
$(D/K)_{it-1} \cdot EXP_{t-1}$	-	0.009 (0.001)	-	0.009 (0.001)
$(D/K)_{it-1} \cdot REC_{t-1}$	-	0.012 (0.002)	-	-
$(D/K)_{it-1} \cdot SOFT_{t-1}$	-	-	0.009 (0.001)	-
$(D/K)_{it-1} \cdot HARD_{t-1}$	-	-	-0.047 (0.043)	-
$(D/K)_{it-1} \cdot REC1_{t-1}$	-	-	-	0.012 (0.002)
$(D/K)_{it-1} \cdot REC2_{t-1}$	-	-	-	0.015 (0.112)
$M_1$	-3.899 [112]	-4.080 [112]	-4.000 [112]	-3.741 [112]
$M_2$	-0.733 [ 90]	-0.416 [ 90]	-0.296 [ 90]	-0.293 [ 90]
Sargan <i>p value</i>	76.162 [ 73] (0.377)	77.158 [ 72] (0.317)	75.687 [ 72] (0.360)	78.036 [ 70] (0.239)
Instruments: $I/K_i(2,3)$ , $y_i(2,3)$ , $C/K_i(2,3)$ , $y_j(2,3)$ , $D/K_i(2,3)$				

Legend:

One-step estimates. Standard errors 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 ( $\chi^2$  distribution).

Degrees of freedom in square brackets.

**Table A1. Number of firms and firm-year observation by year of observation.**

Years	N° of Firms	Firm-year obs.
17	6	102
16	5	80
15	0	0
14	10	140
13	4	52
12	4	48
11	8	88
10	15	150
9	9	81
8	10	80
7	19	133
6	22	132
5	34	170
Total	146	1256

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