

Does debt discipline state-owned firms? Evidence from a panel of Italian firms

Elisabetta Bertero

London School of Economics, UK

Laura Rondi

Ceris-Cnr, Turin, Italy

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Abstract

This paper investigates whether financial pressure has an impact on the performance of state-owned firms. By combining different theoretical frameworks, we explore the conditions under which debt discipline becomes effective even for state firms. Using a panel of 1318 Italian state and private manufacturing companies, for the period 1977-1993, we estimate total factor productivity and employment equations, allowing the financial factors to have a different effect under “soft” and “hard” budget constraint regimes. Consistent with the theoretical predictions, the results show that state firms do respond to financial pressure by increasing total productivity and reducing employment in a “hard” budget constraint environment.

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I. Introduction

In the many industrialised, developing and transition economies involved in privatisation programmes, it is common to lament the lack of financial discipline and consequent lack of efficiency of state-owned firms. Several recent papers echo this widely expressed concern (Boardman and Vining, 1989; Laffont and Tirole, 1993; Ott and Hartley, 1991; Shirely, 1995; Shleifer and Vishny, 1996; Shleifer and Vishny, 1994).

The aim of this study is to investigate whether financial pressure has an effect on the performance of public firms¹. The policy relevance of this study is illustrated by a recent paper on how to improve the performance of public firms. Muir and Saba (1995) emphasise the role of debt among the external incentives that could put pressure on state-owned firms and push them towards greater efficiency. This paper draws on recent theoretical contributions and on new empirical evidence to improve the understanding of that incentive, which is relevant not only for state firms in transition and developing economies, but also for the debate on the privatisation of public firms in industrialised countries.

The paper pulls together three different literatures not combined in this way before: the theory of the existence of financial pressure for private firms; the empirical literature on the effects of financial pressure for private firms; and the literature on the “soft budget constraint”, which enables us to transpose these issues into the context of state-owned firms.

By definition, financial pressure arises in imperfect financial markets. A well established theoretical literature shows how asymmetry of information, incompleteness of contracts, principal-agent problems and financial distress require providers of funding to incur monitoring, agency and transaction costs. These costs add a premium to the (unique) perfect markets cost of capital. The premium on external finance creates a wedge between internal and external cost of financing and, in some cases, leads to the rationing of credit (Greenwald, Stiglitz, and Weiss, 1984; Jensen and Meckling, 1976; Myers and Majluf, 1984). These imperfections also determine the specific terms of the funding contracts, simplified in this literature to just debt and equity. For example, bondholders require covenants (Smith and Warner, 1979) and new shareholders a “lemon” premium (Myers and Majluf, 1984). In brief, this literature has shown that external finance is costly.

Further research has concentrated, instead, on the *benefits* that external finance can

have for shareholders in a context of imperfect markets. These benefits occur in models in which the standard assumption that managers act in the interest of shareholders is relaxed. In this paper we focus on the beneficial effects of debt, more specifically non-marketable, “hard”, senior, non-postponable debt. If we assume that managers have objectives independent from those of shareholders and bondholders, issuing debt has the benefit of constraining management, creating financial discipline and leading to improved efficiency. Two features of debt contracts bring about this effect. The first is that debt contracts are not contingent on the performance of the firm and therefore generate *fixed* repayment obligations. This simple fact has the important consequence, under the assumption that managers’ interests are not in line with shareholders’, of limiting management discretion and providing external discipline. The second is that, when issued in excessive amounts, debt leads to financial distress and, eventually, to bankruptcy, which is likely to reduce the perquisites of managers and even cause their dismissal. The theory shows that the threat of bankruptcy encourages managers to maximise profits and disciplines them into behaving in the interest of shareholders (Grossman and Hart, 1982; Harris and Raviv, 1991; Hart and Moore, 1995; Jensen, 1986)².

A related empirical literature has tested for the effects on investment of those financial market imperfections which result in external funds being more expensive than internal funds (see survey by Schiantarelli, 1996). Seminal work by Fazzari, Hubbard, and Petersen (1988) is based on the idea that if firms were facing perfect capital markets, no relation should exist between the availability of internal funds (i.e., cash flow) and investment. Their results show, instead, that for firms facing information problems in external capital markets investment is (more) sensitive to fluctuations in cash flow. Therefore, for these firms, *financial constraints* arising from the higher cost of external funding affect investment decisions and may lead to underinvestment³.

More recent work, rooted in that literature but more directly linked to the theoretical framework above, has taken a different direction and analysed the impact of financial constraints and, more generally financial pressure, on other aspects of company behaviour, such as inventory investment, R&D investment, employment, pricing and investment in market share (see Hubbard, 1995 for a survey). Nickell and Nicolitsas (1995), for example, investigate the effects of *financial pressure*, following an increase in the general level of interest rates, on wages, productivity and employment. Their results show that financial pressure has a large

negative impact on employment, a small negative effect on wages and a small positive impact on productivity of UK private firms. A related strand of literature analyses the costs and benefits of *financial distress*. The idea is to investigate how highly leveraged firms respond to their own poor economic performance or short term distress. Opler and Titman (1994) find that, for a panel of US companies operating in economically distressed industries, financial distress has a significant cost leading to output contraction and decline in the market value of equity. However, they do not regard their results as conclusive evidence on whether financial distress is costly or beneficial. Ofek (1993) finds that, for a panel also of US firms, higher pre-distress leverage increases the probability of beneficial operational actions such as asset restructuring and employees layoffs. Wruck (1990) also investigates costs and benefits associated with financial distress. Her investigation concentrates on the effects on organisational efficiency.

In summary, this body of empirical literature considers two effects of debt on firms. First, more “hard” debt results in a premium on the cost of capital, which in turn negatively affects firms’ investment decisions (see, for example, Bond and Meghir, 1994 for the UK and Rondi et al., 1994 for Italy). Second, more debt leads to a higher ratio of debt to net worth and, consequently, to higher probability of bankruptcy. This, following the theoretical reasoning above, has a beneficial disciplining effect on management who takes action to reduce “wasteful” investment, to reduce employment and, in general, to increase productivity.

Our empirical study fits in this recent literature on the effects of financial pressure on the performance of firms. Its novelty consists in using the previously unrelated literature on the “soft budget constraint” to transpose the analytical framework into the context of firms owned by the government. Our empirical investigation is carried out on a recently constructed panel of Italian companies which includes both private and public firms.

The paper is divided into six sections. Section I introduces the theoretical framework for state-owned firms. Section II describes the institutional context for Italian public firms and emphasises the factors contributing to a change of budget constraint regimes. Section III discusses the empirical methodology. Section IV describes the data and the descriptive statistics. Section V presents the empirical results. Section VI concludes the paper.

II. State-owned firms and soft budget constraint

We now turn to a discussion of the link between the financial discipline of *public* firms and the theoretical and empirical frameworks for *private* firms.

The general view that public firms lack financial discipline compared to private firms can be translated, in the context of these literatures, into four more precise claims⁴. First, public firms are not disciplined by the threat of take-overs; second, they do not maximise profits; third, they enjoy a more or less formal guarantee of government intervention in case of financial distress; fourth, consequently, they are not subject to the threat of bankruptcy.

The fact that public firms are not disciplined by the fear of take-overs is not as important a difference as it may look at first sight. Taking an international perspective, in most countries private firms rarely experience take-overs (Franks and Mayer, 1990). And even where they do, there is mixed evidence on whether take-overs provide discipline (Boot, 1992; Franks and Mayer, 1996; Grossman and Hart, 1980). For these reasons we do not pursue this difference any further.

The second claim, that public firms do not maximise profits, is more precisely stated by saying that public firms are required to maximise a multiple-objective function (Laffont and Tirole, 1993). One objective is profits, but other objectives are employment and investment targeted to support employment and growth, for example in particular regions. Public firms in most countries are required to take into account the effect of their decisions on employment⁵. This is an important point to which we will return in Section II.

We concentrate now on the other two claims. The fourth claim, that public firms cannot go bankrupt⁶, stems from the third, that public firms enjoy a more or less formal guarantee of government intervention in case of financial distress. Both claims follow from the inability of the government to commit itself *not* to interfere in the economic affairs of a public firm. And this is so, in theory, because that intervention is the principal purpose of the existence a state-owned firm in the first place (see Sappington and Stiglitz, 1987). When this lack of commitment not to intervene concerns the *financial* affairs of the firm, János Kornai defines it a *soft budget constraint* regime, which he opposes to a “hard” budget constraint (Kornai, 1980). “External assistance is a random variable. The decision-maker has a subjective perception of the probability distribution of this random variable. The higher the subjective probability that excess expenditure will be covered by external assistance, the softer the budget constraint” (Kornai,

1990)⁷. According to Kornai, this subjective probability is not meaningful for an individual firm over time, it is rather a collective experience based on the regular experience of a number of firms over time and on the expectation of similar experiences in the future.

Within this framework, the crucial factor that prevents debt from disciplining public firms is the soft budget constraint regime in which they operate. If managers of public firms perceive that the government will intervene when interest payments become too high, they will not be pushed into taking action on the real variables of the firm. Also, they will not fear losing their jobs. Symmetrically, Kornai (1996) discusses how the more the budget constraint moves towards a harder constraint, the more public firms are subject to financial discipline.

As the above quote suggests the softness of the constraint comes in various degrees and can change over time. “The constraint need not assume one of only two different values: *either hard or soft*. There are also intermediate stages. ... The degree of hardness of the budget constraint is *observable and measurable*. Since it is a very complex group of phenomena, it cannot be described by a single cardinal indicator. It can only be measured ordinally, by several indicators together” (Kornai, 1990). In Section II we describe the budget constraint environment in which Italian firms have operated in different periods. We advance the hypothesis that this “very complex group of phenomena” changed at the end of the 1980s. This change will be at the core of our empirical tests in Section V.

One last point we should address here is the required theoretical assumption of a conflict of interests between managers and shareholders, which is plausible for many private firms. In the way public firms are described in some recent academic papers, this conflict does not seem to arise. Public managers are portrayed as bureaucrats with concentrated control rights, which are exercised on the basis of a political agenda in the interest of groups that will make them win the elections, for example trade unions of state employees (Shleifer and Vishny, 1996; Shleifer and Vishny, 1994). This reasoning suggests that managers of state-owned firms act exactly in the interest of the state/shareholder and collude with its representatives, the politicians⁸. Even if this were always the case, this view disregards two facts: that public managers often have multiple principals checking on each other (Dewatripont and Tirole, 1996); and that, in any case, politicians are agents themselves of the ultimate principals, the taxpayers. In the corrupt context above, bureaucrats and politicians interests are certainly in conflict with taxpayers’ interests.

Having clarified the differences between private and public firms that are relevant for our empirical study, we turn to the analysis of the institutional environment in which Italian public firms operate.

III. Institutional context

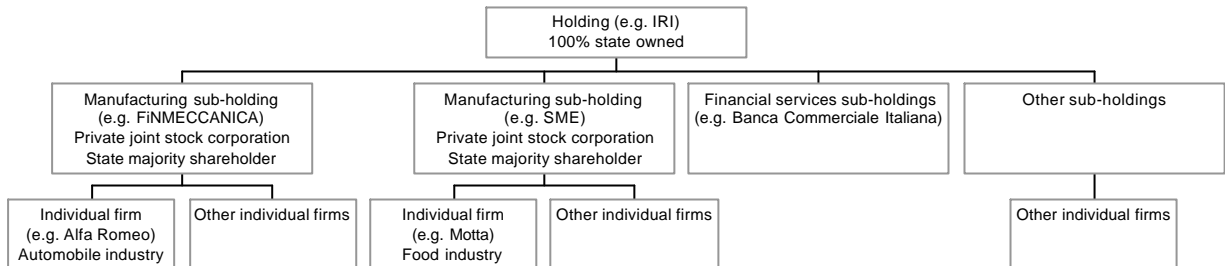
Rephrasing Kornai (1980), the degree of hardness or softness of the budget constraint is “a very complex group of phenomena”, which “cannot be described by a single cardinal indicator”. In Sections II.A and II.B we discuss those “several indicators” that allow us to formulate a hypothesis regarding the budget regime in which Italian state-owned firms operate during the period of our empirical analysis.

III.A. The “soft budget constraint” environment of Italian public firms

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 presence in many industries, services and, of course, public utilities.

A distinctive Italian characteristic is that public ownership is organised through one-hundred percent state-owned holding companies, with controlling interests in diversified sub-holdings. These, in turn, own individual enterprises, occasionally with minority private shareholders (see Chart 1)⁹. 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. Our database is constructed from the balance sheets of a sample of these individual firms (see Section IV).

Chart 1. Italian public sector ownership



Direct public intervention in Italy 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). The mandate was to restructure these as parts of a newly created holding company (IRI, Institute for Industrial Reconstruction) and then reinstate private ownership. After World War II, however, the original rescue plan was extended to promote reconstruction. Eventually, it was further extended into 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. The objectives of the intervention were: counter-cyclical investment, direct management of basic industries, import substitution, the promotion of industrialisation in less developed areas¹⁰, the restructuring of loss-making firms and the protection of employment. “The large number of objectives indicates that the state holdings were recognised as a political instrument (...)” (Bianchi, 1990) and are an example of the multiple objective function discussed in Section I.

Until the 1960s, the net operating performance of these firms was largely positive, which suggests that profitability was also an important objective. At that time the Italian system of state intervention was also reported internationally as a successful model (Shonfield, 1977). During the 1970s, however, things changed. The analyses by Nankani (1988) and Bianchi (1990) attribute this to a variety of factors, among which the increased political pressure and interference. Following the first oil shock, for example, political and social pressure favoured the acquisitions of further collapsing private companies by the holding companies (Bianchi, 1990). Also, political influence deeply affected strategic decisions, such as the location of new plants and appointment of top management¹¹. Moreover, the effects of a number of ill-conceived laws

became evident. An example is the 1977 law (L. n. 675/77) which required state firms to estimate the shadow costs¹² they incurred by implementing “non-economic objectives”. These costs were then subsidised by the Treasury, a procedure which lent itself to abuse.

By the end of the 1970s, which is when our database starts, poor profitability (in some cases huge losses), low productivity and high debt were the norm. A 1979 Mediobanca survey showed that the debt/equity ratio of public firms was around 13.2, compared with 3.5 for the private sector (see Nankani, 1988 and data from our panel in Section IV), and all this, obviously, without these firms ever being exposed to the risk of bankruptcy.

In order for this situation to keep going, government funds were made available to the state holdings, and redistributed to individual firms, through various sources (see Table I). 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. This brought allegations of excessively close relationships between state-owned banks and state-owned firms. There is no hard evidence of misconduct in the allocation of credit by banks or special credit institutions in charge of medium and long term subsidised credit¹³. And, after all, private firms as well, in particular *large* private firms, greatly benefited from substantial subsidies and a close relationship with state banks. Also, “there are cases of banks controlled by government entities, whose management has traditionally enjoyed a high degree of autonomy” (Monti and Porta, 1990). However, the same authors discuss how “the Italian banking system has normally been characterised by a high degree of accommodation towards the needs of the public sector”. Also, there is some evidence that the cost of capital was cheaper for public enterprises until 1988 (D'Auria and Foglia, 1997).

In summary, the environment in which Italian public firms operated in the 1970s up to the mid-1980s was one characterised by political interference, accommodating endowment funds and high debt provided by accommodating state-owned banks. In our view this environment of financial slack contains the main ingredients of what János Kornai defines a soft budget constraint regime in a mixed economy.

III.B. From “soft” to “hard” budget constraint

This situation, not dissimilar from that of other European countries in that period, was financially unsustainable and there came a point when the government could no longer afford

generous transfers to state firms. The government budget deficit went from 3.7 percent of GDP in 1970 to 11.3 percent in 1982 (OECD, 1989). In addition, public opinion was becoming increasingly dissatisfied with the mismanagement of state funds by inefficient and loss-making public enterprises (DiMajo, 1989). With hindsight it is now possible to identify various factors that triggered change and fostered a switch from a soft to a hard regime. In this section we highlight two: the European factor and the privatisation factor.

In 1979, Italy joined the European Monetary System (EMS). This, together with the related process of integration of European economies and institutions in which Italy actively participated, brought about a number of changes. Participation in the EMS indirectly imposed discipline on fiscal and monetary policy and also spurred restructuring in the manufacturing industry. Likewise, it created the environment in which the first steps were taken to give the Bank of Italy greater independence. For example, the Bank was no longer required to absorb unsold government securities, issued independently of monetary base targets. Instruments of monetary policy gradually returned to market-oriented instruments. The First Banking Directive (1977), implemented with delay¹⁴, the financial liberalisation of banks' capital movements (1988), followed by the full liberalisation of capital movements (1990), posed new challenges to Italian (state and private) banks. As part of an enlarged market, at the end of the 1980s, Italian banks felt the external market pressure from international competition and from the restructuring of the entire European banking industry. A reform of the banking system was carried out, important deregulation measures were undertaken and, a few years later, provisions to prepare the privatisation of banks were included in the Amato Law (1990).

Another aspect of the European factor was the tightening of competition policy by the European Commission. Following the Single European Act of 1986 and in preparation for the single internal market to start in 1993, this included a tighter discipline on state aid to firms. In particular, the European Commission advised the Italian government to reduce financial transfers to state-owned firms. For example, the re-capitalisation of the (mainly state-owned) steel industry by the state over the period 1980-1985 was strongly criticised (CER/IRS, 1993).

In the same period, following a change in the international political climate, the privatisation of nationalised industries became a common policy. Several countries, following the example of the UK, started privatisation programmes. In the mid-1980s, a modest privatisation programme for small, restructured state companies was also started in Italy¹⁵. It is interesting to

notice that the privatisation programme in Italy, in contrast for example to the UK experience, did not start as a consequence of major political change. It was devised *despite* the reluctance of the Italian government of the day. Privatisation threats began to be perceived as realistic by public firms mainly as a consequence of the unsustainability of the government deficit and of the pressure from the internal market programme.

In 1987, restructuring plans for public firms began to include the closure of industrial plants and lines of production and, in some cases, the dismissal of management. An example is the complete reorganisation of FINSIDER, an IRI sub-holding and sector holding itself of the steel industry. This trend culminated in 1991 with the liquidation of EFIM, the third largest state holding. It should be stressed that this was a revolutionary new experience for the Italian public sector. And it could be viewed as the nearest public firms went to bankruptcy or take-over, although these words were never mentioned in the political debate.

In summary, the general attitude towards state firms began to change in the mid-1980s, pushing the government to consider the potential benefits of privatisation. This was complemented, and somewhat enhanced, by the expectation of harsher EC scrutiny over government subsidies and increased competitive pressure from European Union partners in both manufacturing and banking industries. The direct impact on state companies and their managers was a sharp reduction in government financial transfers, a programme of corporate restructuring and a realistic possibility of being privatised. Also, evidence in a recent paper by the Bank of Italy on the determinants of bank loan interest rates between 1986 and 1994 suggests that credit for public firms became more expensive than for private firms from 1991 (D'Auria and Foglia, 1997). It was cheaper until 1988 and insignificantly different between 1988 and 1990.

In conclusion, the environment in which Italian public firms were operating in the late 1980s was substantially different from before. In our view, this environment of increased competition at a European level, changes in the banking system, European pressure for the reduction of state aid, threats of privatisation, drying up of endowment funds, contributed to creating more binding financial constraints and to a switch from a “soft” to a “hard” budget constraint regime.

A good quantitative indicator of this evolution is the time series of endowment funds (*fondi di dotazione*). Table I shows the figures for overall government assistance to state holding companies. In spite of new loans from the European Investment Bank and new

government-guaranteed bonds issued by state holdings, the reduction in total assistance to the public corporate sector was sharp. The table clearly shows that the descending trend reached the bottom in 1987¹⁶. This is the year we choose for the structural break in our empirical estimations.

IV. Empirical methodology

The aim of this paper is to investigate whether financial pressure has an effect on the behaviour of public firms. For this purpose the empirical approach developed for private firms has to be adjusted in two important respects.

First, an appropriate assessment of the *source* of financial pressure on state-owned firm has to centre around the issue of the budget constraint. Financial pressure can be perceived as such and be effective only if the budget constraint becomes “hard” following, for example, a change in the macroeconomic and political environment. As discussed above, the presence of a *soft* budget constraint reduces the agency cost of debt due to the fact that the threat of bankruptcy is zero for public firms. In other words, the disciplining effects of financial pressure does not apply if managers perceive that their budget constraint is soft.

Second, an appropriate evaluation of the *impact* of financial pressure on a state-owned firm should concentrate particularly on the effects on employment. As discussed in Section I, there is a fundamental difference between the objective functions of private and state-owned firms. Whereas the function for the first has *one* maximand, profits, the function that public firms are required to maximise has *multiple* variables. And in many cases, profit is not the most important one, employment is (Laffont and Tirole, 1993)¹⁷.

Once these adjustments are made, the aim of this paper becomes to test the hypothesis that state firms, *when operating in a “hard” budget constraint regime*, do react to financial pressure by pursuing restructuring strategies that improve efficiency. In particular, we want to test for the disciplinary benefits of leverage on public firms. We test whether financial pressure in a hard regime induces state firms to reduce organisational slack or restructure in a way that results in an increase in total factor productivity and/or in a reduction in employment.

Using a panel of Italian public and private firms, we estimate a productivity equation and an employment equation to which, *ad hoc*, we add financial factors. Results for private firms enable us to check whether responses to financial pressure differ across ownership structure.

Assuming a standard constant returns Cobb-Douglas gross production function¹⁸, the basic equation for *total factor productivity*, in log-linear form, is:

$$y_{i,t} = \mathbf{a}_i + \mathbf{a}_t + \mathbf{I} y_{i,t-1} + (1-\mathbf{I})\mathbf{b}_i^L n_{i,t} + (1-\mathbf{I})\mathbf{b}_i^C c_{i,t} + (1-\mathbf{I})(1-\mathbf{b}_i^L - \mathbf{b}_i^C)k_{i,t} + \mathbf{b}_1 MS_{i,t-2} + (\mathbf{b}_2 size_i + \mathbf{b}_3 imppen_j + \mathbf{b}_4 conc_j) t + \mathbf{b}_5 LEV_{i,t-2} + \mathbf{b}_6 AVLEV_{i,t} + \mathbf{e}_{i,t} \quad (1)$$

where \mathbf{a}_i is the firm specific effect, \mathbf{a}_t is a time specific effect, $y_{i,t}$ is the log of real sales (deflated by a three-digit industry-specific price index), $n_{i,t}$ is the log of employment¹⁹, $c_{i,t}$ is the log of (real) materials, $k_{i,t}$ is the log of (real) capital stock,, i is the firm subscript, t is the time subscript and j is the industry subscript. $\mathbf{e}_{i,t}$ is a zero mean stochastic shock to the production function, under the assumption of no serial correlation. The lagged dependent variable is included to capture adjustment lags, since additional production factors usually take time to become fully productive.

In order to account for the impact of competition on productivity growth, we add the firm's time-variant market share (MS_i), and the firm's average size ($size_i$), industry average import penetration ($imppen_j$) and point industry concentration ($conc_j$), all time-invariant²⁰. Since for estimation purposes we take variables in first differences to eliminate the firm-specific effects, the inclusion of the time-variant market share captures the effect of *changes* in competition (more precisely, the firm's market power) on *changes* in productivity (i.e., productivity *growth*). In contrast, the remaining time-invariant variables represent cross-section correlations between the *level* (toughness) of competition and productivity growth²¹.

To ensure that we capture as comprehensively as possible the effects of financial pressure, we include two financial variables in equation (1). The first, LEV , is the ratio of total debt to assets (fixed capital and gross working capital). A number of important observations need to be made on this measure. First, LEV is lagged two periods and this is for two reasons: the effect of a change in financial pressure does take time to translate into productivity growth and, also, any shock to productivity is likely to have an impact on the firm's financial policy and may generate reverse causality problems. Analogously, market share is lagged two periods to

reduce reverse causality problems. Second, as in the case of market share, the relationship between the level of the debt ratio (*LEV*) and the level of productivity becomes, in first differences, the relationship between a change in the debt ratio and a change in productivity. Therefore, we investigate the impact of a *change* in leverage on a *change* in productivity. Third, our choice of a stock variable to measure financial pressure for public firms, as opposed to a financial flow measure as used in other empirical works in this area, is due to the fact that these are likely to receive substantial subsidised loans. Indeed, a flow measure, for example interests over cash flow as used by Nickell and Nicolitsas (1995), misrepresents the financial pressure public firms are subject to. Subsidised interest payments do not capture the full pressure of the expected repayment of the *full* principal at maturity²². Fourth, besides long, medium and short term financial debt, in the numerator of *LEV*, we also include trade debt. This is because trade debt is a substantial component of debt for Italian (and other continental) firms. Marotta (1992) reports that, in 1983, trade debt for Italian firms accounted for twenty-two percent of their sales, in contrast to a seven percent figure for US firms. As it is also the norm for Italian firms, financial debt in *LEV* is non-marketable debt²³ and includes intra-group debt.

The second variable for financial pressure in equation (1), *AVLEV*, is a three-year moving average of the debt ratio *LEV*, centered at $t-3$. In equation (1) *AVLEV* is multiplied by t as an expositional device to show that it enters in levels in the estimated regression in first differences. The rationale for this is that we want to investigate whether firms with higher leverage, i.e. with a high *stock* of debt, are likely to have a greater improvement in productivity. The theory suggests that this could happen for two reasons. First, higher leverage is likely to increase contract enforcement costs and incentive problems, thus raising the premium on the cost of capital and, in turn, increasing the pressure to reduce slackness. Second, highly leveraged companies are more likely to be closer to financial distress and to be more motivated to restructure. In theory, they should achieve the largest improvement in efficiency (see Jensen, 1989).

The equation for the demand for labour is again derived from a Cobb-Douglas production function. In log-linear form, the equation is:

$$n_{i,t} = \beta w_{i,t} + \beta n_{i,t-1} + \beta n_{i,t-2} + \beta k_{i,t} + \beta MS_{i,t} + \beta y_{j,t} + \beta y_{j,t-1} + \beta LEV_{i,t-2} + \beta AVLEV_{i,t} + \alpha + \alpha + e_{i,t} \quad (2)$$

where $n_{i,t}$ is the log of employment and $w_{i,t}$ is the log of real wages (total labour cost divided by the number of employees). To account for imperfect (Cournot) competition we add the firm's market share ($MS_{i,t}$) and industry demand factors ($y_{j,t}$, the log of the three-digit industry output). To account for adjustment costs, we include lagged employment. We assume static expectations²⁴. Again we include both LEV and $AVLEV$ as measures of financial pressure. With LEV we capture the impact of a change in the debt ratio on a change in employment. With $AVLEV$ we capture the effect of the stock of the debt ratio on changes in employment in order to investigate whether highly-leveraged firms reduce their workforce more than less-leveraged firms.

Finally, in both productivity and employment equations, we introduce a structural break to check whether our financial variables (LEV and $AVLEV$) have a different impact during the “soft” budget constraint period (1977-87) and the “hard” budget constraint years (1987-1993). We interact our financial variables in all estimating equations with two time dummies which locate the structural break in 1987.

V. Data and descriptive statistics

The database we use for estimation purposes is an unbalanced panel constructed by researchers at CERIS using the balance sheet data collected by Mediobanca investment bank²⁵. The 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. Table A1 reports the number of firm-year observations by type of ownership. Firms are classified according to their ownership, which can change over time in either direction, from state-owned to private or viceversa. 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.

This data base does not contain other information that in principle would be interesting to have, such as dividend payout data, firms' market value and marketable debt and bond issues. However, relatively few Italian firms are quoted on the stock exchange and the Italian corporate bond market is very small. More importantly for the focus of this paper, it also does not contain disaggregated information on intra-group debt, trade credit, or subsidised loans.

Tables II and III report yearly data for the main variables used in the econometric analysis. Table IV reports the average values for the entire period of other relevant economic and financial variables. For these variables, Tables IV also reports the averages for the two sub-periods, the soft budget constraint years (1977-87) and the hard budget constraint years (1988-93).

The first impression one gets from looking at the averages over the entire period is that differences between state firms and private firms are not as great as one might have assumed *a priori*. The average employment growth rate, although not significant, is exactly the same, -0.015 for both groups of firms (last line in Table II). The average investment ratio over the entire period is 0.119 for state firms and 0.113 for private firms. The average leverage is 0.565 for public firms and 0.453 for private firms (see Table III). However, differences do emerge when we split the period into soft budget and hard budget constraint periods.

The first important difference is exactly in the values of the leverage ratio (*LEV*). The average for public firms drops by five percentage points in the second period while the one for private firms remains unchanged (see Tables IV). The year by year dynamic is illustrated in Table III, which shows the steady reduction of the leverage ratio of public firms (temporarily reversed only in 1987 and between 1989 and 1991), in contrast to the fairly constant indebtedness of private firms. The largest point difference with private firms is in 1977 when the leverage ratio was 0.771 for public firms and 0.497 for private firms, more than fifty percent

higher. Another important difference is in the values of labour productivity. Table II illustrates the remarkable catching up of public firms' labour productivity. Starting from an eight percentage point difference in 1977, the steady improvement culminates in a spurt which brings public firms' labour productivity, in 1993, to a level (2.45) higher than that of private firms (2.16). Another difference is in the pattern of the investment ratio, reported for completeness in Table II. It shows the counter-cyclical pattern of investment of public firms during the 1981-83 recession, during the soft budget constraint years. It also shows that this pattern was not as strong during the 1991-92 recession.

Table IV reports average statistics for cash flows and gross margins, split into the two sub-periods. These show the clear improvement in public firms profitability between the soft budget constraint years and the "hard" ones. Average cash flows over sales were *negative* in the first period and turned positive (although small) in the second. Gross margins over sales improved by one percentage point. The pattern for private firms, instead, remains similar across the two periods.

We also report data on the components of the debt included in our leverage ratio. These confirm what discussed in Section III on the relevance of trade debt for Italian firms. In our sample trade debt makes up for roughly half of the debt of both private and public firms. Also noticeable is its increase for public firms during the hard budget constraint years. We also report statistics for the maturity of debt (MAT), which decreases for public firms and increases for private firms in the second period.

VI. Estimation and empirical results

In this section we present the results of the estimation of the productivity and employment equations for a panel of Italian state-owned and private companies. In Tables V and VI we report the results for the entire period and for a specification which accounts for the inclusion of the structural break.

To carry out the estimation, we use the DPD programme by Arellano and Bond (1988, 1991), which is designed for dynamic panel data. To eliminate the time-invariant firm specific effects, all equations are estimated in first differences. To control for endogeneity of the regressors, we use the Generalised Methods of Moments technique, with variables lagged at least two periods as instruments. The use of instrumental variables is necessary because employment ($n_{i,t}$) and capital ($k_{i,t}$) are likely to be correlated with the error term²⁶. Lagging two periods is necessary because, after first-differencing, the lagged dependent variable is correlated with the error term, so that instruments lagged one period are invalid. To check for absence of serial correlation in the residuals, we use the M_1 and M_2 tests for first- and second-order serial correlation developed by Arellano and Bond (1991) and report them for all equations. However, if the error term in the level equation is serially uncorrelated, after first-differencing, first-order, but not second-order, serial correlation is to be expected. If we find second order correlation we use instruments dated t-3 or earlier. The Sargan test of correlation between the instruments and the error term is also reported (cf. Sargan, 1958, and Hansen, 1982). To distinguish the time pattern of state and private firms, in all equations we include ownership-specific time dummies. Finally, to account for the fact that a poor (good) performance may affect the government decision to rescue (privatise) the firm, the dummy variable that distinguishes private and public firms is instrumented.

VI.A. Productivity regression and results

As mentioned above, to eliminate the firm-specific characteristics \mathbf{a}_i , we take first differences of equation (1) and we rearrange to obtain:

$$\begin{aligned} \mathbf{D}(y_{i,t} - k_{i,t}) = & \mathbf{I} \mathbf{D}(y_{i,t-1} - k_{i,t}) + (1-\mathbf{I})\mathbf{b}_i^L \mathbf{D}(n_{i,t} - k_{i,t}) + (1-\mathbf{I})\mathbf{b}_i^M \mathbf{D}(c_{i,t} - \\ & k_{i,t}) + \mathbf{b}_1 \mathbf{DMS}_{i,t-2} + \mathbf{b}_2 size_i + \mathbf{b}_3 imppen_j + \mathbf{b}_4 conc_j + \mathbf{b}_5 \mathbf{DLEV}_{i,t-2} \\ & + \mathbf{b}_6 \mathbf{AVLEV}_i + \mathbf{D}\mathbf{a}_i + \mathbf{D}\mathbf{e}_{i,t} \end{aligned} \quad (3)$$

In Table V, column (1), we report the estimated coefficients for the entire period²⁷. In column (2), we introduce the structural break and allow financial variables to have a different impact on productivity depending on the budget constraint regime. In the estimation we add 2-digit industry dummies as regressors and as instruments to deal with the lack of appropriate

instruments for the time-invariant competition variables ($size_i$, $imppen_j$ and $conc_j$) and to account for the influence of industry specific technological factors on productivity growth.

Given the purpose of the paper, we turn first to the results for the variables that measure financial pressure, the coefficients on LEV and $AVLEV$ ²⁸. For *state-owned* firms, in column (1), we find that the coefficient on LEV is negative and significant. In other words, *when we consider the entire period*, we find that financial pressure for state firms does not translate in higher productivity.

In contrast, the results for *private* firms for the entire period show a positive and significant coefficient on LEV . In line with theoretical predictions, this implies that Italian private firms are disciplined by an increase in leverage which, in turn, leads to an improvement in productivity. This behaviour is consistent with that of the UK private firms studied by Nickell and Nicolitsas (1995)²⁹. Moreover, the coefficient on $AVLEV$ is also positive and significant. Not only an increase in financial pressure positively affects productivity growth for private firms, but also the more highly leveraged firms appear to be more motivated to take actions to improve efficiency.

In column (2) we introduce the structural break. We run the same regression interacting LEV with two dummy variables accounting for a change in the budget constraint. $LEV*S$ investigates the effect of financial factors during the “soft” regime (1977-1987) and $LEV*H$ during the “hard” regime (post 1988)³⁰. We apply the same procedure to $AVLEV$.

The results for private firms for the subperiods are virtually unchanged from those of column (1). The coefficients remain positive and significant in both periods, with the exception of the coefficient on $AVLEV*S$. After all, private firms should always be under a “hard” budget constraint! It is interesting to notice that the coefficient on $LEV*H$ is lower than the one on $LEV*S$. Although our hypothesis of a structural break in 1987 does not apply to private firms, one could argue that in a hard budget constraint regime private firms are less likely to be “rescued” from bankruptcy by state-owned holding companies and therefore one could expect a stronger impact of financial pressure in that period (see also note 5). However, this effect does not show in our results.

In contrast, the empirical findings for *public firms* clearly show the effect of a change of budget regime. The estimated coefficient for $LEV*S$ is *negative* and significant, whereas the coefficient on $LEV*H$ is *positive* and significant. Financial pressure becomes beneficial when

the budget constraint hardens after 1987. Additional evidence of the strong effect of the change of regime is that the coefficient on $LEV*H$ for state firms is large (0.134 in column (2)) and is more than six times greater than the one for private firms (0.022).

Allowing for the structural break brings the estimated coefficients on $AVLEV$ for state firms to acceptable levels of significance in the second period. However, contrary to the theoretical predictions, the signs of the coefficients are negative. Our interpretation of this result hinges on what we call the “lost cause” argument. By this we mean that the most highly leveraged firms are so heavily compromised that they cannot recover efficiency. There are a number of “lost cause” firms in the Italian public sector. For example, in our sample several state firms are part of EFIM, one of the state holding companies, which went bankrupt in 1991. In our sample, the most highly leveraged firms have a debt ratio three times larger than the least indebted firms. Companies in the top decile average a debt to asset ratio of 0.87 against 0.26 for companies in the first decile. In a Modigliani and Miller-cum-financial distress framework, these companies have a debt/equity ratio so beyond the optimal level (see Wruck, 1990) that they are unable to recover.

We conclude with some brief comments on the coefficients of the variables capturing the effect of competition on productivity growth. In both columns, the market share (MS) and concentration ($conc$) coefficients are the only ones that are statistically significant and, in addition, they have the same sign for private and public firms. The coefficients for the lagged market share are negative, suggesting that an *increase* in market power, reducing competitive pressure, depresses productivity. This is in line with the commonly held view that competition improves company performance and is also in line with the results obtained by Nickell (1996) for UK firms. In contrast, the estimated coefficients on point concentration are positive, which, counterintuitively, indicate that firms in more concentrated industries have higher total factor productivity growth. This may seem inconsistent with the market share result. However, whereas the coefficients on market share capture a time series effect, the concentration coefficients only capture the cross-section effect and therefore they might reflect a reverse causality effect. This may also arise due to the lack of appropriate instruments. For a particular firm, causality may run such that the higher the productivity growth, the stronger the company’s market position and, eventually, the higher the industry concentration of the sector, which, in turn, translates in a positive relationship between concentration and productivity growth.

VI.B. Employment results

In Tables VI we report the empirical results for the employment equation (2). We want to check whether, in their effort to recover efficiency, state companies had to resort to reducing the labour force in response to increased financial pressure. If this is the case, it implies that the pressure was so great that they had to abandon one of their main institutional goals. Indeed, as discussed in sections II and III, employment is one of the most important variables in the objective function of state firms.

We start again with the results *for the entire period*, reported in column (1). The estimated coefficient on lagged *LEV* for state-owned is negative and significant. This clearly indicates that, in response to an increase in total debt to asset ratio over time, state companies reduced employment, a result already consistent for the entire period with what the theory predicts. An increase in debt has the effect of pushing the firm towards efficiency measures such as reducing employment. The coefficient for *AVLEV* is also negative and not far from significance. This suggests that the higher the stock of debt the more firms tend to reduce their labour demand.

However, when we introduce the structural break in column (2), the empirical findings clearly show that the switch of regimes has, once more, a strong impact on public firms. Once we relax the restriction of the coefficients on the financial factors to be equal across the full sample period, we find that state firms' propensity to reduce employment in response to increasing financial pressure is *three times stronger* under a "hard" regime. The coefficient on *LEV*H* is -0.131 and the one on *LEV*S* is -0.039. This result indicates that from the late 1980s a harsher external environment led public firms to respond to the financial pressure of high debt and to undertake restructuring and efficiency seeking strategies.

The coefficient for *AVLEV*S* - negative and significant - is consistent with *LEV*S*. However, the coefficient for *AVLEV*H* is positive. Again, we explain this result with the "lost cause" argument. As discussed above, it is reasonable to assume that firms with extreme leverage ratios, as those, for example, in the top decile of our sample, are unable to improve efficiency under any condition.

The results for private firms for the entire period show a negative coefficient on *LEV*, which is consistent with Nickell and Nicolitsas (1995)'s results for UK private firms, although small and not significant. The coefficient for *AVLEV* is very small, positive and not significant.

The coefficients in Table VIIb for the two periods are more informative. Both coefficients on *LEV* are still negative, and this time the one for the first period is substantial and significant. This suggests that the reaction of private firms to financial pressure is much stronger in the period 1977-87. A possible explanation for this result has to do with the liberalization of the banking system in the late 1980s. A study by the *Banca Commerciale Italiana* (Tendenze Monetarie, February 1994) shows that changing from a restrictive regime to one of liberalized competition led to an adjustment process by trial and error in which banks overlent. This may have softened the financial pressure for private firms. We also find that, in contrast to the results for state firms, the coefficients on *AVLEV* are very small, showing a negligible impact of the stock of debt on employment growth.

VII. Conclusions

This paper extends the literature on financial pressure to the case of state-owned firms and then carries out an empirical investigation using a panel of private and public Italian firms. In developing our hypotheses, we draw from three literatures not combined in this way before. The theoretical literature on financial pressure shows that debt can have a beneficial disciplining effect on the performance of private firms. The related empirical literature finds some evidence of this effect for private firms. In the context of public firms, Kornai (1990) has highlighted the importance of distinguishing between “soft” and “hard” budget constraint regimes.

We hypothesise that financial pressure applies to state-owned firms *only* in a “hard” budget constraint regime. Therefore, we test for the effect of financial pressure during a period of soft budget constraint and a period of hard budget constraint. Our empirical approach consists in the estimation of two equations, one for total factor productivity and one for employment, to investigate whether financial pressure leads state-owned firms to enhance efficiency and to reduce employment. In particular, we check whether both a *change* in the leverage of these firms and the *level* of their stock of debt have an impact on productivity growth and employment growth. We use an unbalanced panel of 1318 Italian firms, 150 state-owned and 1168 privately owned, over the period 1977-1993. An examination of the institutional context in which Italian public firms operate provides support for the hypothesis that our sample period can be split into a “soft” budget constraint period 1977-1987 and a “hard” budget constraint period 1988-1993.

Our results reveal a sharp contrast in the response of Italian public firms to the pressure of debt between the two periods. We find that the responses of public firms to increased debt are consistent with financial pressure only during the period of hard budget constraint, when their behaviour is similar to that of private firms. In that environment, public firms *do* respond to financial pressure by increasing total factor productivity and reducing employment.

This paper also has implications for policy. The empirical findings provide support for the view described in Muir and Saba (1995) that external debt can create an incentive for state-owned firms to improve efficiency. The findings are relevant not only for state firms in transition and developing economies, but also for public firms in industrialised economies engaged in (or considering) privatisation programmes.

Table I
Italy - Government Assistance to State Holding Companies (US\$ million)

	1984	1985	1986	1987	1988	1989
Endowment funds (excluding GEPI) ^{1,2}	2,910	1,857	932	123	147	122
Capital & Interest Repayment on EIB Loans	30	48	76	117	214	214
New EIB Loans	405	116	976	714	783 ³	572
Bond Issues	-	917	1,174	386	115	-
Total Assistance	3,315	3,140	2,615	902	861	709

¹ In addition, each entity receives payments for the purchase of GEPI (*Gestioni e Partecipazioni Industriali*) stock which are additions to the endowment funds. The total allocations per entity authorized from 1971 to 1990 were US\$540 million each. Not all of this has been paid; annual allocations for 1988 to 1990 per entity are US\$30 million or US\$90 million each for each year (1990 exchange rates).

²These totals may not add up because of small sums allocated to other small state holding agencies.

³US\$350 million with service on principal and interest entirely charged to the State, plus US\$500 million.

Source: Ministry of State Holdings: *Bilancio consolidato*, various years, in Kumar (1993).

Table II

Descriptive statistics - Labour productivity, employment growth and investment rate

	<i>State-owned</i>			<i>Private</i>		
	LABPROD	ΔN	IK	LABPROD	ΔN	IK
<i>Year</i>	<i>Mean (Std.Dev.)</i>	<i>Mean (Std.Dev.)</i>	<i>Mean (Std.Dev.)</i>	<i>Mean (Std.Dev.)</i>	<i>Mean (Std.Dev.)</i>	<i>Mean (Std.Dev.)</i>
1977	0.797 (0.992)	--	--	0.877 (0.899)	--	--
1978	0.833 (1.007)	0.010 (0.082)	0.159 (0.159)	0.953 (1.132)	-0.004 (0.797)	0.176 (0.430)
1979	0.804 (0.926)	0.012 (0.094)	0.124 (0.225)	0.996 (1.140)	0.006 (0.102)	0.169 (0.248)
1980	0.817 (0.924)	0.012 (0.097)	0.154 (0.138)	1.101 (1.265)	-0.011 (0.118)	0.152 (0.160)
1981	0.935 (1.365)	-0.017 (0.092)	0.166 (0.134)	1.119 (1.255)	-0.030 (0.143)	0.133 (0.125)
1982	0.857 (0.899)	-0.027 (0.052)	0.125 (0.119)	1.138 (1.195)	-0.037 (0.099)	0.094 (0.226)
1983	0.995 (1.071)	-0.040 (0.097)	0.127 (0.113)	1.232 (1.557)	-0.042 (0.135)	0.096 (0.131)
1984	0.912 (0.792)	-0.040 (0.105)	0.096 (0.090)	1.384 (1.763)	0.032 (0.156)	0.100 (0.091)
1985	0.916 (0.687)	-0.035 (0.084)	0.079 (0.139)	1.489 (2.113)	-0.021 (0.096)	0.107 (0.085)
1986	1.051 (1.273)	-0.053 (0.265)	0.111 (0.106)	1.749 (5.536)	0.012 (0.101)	0.102 (0.104)
1987	1.172 (1.374)	0.007 (0.287)	0.110 (0.119)	1.799 (4.697)	0.008 (0.106)	0.114 (0.091)
1988	1.389 (1.840)	0.002 (0.149)	0.103 (0.082)	1.794 (2.198)	0.007 (0.098)	0.112 (0.084)
1989	1.710 (2.610)	-0.009 (0.070)	0.108 (0.062)	1.947 (2.858)	-0.001 (0.136)	0.110 (0.090)
1990	1.694 (2.662)	0.024 (0.218)	0.126 (0.091)	1.930 (2.778)	0.004 (0.137)	0.120 (0.127)
1991	1.907 (2.984)	0.003 (0.105)	0.123 (0.117)	2.002 (3.142)	-0.021 (0.105)	0.136 (0.075)
1992	2.139 (3.769)	-0.075 (0.117)	0.078 (0.058)	2.101 (3.264)	0.040 (0.139)	0.079 (0.075)
1993	2.450 (4.944)	-0.010 (0.150)	0.074 (0.061)	2.160 (4.085)	-0.028 (0.135)	0.072 (0.073)
Average	1.167 (1.874)	-0.015 (0.145)	0.119 (0.126)	1.618 (3.001)	-0.015 (0.122)	0.113 (0.142)

Legend:

LABPROD = real sales / number of employees

ΔN = rate of growth of employment
IK = investment / fixed capital

Table III
Descriptive statistics -Leverage ratio (*LEV*) for state-owned and private firms

<i>State-owned</i>				<i>Private</i>			
<i>Year</i>	<i>Cases</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Year</i>	<i>Cases</i>	<i>Mean</i>	<i>Std. Dev.</i>
1977	76	0.771	(0.479)	1977	288	0.497	(0.234)
1978	76	0.734	(0.379)	1978	291	0.489	(0.224)
1979	81	0.711	(0.266)	1979	340	0.502	(0.210)
1980	90	0.703	(0.264)	1980	414	0.481	(0.201)
1981	93	0.568	(0.222)	1981	470	0.460	(0.186)
1982	90	0.539	(0.210)	1982	528	0.436	(0.175)
1983	88	0.515	(0.185)	1983	570	0.447	(0.187)
1984	86	0.502	(0.189)	1984	586	0.455	(0.191)
1985	87	0.478	(0.186)	1985	662	0.440	(0.198)
1986	84	0.430	(0.170)	1986	736	0.426	(0.202)
1987	79	0.453	(0.200)	1987	752	0.434	(0.261)
1988	78	0.441	(0.185)	1988	800	0.445	(0.252)
1989	85	0.566	(0.226)	1989	840	0.473	(0.254)
1990	70	0.565	(0.232)	1990	776	0.454	(0.235)
1991	53	0.567	(0.238)	1991	688	0.442	(0.252)
1992	49	0.552	(0.245)	1992	639	0.443	(0.266)
1993	35	0.492	(0.252)	1993	547	0.453	(0.311)
Average	1300	0.565	(0.271)	Average	9927	0.453	(0.232)

Legend:

$$LEV = (MLTFD + STFD + TRAD) / (FC + GWC)$$

where:

MLTFD = medium and long term financial debt

STFD = short term financial debt

TRAD = trade debt

FC = fixed capital
 GWC = gross working capital (liquidity excluded)

Table IV
Descriptive statistics - Other characteristics of state-owned and private firms

	Period 1977-1993		Period 1977-1987		Period 1988-1993	
	<i>State-owned</i>	<i>Private</i>	<i>State-owned</i>	<i>Private</i>	<i>State-owned</i>	<i>Private</i>
	Mean (<i>Std. Dev.</i>)	Mean (<i>Std. Dev.</i>)	Mean (<i>Std. Dev.</i>)	Mean (<i>Std. Dev.</i>)	Mean (<i>Std. Dev.</i>)	Mean (<i>Std. Dev.</i>)
LEV	0.565 (0.271)	0.453 (0.232)	0.579 (0.285)	0.453 (0.209)	0.531 (0.230)	0.453 (0.260)
MLONGD	0.252 (0.206)	0.213 (0.176)	0.277 (0.209)	0.211 (0.172)	0.189 (0.181)	0.217 (0.182)
SHORTD	0.307 (0.226)	0.260 (0.203)	0.322 (0.222)	0.263 (0.192)	0.271 (0.229)	0.256 (0.218)
TRADED	0.441 (0.228)	0.527 (0.202)	0.401 (0.215)	0.527 (0.214)	0.540 (0.233)	0.527 (0.232)
MAT	0.469 (0.324)	0.459 (0.327)	0.474 (0.311)	0.445 (0.312)	0.458 (0.356)	0.478 (0.345)
LY	6.537 (1.025)	6.200 (0.867)	6.542 (1.069)	6.193 (0.897)	6.524 (0.909)	6.209 (0.827)
LN	6.768 (1.010)	6.077 (0.985)	6.930 (1.079)	6.245 (1.023)	6.362 (1.043)	5.857 (0.885)
CFS	-0.029 (0.168)	0.044 (0.077)	-0.042 (0.177)	0.045 (0.078)	0.003 (0.138)	0.043 (0.076)
MARG/S	0.069 (0.125)	0.105 (0.084)	0.066 (0.127)	0.110 (0.085)	0.077 (0.118)	0.099 (0.082)

Legend:

LEV = (LTFD + STFD + TRAD) / (FC + GWC)
 MLONGD = LTFD / (LTFD + STFD + TRAD)
 SHORTD = STFD / (LTFD + STFD + TRAD)
 TRADED = TRAD / (LTFD + STFD + TRAD)
 MAT = LTFD / (LTFD + STFD)
 LY = Log of real sales
 LN = Log of employment
 CFS = cash flow / sales
 MARG / S = gross margin / sales

where:

cash flows = value added - labour cost - interests - taxes

gross margin = value added - labour cost

MLTFD = medium and long term financial debt

STFD = short term financial debt

TRAD = trade debt

FC = fixed capital

GWC = gross working capital (liquidity excluded)

Table V
Estimates- Productivity equation (period 1981-1993)

Dependent Variable: $\Delta (y_{it} - k_{it})$

S ("soft" budget constraint): 1977-1987

H ("hard" budget constraint): 1988-1993

	(1)		(2)	
	<i>State-owned firms</i>		<i>State-owned firms</i>	
$\Delta (y_{it-1} - k_{it})$	0.246	(0.025)	0.230	(0.026)
$\Delta (n_{it} - k_{it})$	0.060	(0.028)	0.085	(0.031)
$\Delta (c_{it} - k_{it})$	0.693	(0.017)	0.679	(0.018)
imp pen _i .	0.002	(0.013)	0.016	(0.017)
conc _i	0.042	(0.013)	0.048	(0.015)
size _i .	-0.008	(0.007)	-0.011	(0.007)
ΔMS_{it-2}	-0.511	(0.100)	-0.461	(0.097)
ΔLEV_{it-2}	-0.025	(0.012)	-	-
$\Delta LEV_{it-2} \cdot S$	-	-	-0.047	(0.013)
$\Delta LEV_{it-2} \cdot H$	-	-	0.134	(0.040)
AVLEV _i	-0.005	(0.010)	-	-
AVLEV _{i} \cdot S}	-	-	-0.001	(0.011)
AVLEV _{i} \cdot H}	-	-	-0.104	(0.031)
	<i>Private firms</i>		<i>Private firms</i>	
$\Delta (y_{it-1} - k_{it})$	0.063	(0.015)	0.048	(0.015)
$\Delta (n_{it} - k_{it})$	0.184	(0.016)	0.204	(0.016)
$\Delta (c_{it} - k_{it})$	0.766	(0.013)	0.759	(0.014)
imp pen _i .	-0.004	(0.007)	-0.004	(0.007)
conc _i	0.027	(0.008)	0.033	(0.008)
size _i .	-0.002	(0.001)	-0.001	(0.001)
ΔMS_{it-2}	-0.241	(0.073)	-0.262	(0.075)
ΔLEV_{it-2}	0.023	(0.007)	-	-
$\Delta LEV_{it-2} \cdot S$	-	-	0.042	(0.009)
$\Delta LEV_{it-2} \cdot H$	-	-	0.022	(0.007)
AVLEV _i	0.004	(0.002)	-	-
AVLEV _{i} \cdot S}	-	-	0.002	(0.003)
AVLEV _{i} \cdot H}	-	-	0.013	(0.003)
W	8300.3 [18]		8261.0 [22]	
M ₁	-5.690 [1042]		-5.348 [1042]	
M ₂	-1.711 [842]		-1.104 [842]	
Sargan	271.173 [252]		257.367 [248]	

Instruments: $(y_{i,t-1} - k_{it})$ (t-2,...), $(n_{it} - k_{it})$ (t-2,...), y_{it} (t-2,...), AVLEV (t-2,...), PUB (t-2), ownership specific time dummies, 2-digit industry dummies. 2-digit industry dummies also included as regressors.

Legend:

Standard errors in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

W = Wald test of joint significance of the regressors (χ^2 distribution).

M₁ = Test for first order correlation in the residuals (normal distribution).

M₂ = 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 VI
Estimates - Employment equation (period 1981-1993)

Dependent Variable: Δn_{it}

S ("soft" budget constraint): 1977-1987

H ("hard" budget constraint): 1988-1993

	(1)		(2)	
	<i>State-owned firms</i>		<i>State-owned firms</i>	
Δw_{it}	-0.508	(0.034)	-0.498	(0.036)
Δn_{it-1}	0.579	(0.029)	0.537	(0.033)
Δn_{it-2}	0.131	(0.009)	0.136	(0.009)
Δk_{it}	-0.073	(0.024)	-0.074	(0.026)
ΔMS_{it}	-0.034	(0.057)	-0.166	(0.081)
$\Delta YIND_{it}$	0.207	(0.034)	0.197	(0.035)
$\Delta YIND_{it-1}$	0.051	(0.034)	0.108	(0.039)
ΔLEV_{it-2}	-0.029	(0.006)	-	-
$\Delta LEV_{it-2} \cdot S$	-	-	-0.039	(0.008)
$\Delta LEV_{it-2} \cdot H$	-	-	-0.131	(0.020)
$AVLEV_i$	-0.007	(0.004)	-	-
$AVLEV_i \cdot S$	-	-	-0.020	(0.006)
$AVLEV_i \cdot H$	-	-	0.028	(0.015)
	<i>Private firms</i>		<i>Private firms</i>	
Δw_{it}	-0.465	(0.020)	-0.445	(0.021)
Δn_{it-1}	0.578	(0.018)	0.578	(0.019)
Δn_{it-2}	0.121	(0.008)	0.121	(0.008)
Δk_{it}	0.024	(0.007)	0.018	(0.007)
ΔMS_{it}	0.249	(0.012)	0.256	(0.013)
$\Delta YIND_{it}$	0.136	(0.023)	0.136	(0.025)
$\Delta YIND_{it-1}$	0.020	(0.019)	0.022	(0.020)
ΔLEV_{it-2}	-0.005	(0.005)	-	-
$\Delta LEV_{it-2} \cdot S$	-	-	-0.027	(0.007)
$\Delta LEV_{it-2} \cdot H$	-	-	-0.005	(0.006)
$AVLEV_i$	0.001	(0.002)	-	-
$AVLEV_i \cdot S$	-	-	0.006	(0.003)
$AVLEV_i \cdot H$	-	-	-0.007	(0.002)
W	355.7 [18]		383.6 [22]	
M_1	-3.251 [1042]		-3.311 [1042]	
M_2	-0.582 [842]		-0.685 [842]	
Sargan	353.818 [344]		344.245 [340]	

Instruments: w_{it} (t-3, ...), n_{it} (t-3, ...), k_{it} (t-3, ...), MS_{it} (t-3, ...), $AVLEV$ (t-3, ...), PUB (t-3), $YIND$ (t-3), ownership specific time dummies.

Legend:

Standard errors in round brackets. All standard errors are robust to time series and cross-section heteroskedasticity.

W = Wald test of joint significance of the regressors (χ^2 distribution).

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 A.1

Unbalanced panel of Italian firms. Number of observations by type of ownership

<i>Year</i>	<i>State-owned</i>	<i>Private</i>	<i>Total</i>
1977	76	288	364
1978	76	291	367
1979	81	340	421
1980	90	414	504
1981	93	470	563
1982	90	528	618
1983	88	570	658
1984	86	586	672
1985	87	662	749
1986	84	736	820
1987	79	752	831
1988	78	800	878
1989	85	840	925
1990	70	776	846
1991	53	688	741
1992	49	639	688
1993	35	547	582
Total	1300	9927	11227

REFERENCES

- Arellano, M., and S. Bond, 1988, Dynamic panel data estimation using DPD - A guide for users, Working Paper 88-15, Institute for Fiscal Studies, London.
- Arellano, M., and S. Bond, 1991, Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations, *Review of Economic Studies*, 58,277-297.
- Bertero, E., 1995, Restructuring financial systems in transition and developing economies: an approach based on France, Special Papers Series n. 80, Financial Markets Group, London School of Economics (forthcoming in *The Economics of Transition*, 1997).
- Bertero, E., 1997, Financial markets, corporate governance and state-owned firms, Mimeo, Department of Accounting and Finance, London School of Economics.
- Bianchi, P., 1990, The restructuring of the Italian state holding companies' portfolios, *Annals of Public and Cooperative Economics*, 61,35-61.
- Boardman, A.E., and A.R. Vining, 1989, Ownership and Performance in Competitive Environments: A Comparison of the Performance of Private, Mixed, and State-Owned Enterprises, *Journal of Law and Economics*, 32 (1),1-33.
- Bond, S., and C. Meghir, 1994, Dynamic investment models and the firms' financial policy, *Review of Economic Studies*, 61 (2),197-222.
- Boot, A.W.A., 1992, Why Hang on to Losers? Divestitures and Takeovers, *Journal of Finance*, 47 (4),1401-23.
- Brunello, G., C. Graziano, and B. Parigi, 1996, Executive compensation and firm performance in Italy, unpublished.
- CER/IRS, 1993.*La trasformazione difficile - VI rapporto CER/IRS* (Il Mulino, Bologna).
- D'Auria, C., and A. Foglia, 1997, Le determinanti del tasso di interesse sui crediti alle imprese, Temi di Discussione della Banca d'Italia, n.293.
- De Cecco, M., and F. Giavazzi, 1993, Inflation and stabilization in Italy: 1946-1951, in R. Dornbusch, W. Nvlling and R. Layard,ed.:*Postwar economic reconstruction and lessons for the East today*(The MIT Press, Cambridge, Mass).
- Dewatripont, M., and E. Maskin, 1995, Credit and Efficiency in Centralized and Decentralized Economies, *Review of Economic Studies*, 62 (4),541-55.
- Dewatripont, M., and J. Tirole, 1996, Biased principals as a discipline device, *Japan and the World Economy*, 8 (2),195-206.
- DiMajo, A., ed. 1989. *Le politiche di privatizzazione in Italia - III rapporto CER/IRS* (Il Mulino, Bologna).
- Faure-Grimaud, A., 1996, Soft budget constraint and stock price information, mimeo, London School of Economics.
- Fazzari, S., G. Hubbard, and B. Petersen, 1988, Financing constraints and corporate investment, *Brooking Papers on Economic Activity*, 1,141-206.
- Franks, J., and C. Mayer, 1990, Capital markets and corporate control : a study of France, Germany and the UK, *Economic Policy*, ,191-216.
- Franks, J., and C. Mayer, 1996, Hostile Takeovers and the Correction of Managerial Failure, *Journal of Financial Economics*, 40 (1),163-81.

- Gilchrist, S., and C.P. Himmelberg, 1995, Evidence on the Role of Cash Flow for Investment, *Journal of Monetary Economics*, 36 (3), 541-72.
- Greenwald, B., J.E. Stiglitz, and A. Weiss, 1984, Informational Imperfections in the Capital Market and Macroeconomic Fluctuations, *American Economic Review*, 74 (2), 194-99.
- Grossman, S., and O. Hart, 1980, Takeover bids, the free rider problem and the theory of the corporation, *Bell Journal of Economics*, (Spring),42-64.
- Grossman, S., and O. Hart, 1982, Corporate financial structure and managerial incentives, in J. McCall,ed.:*The economics of information and uncertainty*(The University of Chicago Press, Chicago).
- Hansen, L.P., 1982, Large Sample Properties of Generalized Methods of Moments, *Econometrica*, 50, 1029-1054.
- Harris, M., and A. Raviv, 1991, The Theory of Capital Structure, *Journal of Finance*, 46 (1), 297-355.
- Hart, O., and J. Moore, 1995, Debt and Seniority: An Analysis of the Role of Hard Claims in Constraining Management, *American Economic Review*, 85 (3), 567-85.
- Hubbard, R.G., 1995, Capital markets imperfections and investment, unpublished, March.
- Jensen, M., 1986, Agency costs of Free Cash-Flow, Corporate Finance and Takeovers, *American Economic Review*.
- Jensen, M.C., and W.H. Meckling, 1976, Theory of the Firm: Managerial Behaviour, Agency Costs and Ownership Structure, *Journal of Financial Economics*, 3,305-360.
- Kaplan, S., and L. Zingales, 1995, Do financing constraints explain why investment is correlated with cash flow?, Working Paper n. 5267, National Bureau of Economic Research, September.
- Kornai, J., 1980, "Hard" and "Soft" Budget Constraint, *Acta Oeconomica*, 25 (3-4), 231-45.
- Kornai, J., 1990, The soft budget constraint, in J. Kornai,ed.:*Vision and reality, market and state. Contradictions and Dilemmas Revisited* (Harvester and Wheatsheaf, Hemel Hempstead).
- Kornai, J., 1996, Hardening of soft budget constraint under the postsocialist system, *Japan and the World Economy*, 8 (2), 135-151.
- Kumar, A., 1993.*State holding companies and public enterprises in transition* (St. Martin's Press, New York, NY).
- Laffont, J., and J. Tirole, 1993, *A Theory in Incentives Procurement and Regulation* (MIT Press, Cambridge).
- Li, D., 1996, A theory of the soft budget constraint based on insiders' control rights, mimeo.
- Margon, D., A. Sembenelli, and D. Vannoni, 1995, Panel Ceris su dati di impresa: aspetti metodologici e istruzioni per l'uso, 7/1995.
- Marotta, G., 1992, L'allocazione del credito commerciale tra le imprese italiane, *Politica Economica*, VIII (3), 245-275.
- Maskin, E., 1996, Theories of the soft budget constraint, *Japan and the World Economy*, 8(2), 125-133.
- Monti, M., and A. Porta, 1990, Finance, industry and the public sector: the issue of separation in Italy, in A. Porta,ed.:*The separation of industry and finance* (Bocconi University, Milano).

- Muir, R., and J. Saba, 1995, *Improving state enterprise performance* (IBRD/World Bank, Washington, DC).
- Myers, S.C., and N.S. Majluf, 1984, Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have, *Journal of Financial Economics*, 13 (2), 187-221.
- Nankani, H., 1988, Techniques of privatization of state-owned enterprises, World Bank Technical Paper n. 89, World Bank.
- Nickell, S., and D. Nicolitsas, 1995, How does financial pressure affect firms?, Applied Economics Discussion Paper Series n. 170, Institute of Economics and Statistics, University of Oxford.
- Nickell, S.J., 1996, Competition and Corporate Performance, *Journal of Political Economy*, 104 (4), 724-46.
- OECD, 1989. *Economies in transition: structural adjustment in OECD countries* (OECD, Paris).
- Ofek, E., 1993, Capital Structure and Firm Response to Poor Performance: An Empirical Analysis, *Journal of Financial Economics*, 34 (1), 3-30.
- Opler, T.C., and S. Titman, 1994, Financial Distress and Corporate Performance, *Journal of Finance*, 49 (3), 1015-40.
- Ott, A.F., and K. Hartley, eds, 1991, *Privatization and Economic Efficiency* (Edward Elgar, London).
- Rondi, L., and A. Sembenelli, 1996, The impact of financial pressure on firms' hiring and firing decisions: evidence from a panel of Italian companies, Working Paper - CNR Strategic project "Unemployment", CERIS-CNR, Torino, December.
- Rondi, L., A. Sembenelli, and G. Zanetti, 1994, Is excess sensitivity of investment to financial factors constant across firms? Evidence from panel data on Italian companies, *Journal of Empirical Finance*, 1, 365-383.
- Sappington, D.E.M., and J.E. Stiglitz, 1987, Privatization, Information and Incentives, *Journal of Policy Analysis and Management*, 6 (4), 567-82.
- Sargan, J.D., 1958, The Estimation of Economic Relationships Using Instrumental Variables, *Econometrica*, 26, 393-415.
- Schiantarelli, F., 1996, Financial constraints and investment: methodological issues and international evidence, *Oxford Review of Economic Policy*, 12 (2), 70-89.
- Schiantarelli, F., and A. Sembenelli, 1997, The maturity structure of debt, Policy Research Working Paper n. 1699, World Bank, Washington DC.
- Shirely, M., 1995. *Bureaucrats in Business: The Economics and Politics of Government Ownership* (Oxford University Press, Washington, DC).
- Shleifer, A., and R. Vishny, 1996, A survey of corporate governance, Working Paper n. 5554, NBER, April.
- Shleifer, A., and R.W. Vishny, 1994, Politicians and Firms, *Quarterly Journal of Economics*, 109 (4), 995-1025.
- Shonfield, A., 1977. *Modern Capitalism* (Oxford University Press, Oxford).

- Smith, C., and J. Warner, 1979, On Financial Contracting: an analysis of bond covenants, *Journal of Financial Economics*, 7, 117-161.
- Stulz, R.M., 1990, Managerial Discretion and Optimal Financing Policies, *Journal of Financial Economics*, 26 (1), 3-27.
- Wruck, K., 1990, Financial distress, reorganization and organizational efficiency, *Journal of Financial Economics*, 27, 419-444.

NOTES

¹ In the paper we use interchangeably the terms *state-owned firms*, *state-owned enterprises* (commonly used in the transition economies literature) and *public firms* (commonly used in the public economics literature). In all cases we mean firms whose majority shareholder is the government.

² It is important to note that there is a distinction between the effect of debt, on one side on shareholders' interests and the performance of the firm and, on the other, on investment. The theoretical predictions of the effects of debt on shareholders' wealth through investment is more complex. Although it is clear that more debt leads to higher interest payments, lower available cash flow and therefore a decrease in investment, whether this is beneficial to shareholders depends on whether the investment undertaken is profitable or wasteful (see Stultz, 1990). This distinction is empirically difficult to make. We leave the relationship of debt and investment in state firms for future research. See also Section III.

³ Kaplan and Zingales (1995) have criticised the interpretation of the results by Fazzari et al. (1988) and cast doubt on their methodology. For a different view, see Gilchrist and Himmelberg (1995) who provide supporting evidence in favour of the predictive power of cash flow.

⁴ See Bertero (1997).

⁵ For example, for Italian firms, the state-owned holding companies' investment proposals presented to the government used to include details on incremental employment created in designated crisis areas (Kumar, 1993).

⁶ However, the threat of bankruptcy for private firms might be weaker than commonly assumed and, on the other hand, equivalent mechanisms for public firms are sometimes overlooked. In many countries, although the *threat* of bankruptcy might have some discipline effect on the management, in practice, large private firms rarely are "allowed" to go bust. This is particularly true in Italy, where some Italian private firms have become state-owned exactly to prevent their bankruptcy as private firms. On the other hand, public firms do incur restructuring and closing downs and, more recently, often operate under the threat of privatization. Laffont and Tirole (1993) make a similar point.

⁷ Recently, Maskin (1996) and Li (1996) attempt to provide a formal theoretical framework to Kornai's concepts; Faure-Grimaud (1996) models the effects of the soft budget constraint for regulated firms. For related issues see also Dewatripont and Tirole (1995).

⁸ It is unclear whether this outcome is due to the hopelessness of putting firms in the hands of bureaucrats or to the incompleteness of contracts between managers and the state and also between the state and the taxpayer, in a similar fashion to private firms.

⁹ See Kumar (1993) for a good survey on the evolution and organisation of Italian state holding companies.

¹⁰ For example, with the Law n. 634/57 of 1957 state holdings were required to locate a fixed amount (40 percent of the stock or 60 percent of any increment) of fixed capital investment in Southern Italy, independently of expected profitability. Although this rule was never fully implemented, it shows that regional development was a priority for state intervention.

¹¹ By tradition, IRI and ENI, the two major state holding used to be “controlled” by Christian Democrats and Socialists, respectively. Although employment contracts are under the private law and pay-performance incentives are applied, this did not prevent a vicious circle of political patronage (see Kumar, 1993 and Brunello, Graziano and Parigi, 1996 on executive compensations in Italy).

¹² The so-called *oneri impliciti*, implicit costs.

¹³ In this and other respects Italian medium and long term credit banks are similar to French specialised financial institutions. See Bertero (1995).

¹⁴ The Italian government was allowed a longer adjustment period to implement the First Banking Directive because of the technical and structural problems of its banking system.

¹⁵ However, it was soon blocked. The privatisation of Alfa Romeo (automobile industry) in 1986, was followed by the sale of Lanerossi (textile industry) in 1987, but the sales of SME (food industry) and Maccarese (agriculture) were blocked in 1985. The coalition government in power at that time feared that privatizations would dent their control and political patronage in public enterprises (see Kumar, 1993 and CER/IRS, 1993).

¹⁶ Our own calculations from data in other sources show that after reaching a peak of 1.08 percent of GDP in 1983, endowment funds to state-owned firms shrank to 0.46 percent of GDP in 1985 and then collapsed to 0.09 percent of GDP in 1987. For completeness, we also report that in 1991 and 1992 endowment funds were raised again and reached about 0.13 percent of GDP, still well below previous peaks (CER/IRS 1993).

¹⁷ Investment is also important, but beyond the scope of this paper. Besides the theoretical considerations in note 2, assessing the impact of financial pressure on investment for public firms is an exercise even more complex than for private firms. Investment decisions for public firms are based not only on the standard criteria of positive net present value, as for private firms, but also on other issues, such as the promotion of economic growth, regional development and the softening of the impact of the business cycle.

¹⁸ Our estimation strategy follows Nickell and Nicolitsas (1995)’s one, although theirs was applied in a study with a different motivation, overall framework and institutional background. From a macroeconomic perspective, they test whether a rise in interest rates (i.e., in the cost of borrowing and in financial pressure) leads managers to take actions to raise efficiency, reduce wages, cut back on hiring for a panel of UK large, manufacturing, private firms. In particular, we do not include a wage equation in our analysis because in the highly regulated and rather inflexible Italian labour market it would be a rather dull exercise.

¹⁹ Employment figures include workers in temporary lay-off (*Cassa Integrazione Guadagni*).

²⁰ For import penetration we use three-digit NACE industry data averaged over the period 1977-1991. For industry concentration, the only available data is the four-firm concentration ratio (CR4) for 1987 at the three digit level of the NACE classification.

²¹ In equation (1) these variables are multiplied by t to ensure that they enter in levels in the estimating equation after first differencing. This approach draws from the approach that Nickell (1996) uses for the study of the impact of competition on corporate productivity of UK private firms.

²² In this paper we do not address the issue of the discipline of debt relative to its maturity. In parallel to the argument regarding our choice of a stock measure of leverage, we think that, for public firms, the maturity of loans might reflect the availability of loans for which interests are subsidised. And we have no disaggregated information on the size and maturity of subsidised debt. However, for completeness, we carried out a few estimations which add a maturity ratio to our basic specification. The results show statistically significant evidence of a disciplining effect of short term debt on employment and no relationship between maturity and productivity.

²³ More precisely, the Mediobanca aggregate data show that our dataset includes a few bonds for which we have no disaggregated information (see Section IV). However, they make up, on average over the entire period, for less than 0.95% of total debt (Mediobanca, Dati Cumulativi di 1760 Società Italiane, 1995).

²⁴ For the estimation of a labour demand equation under non-static expectations, within the Euler framework, see Rondi et al (1996), investigating the impact of financial pressure on the firm's adjustment costs for labour on a panel of Italian private companies.

²⁵ The database is built from the yearly directory *Le Principali Società Italiane*. Each annual volume includes balance sheets, profit and loss accounts and other general information for the two previous years. Time series for our database are therefore obtained by merging data from consecutive volumes for the firms appearing in each volume, using firms' names as the main variable in merging. Firms are included in the Mediobanca directory on the basis of a variable size measure. Between 1977 and 1984, firms with sales larger than ten billion Lire were included, between 1985 and 1986 with sales of at least 20 billion Lire and between 1987 and 1993 with sales of at least 25 billion Lire. For a complete description of the original database see Margon et al. (1995).

²⁶ Indeed, some productivity shocks, for example variations in the skill composition of the work-force or in the speed of the production lines, are directly related to employment and capital intensity.

²⁷ Due to the lagged variables, the estimation period becomes 1981-1993.

²⁸ We checked the cross correlation between *LEV* and *AVLEV* for potential multicollinearity problems and it turns out to be as low as 0.21 for the full sample.

²⁹ Schiantarelli and Sembenelli (1997) find the opposite result using a specification aimed at investigating the correlation between the maturity structure and firms' performance. Also, they use a shorter version of the CERIS panel of private firms.

³⁰ Our choice of 1987 as the structural break is discussed in detail in Section II. However, the results do not change when we locate the structural break in 1986 or 1988.

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MARIA ZITTINO, Working Papers Coordinator, CERIS-CNR

Via Real Collegio, 30; 10024 Moncalieri (Torino), Italy

Tel. +39 011 6824.914; Fax +39 011 6824.966; m.zittino@ceris.cnr.it; <http://www.ceris.cnr.it>