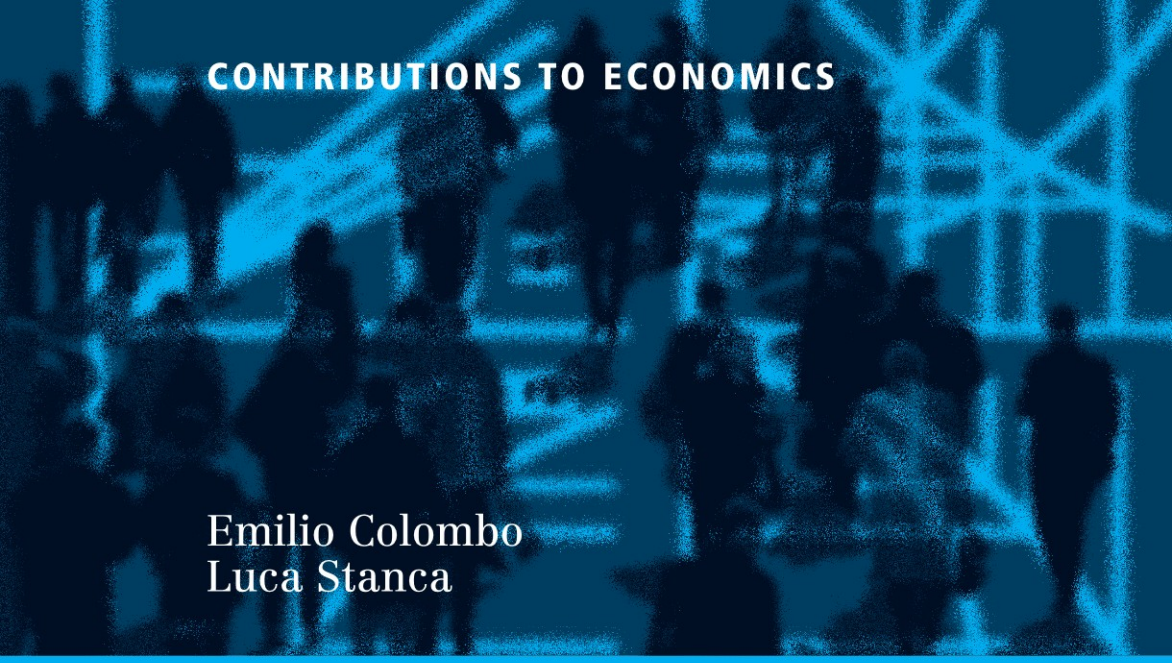

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Luca Stanca

Financial Market Imperfections and Corporate Decisions

Lessons from the Transition Process in Hungary

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To Elisa, Tommaso
and Matteo

To Giorgia, Maria,
Chiara and Sabia

Preface

We would like to thank Ákos Valentinyi and Mark Schaffer for their advice on various stages of this research project. We also would like to thank our colleagues at the Department of Economics of the University of Milan - Bicocca for their advice and support.

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Milan, March 2005

Emilio Colombo
Luca Stanca

Contents

1

Introduction

This book investigates the role of financial markets for corporate decisions and macroeconomic performance in the transition process, focusing on the experience of Hungary, one of the early reformers among formerly centrally planned economies. The book presents the results of an empirical analysis of company accounts for a large panel of Hungarian firms between 1989 and 1999, focusing on the role of financial market imperfections in determining corporate capital structure and investment decisions. This introductory chapter provides a brief discussion of the motivation and structure of the book.

The emphasis on the role of financial market imperfections for firms' decisions is due to three main reasons. First, in recent years this topic has received increasing attention in the theoretical and empirical economic literature. Second, there are specific aspects that make financial market imperfections particularly relevant for Eastern European countries. Third, the role of credit and financial markets during the transition process has been somewhat neglected by the literature on transitional economies, partly because initially other issues, such as labour market dynamics, appeared to be more relevant, and partly because of lack of adequate data.

In the past decades, financial market imperfections have been one of the central topics in microeconomics and macroeconomics, both theoretically and empirically. Recent developments in the theory of asymmetric information have produced an alternative approach to the standard neoclassical framework in the analysis of financial markets. Whereas in the standard neoclassical framework financial markets play a marginal role with respect to the real side of the economy, the new approach based on asymmetric information places financial markets at the core of macroeconomic dynamics. A number of contributions showed that financial market imperfections are a crucial factor for both short term and long term macroeconomic dynamics. In a long run perspective, growth is linked to the degree of development and efficiency of financial and credit markets (see, among others, King and Levine (1993a), Beck *et al.* (2000)). In a short term perspective, taking into account financial market imperfections allows to improve, both qualitatively and quantitatively,

the description of the propagation mechanism that explains aggregate fluctuations.

In the literature on the role of financial market imperfections, most contributions refer to developed economies. However, informational failures that are at the core of financial market imperfections are generally more pronounced in developing countries. Although transitional economies can be considered in many respects similar to developing economies, there are some factors specific to formerly centrally planned economies that made the initial conditions of Eastern European credit and financial markets quite unique. In particular, it is important to consider the organisation of economic relations during the planned system and, consequently, the challenge faced by financial institutions in the transition process.

In the planned system the financial sector was to a large extent fictitious, while generally firms had no binding budget constraint. If a firm was in shortage of liquidity or credit, a commercial bank could be ordered to provide an additional loan to the firm. The solvency of the whole system was secured by the central bank, that had always the possibility of printing money without generating inflation, since prices were controlled administratively. Moreover, as the problem of solvency was non-existent, there was no difference between borrowing from banks or from other firms. Therefore, at the beginning of the transition process, firms' debt was composed largely of *interenterprise credit.* Because in their lending decisions banks were merely executing what was stated in the plan, they hardly exercised any monitoring or risk assessment activity. As a result, at the beginning of transition, even if banks had an ongoing long term relationship with some firms, this relationship was largely uninformative.[1]

With the beginning of transition, the central bank no longer exercised a passive role, hard budget constraints were gradually imposed, and banks had to start providing, in a short period of time, a range of quite sophisticated services, often without the ability to do it. Moreover, the needs that they were facing were not comparable to those of a developing country, but rather to those of a developed economy. In this perspective, banks in Eastern European economies were in a worse condition than in other developing countries, because they did not have time to adjust to the needs of a growing economy. All the rules and regulations of financial intermediation had to be designed, starting from adequate bankruptcy procedures. Most importantly, banks had to develop monitoring skills: they had to collect information on their customers, learn how to assess risks and implement all those actions that reduce informational failures in the borrower-lender relationship.

Moreover, the early stages of transition were characterised by a high level of economic instability. In an unstable economic system, current performance is a poor indicator of future performance. Therefore, not only borrowers did

[1] A detailed description of how the credit system operated in planned economies is provided in IMF *et al.* (1992).

not have a reputation from the past, but they also had difficulties in building one *ex novo*. The picture described so far contains all the ingredients for a severe credit crunch, due to forms of rationing during the early stages of the transition process (see Calvo and Coricelli (1993), Calvo and Frenkel (1991)). In fact, after the initial credit crunch, both the level and the quality of financial intermediation improved, but at a very slow pace, placing a severe constraint on the development of transition economies.

Imperfections in financial markets have significantly affected three aspects of the process of transition, that in turn had a profound impact on macroeconomic performance. First, the restructuring of state-owned firms: state-owned firms represented the backbone of the planned system, and the possibility of restructuring them relied to a large extent on the efficiency of financial markets in providing capital for this purpose. Second, the growth of new private firms: with the beginning of transition, there was an impressive rate of birth of new firms; an inefficient financial market cannot provide adequate financing for new (and risky) entrepreneurial projects and, as a consequence, there is a serious risk of hampering the development of the new private sector and the growth prospects of the economy. Third, the privatisation process, whose success depends ultimately on the efficiency of financial markets in pricing firms correctly and providing alternative financing methods, thus enabling firms to achieve the desired capital structure.

A number of contributions in the theoretical literature illustrate these aspects of the transition process. Coricelli (1996) considers a framework similar to the one developed by Calvo and Coricelli (1992b) to analyse the role played by financial market inefficiencies and their interaction with trade credit in affecting the long run growth of the economy. The relationship between private sector development and financial markets is analysed by Brixiova and Kiyotaki (1997) in a model of liquidity constraints conceptually similar to Kiyotaki and Moore (1997b).

Empirically, until recently it has been difficult to assess the relevance of financial market imperfections in transition economies, due to the lack of reliable microeconomic data to test the relevant hypotheses. Firm-level case studies reported by Belka *et al.* (1995), Bonin and Schaffer (1995), Carlin and Landesmann (1997) and Estrin *et al.* (1995) underline that firms in Eastern Europe faced severe financing constraints during the initial years of transition. As an example, Belka *et al.* (1995) survey 200 Polish firms in 1993. When asked to identify the most important obstacle constraining their investment behaviour, firms ranked first high interest rates, second their poor financial situation, and third the unwillingness of banks to lend. All these factors are linked to the presence of financial market imperfections.

More recently Bratkowski *et al.* (2000), using survey data, analyse the investment behaviour and the financing methods of *de novo* private firms in Hungary, Poland and the Czech Republic. They find evidence of imperfections in financial markets, but also that there do not appear to be severe forms of credit rationing for *de novo* firms, and that imperfections do not seem to in-

hibit the growth of these firms. Similar conclusions are reached by Johnson *et al.* (1999a,b). Other econometric studies have been conducted by Colombo (2001) for Hungary, Cornelli *et al.* (1998) for Hungary and Poland, Carare and Perotti (1997) for Romania, Budina *et al.* (2000) for Bulgaria, Lensink and Sterken (1998) for Estonia and Lízal and Svejnar (1998, 1999) for the Czech Republic. All these studies provide evidence of imperfections in financial markets that constrain firms in the achievement of their optimal capital structure or in their investment behaviour. Understanding the problems in the development of efficient credit and financial markets in Eastern Europe is therefore crucial for a correct analysis of the transition process.

Against this background, this book is structured as follows. Chapter 2 sets the theoretical basis for the empirical analysis conducted in the subsequent chapters. The chapter provides a survey of the recent theories that emphasise the role of financial market imperfections in the explanation of macroeconomic phenomena, both in the short run and in the long run, and discusses the links between the literature on transitional economies and the core of the literature that focuses on developed economies.

One of the key factors explaining the Hungarian economic performance is the progressive liberalisation and development of financial markets, accompanied by a strong institutional and regulatory reform, and the attraction of considerable flows of foreign direct investment. Chapter 3 provides an account of the evolution of the Hungarian economy since the beginning of transition, analysing in particular the performance and transformation of financial markets throughout this period, and presenting an overview of Hungarian macroeconomic performance in the first decade of transition. This chapter sets up the institutional and macroeconomic framework for the microeconomic analysis developed in the subsequent chapters.

Chapter 4 presents a descriptive empirical analysis of firms' financial positions in the 1990s, providing an assessment of the impact of the transition process on the financial stability of the Hungarian corporate sector. We focus on indicators of leverage, liquidity, profitability and efficiency, investigating the static and dynamic features of the whole distribution of firms' financial positions. We examine the static pattern of financial ratios for the overall sample and by sub-samples defined according to ownership, size and industry. We also study how the distribution of corporate financial positions evolved over time, characterising both external shape dynamics and intra-distribution mobility.

The remaining chapters provide an empirical assessment of the role of financial market imperfections for firms' economic decisions. Chapter 5 analyses the determinants of the capital structure of Hungarian firms in the 1990s. The objective of the analysis is to investigate the presence of constraints for firms in achieving their optimal capital structure and, more generally, the efficiency of the banking sector in providing credit. We find evidence of financial market imperfections resulting in the substitution of external finance with internal finance and interenterprise debt. There are also positive signals, as reforms

seem to have hardened firms' budget constraints and to have made the credit allocation process more efficient and market oriented.

In chapter 6 we investigate the role of financial factors for corporate investment decisions before and after the introduction of major financial reforms, exploring differences across sub-samples of firms defined according to size and leverage. The analysis shows that the role of financial factors for investment decisions has changed significantly after the introduction of financial reforms, and that firms were affected differently depending on their ownership type. In the post-reform period, small private firms came to face binding financial constraints, whereas state-owned firms kept facing a soft budget constraint, although the investment decisions of small state firms became more sensitive to financial conditions. Foreign-owned firms were subject to a hard budget constraint in both periods, but became less sensitive to financial conditions after 1993, providing an indication that reforms have been successful in lowering informational costs.

Chapter 7 concludes with a summary of the main results of the analysis and a discussion of the implications for transition economies. An appendix provides a full description of the data set, with details on the definition and construction of the variables used in the empirical analysis.

2

Financial market imperfections and corporate decisions: theory and evidence

2.1 Introduction

This chapter reviews the recent developments in the literature on financial market imperfections and the role that they play in explaining firms' capital structure choice and investment decisions. The objective of the chapter is twofold: on the one hand, we provide the theoretical background for the empirical analysis presented in the subsequent chapters; on the other hand, we aim at linking the literature on transitional economies with the core of the literature that focuses on developed economies.

The transition process of the Hungarian economy has several peculiarities that make the models surveyed in this chapter somewhat inappropriate for transitional economies. However, the Hungarian relatively advanced stage of development, and more importantly the recent accession to the European Union, call for a change in perspective in analysing its economic development. This chapter outlines the issues that are becoming of central importance as the process of transition is being completed.[1]

At the end of the seventies, the claim that financial markets were an important determinant of downturns and upturns that characterised the economy seemed unfounded and the task of proving this appeared to be extremely difficult. The challenge came mainly from real business cycle theory, that empirically proved able to match surprisingly well the behaviour of macroeconomic variables. Real business cycle models are stochastic growth models with optimising agents in which markets are complete. In such an environment the Modigliani-Miller theorem applies,[2] providing a formal proof of the

[1] Booth *et al.* (2001) investigate whether capital structure theory can be applied to countries characterised by different institutional structures. They find that variables that are relevant for explaining capital structure in the United States and in European countries are also relevant in developing countries. It seems therefore appropriate to deepen the theoretical linkages of the specific literature on transitional economies with the more general literature on developed economies.

[2] See Modigliani and Miller (1958).

irrelevance of the financial structure of firms. With symmetric information and the possibility for firms to obtain unlimited credit at the prevailing interest rate (perfectly elastic supply of capital), each investment project is valued on the basis of its expected payoff and degree of risk, and only the projects whose expected payoff exceeds the acquisition and installation cost of capital are undertaken. In such an environment there is no role for financial variables in the explanation of investment decisions and, in turn, of macroeconomic fluctuations.

In order to overcome the implications of the Modigliani-Miller theorem, it was necessary to change the underlying assumption of complete markets and introduce some form of asymmetric information. This has important consequences for the analysis of both firms' investment behaviour and capital structure choice. First, there is a more important role of financial intermediation: banks and financial intermediaries are considered not only as a channel of transmission of monetary and financial flows but also, and more importantly, as processors of information and controllers of borrowers' behaviour.

Second, asymmetric information introduces a relationship between the role of the bank in processing information and the determination of investment. When information is asymmetric, information processing becomes crucial: idiosyncratic risk cannot be completely diversified away and the actual service provided by the banking sector becomes the sorting of good from bad borrowers.

Third, asymmetric information has important implications not only for firms' external relations (e.g. the relationship between borrowers and lenders) but also for their internal relations, like the one between managers and shareholders. The fact that some actions of the management cannot be observed or verified implies that managers' objectives may not be perfectly aligned with those of the shareholders. This has profound implications for capital structure, since the latter can be designed in order to minimise the agency cost deriving from asymmetric information.

The recent literature has taken different directions in analysing the implications of financial market imperfections. It is possible to identify three main approaches. The first considers the long run consequences of financial market imperfections, analysing their effect on growth.[3] The second approach, discussed in Sec. 2.2, analyses the effects of imperfections in credit and financial markets on investment decisions and macroeconomic fluctuations.[4] The third approach, examined in Sec. 2.3, is mainly microeconomic and has made use of the recent developments in game theory and contract theory in order to

[3] This chapter will refer to these topics only marginally. A good survey of this literature is provided by Demirguc-Kunt and Levine (2001).

[4] Gertler (1988) provides a comprehensive overview of this literature from the fifties to the mid-eighties.

analyse firms' optimal capital structure and the allocation of property rights within the firm in presence of asymmetric information.[5]

Although the effects of financial market imperfections on firms' investment decisions and on their capital structure choice will be considered separately, these issues are closely related. The models presented in Sec. 2.2 show that firms' investment decisions are heavily affected by informational failures in financial markets, that in turn determine different costs of alternative financing methods. Generally, these models focus on the fact that informational failures generate a wedge between internal and external finance. External finance (debt or equity) can be rationed, as in the models à la Stglitz (Sec. 2.2.1), or it can simply be more costly than internal finance. In any case, the imperfect substitutability between financing methods affects the amount of funds which firms have access to and, as a consequence, it also affects firms' investment decisions. This implies that in the literature investigating the role of financial market imperfections on firms' investment, the issue of capital structure choice remains in the background. Whether the financial contract used by firms is assumed (as in the Stiglitz view) or derived (as in the agency cost approach) the capital structure choice is never fully explored, but taken as given. Similarly, the literature surveyed in Sec. 2.3 starts from the same assumption, i.e. that informational failures in financial markets generate different costs of different financing methods. The focus in this case is on how the imperfect substitutability of financing methods affects firms' capital structure choice. The fact that firms choose their capital structure because they need to finance their investment plans remains in the background. The two branches of the literature surveyed in this chapter thus tackle the same issue, but focus on different aspects, and should be seen as complementing each other.

2.2 Financial market imperfections, investment and cycles

2.2.1 The Stiglitz view

Joseph Stiglitz has been a forerunner in the analysis of the implications of imperfect information in financial markets. Starting in the early eighties, together with Bruce Greenwald and Andrew Weiss, he developed a theory of the role of financial market imperfections macroeconomic dynamics. In order to fully understand the implications of this approach it is necessary to consider the different implications of informational asymmetries in financial markets.

Asymmetric information and credit rationing

The effects of asymmetric information in the credit market are analysed in the seminal paper by Stiglitz and Weiss (1981) [henceforth SW]. As in Akerlof's

[5] An excellent survey of these topics is provided by Hart (1995).

"lemon market", information is asymmetrically distributed between buyers (firms) and sellers of loans (banks) and the outcome can be the (partial) failure of the credit market in which an inefficient level of loans is offered. In the theoretical framework of SW, risk neutral entrepreneurs turn to risk neutral banks to obtain a loan necessary to finance an investment project (every entrepreneur has the same initial wealth ω and every investment project requires the same investment $I > \omega$). The informational asymmetry derives from the fact that the entrepreneurs have private information on the profitability of investment projects. These have the same expected return but differ in terms of risk (this assumption is referred to as *mean preserving spread*).

Banks can use the interest rate as a screening device in order to sort out good borrowers from bad ones, but in doing so they trigger a twofold effect. First, an adverse selection effect: as the interest rate rises, good borrowers may drop out of the market, increasing the average riskiness of the loans; this occurs because, under reasonable assumptions, good borrowers are on average less willing to pay high interest rates than bad borrowers, who already perceive a high probability of not repaying the loan. Second, a moral hazard effect: when the borrowers have the possibility of undertaking different types of projects, the interest rate can affect their behaviour. An increase in the interest rate reduces the effective return on successful projects and this may induce borrowers to choose riskier projects.

Due to both these effects, the relationship between the interest rate and the bank's expected return is not monotonically increasing but there can be a "Laffer curve" characterised by an optimal rate at which the expected return is maximised. For interest levels higher than the optimal rate, the moral hazard and adverse selection effects are so relevant that they overcome the positive direct effect of the increase in the interest rate. In this case, in equilibrium the demand of credit exceeds the supply and some entrepreneurs (who are undistinguishable from the bank's point of view) are denied access to credit.[6]

Asymmetric information and equity rationing

The most natural objection that can be made to the model of credit rationing presented above is the following: if firms are credit rationed, why don't they resort to equity to finance their investment? Indeed, De Meza and Webb (1987) show that in the SW model the equilibrium source of finance is an equity contract, and if all entrepreneurs choose equity finance, the social optimum

[6] It should be observed that the results obtained by SW depend heavily on the assumption of mean preserving spread in projects' returns. De Meza and Webb (1987), assuming differences in projects' expected returns, obtain a positive monotone relationship between interest rate and loan's expected return, implying no credit rationing in equilibrium.

is achieved.[7] It is clear that different financing methods are strictly complementary, since they are the outcome of the capital structure choice of the firm. Therefore, credit rationing must be accompanied by some sort of equity rationing to have an effect at the aggregate level. This possibility is explored by Greenwald *et al.* (1984) [henceforth GSW].[8]

GSW suggest that informational problems that affect the credit market may intensify when a firm is financed with equity. First, with equity finance most of the profit can be used by managers with extreme flexibility, while debt financing reduces the discretion of managers. Moreover with debt financing there is always the discipline exerted by the threat of lenders withdrawing their funds. Both these aspect reduce informational problems. Second, there may be *signalling effects* that restrict the firm's ability to issue equity. Since managers are assumed to have superior information about firms' profitability, a greater debt burden would be a signal of a healthy firm. If good firms rely primarily on debt, then equity is issued mainly by bad firms. As a consequence, by issuing equity a firm may convey a negative signal and its market value may be reduced.

The negative signal associated with equity issues may thus imply that the cost of equity can become prohibitively high for some firms, while firms using equity issues may experience a drop in their market value. These two factors imply that, in the presence of the need to raise external capital, firms will strongly prefer debt, introducing in this way a bankruptcy risk that, as we will see in the next paragraph, can significantly affect their behaviour.

Asymmetric information, risk and cycles

In order to investigate the implications of the observations made so far on the analysis of economic fluctuations, we can extend the model presented in the previous paragraph along the lines of Greenwald and Stiglitz (1993a). It is assumed that each firm i is characterised by a concave production function $q_i = \Phi(l^i)$ with labour (l) as the only factor of production. Inputs are paid one period before output is produced. The credit market is characterised by perfect information, but in the equity market there are informational failures of the sort described in the previous paragraph which prevent firms from issuing new shares. At the beginning of period t, each firm has the following nominal equity value:

$$A_t^i = P_t^i q_{t-1}^i - (1 + r_{t-1}^i) B_{t-1}^i \tag{2.1}$$

where B_{t-1}^i is the level of nominal debt inherited from the previous period, r_{t-1} is the contractual interest rate, and P is the price of output. Since inputs

[7] The reason is simple: with equity finance, since all projects have the same expected return, they are all equally attractive for investors, so that adverse selection and moral hazard problems disappear completely.

[8] In Sec. 2.3.1 we will present the closely related model by Myers and Majluf (1984) that investigates similar issues from a capital structure perspective.

are paid one period in advance, firms issue debt in order to pay wages

$$B_t^i = P_t w_t \phi(q_t^i) - A_t^i \tag{2.2}$$

where labour input is obtained by inverting the production function as $l_t^i = \phi(q_t^i)$. Uncertainty is due to price levels, where the relevant price for each firm (P_i) is given by the product between the general price level and a sectoral shock

$$P_t^i = \tilde{u}_t^i P_t \tag{2.3}$$

where the sectoral shock has unit mean and distribution $F(\cdot)$. A firm goes bankrupt if $A_i < 0$, so that using equations (2.1), (2.2) and (2.3), it is possible to define a threshold level of $\tilde{u}_t^i$ (call it $\bar{u}_t^i$) below which the firm goes bankrupt. The probability of bankruptcy $(F(\bar{u}_t^i))$ therefore becomes endogenous. Making the assumption that banks choose the interest rate r_t^i which yields an expected return equal to the risk free rate ρ_t, and assuming away uncertainty on future values of the general price index, it is possible to determine the interest rate on loans and the probability of bankruptcy as functions of the relevant variables:

$$r_t^i = r_t^i \left(q_t^i, a_t^i, w_t, P_t/P_{t+1}^e, 1+\rho_t\right) \tag{2.4}$$

$$F(\bar{u}_{t+1}^i) = F\left[\bar{u}_{t+1}^i(q_t^i, a_t^i, w_t, P_t/P_{t+1}^e, 1+\rho_t)\right] \tag{2.5}$$

$$\begin{matrix} & - & + & + & + \end{matrix}$$

where $a_t^i = A_t^i/P_t$. As indicated by the signs of the partial derivatives in equation (2.5), the probability of bankruptcy increases with costs $(w_t, P_t/P_{t+1}^e, 1+\rho_t)$ and decreases with the equity level a_t^i. The effect of output on $F(\bar{u}_{t+1}^i)$ is ambiguous: an increase of q_t on the one hand generates an increase in revenues, but on the other hand causes an increase of labour costs and therefore of debt; the net effect depends on the precise point of the production function in which the firm operates. It is assumed that firms maximise real expected profits minus real expected bankruptcy costs:

$$\max_{q_t^i}[q_t^i - (1+\rho_t)(w_t\varphi(q_t^i) - a_t^i)] - c_t^i F(\bar{u}_{t+1}^i) \tag{2.6}$$

where $c_t^i = cq_t^i$ denotes the bankruptcy cost which is assumed to be increasing in the level of output. From the first order conditions

$$1 = (1+\rho_t)w_t\varphi' + \psi_t^i \tag{2.7}$$

where ψ_t^i denotes the marginal bankruptcy cost, defined as:

$$\psi_t^i = \left(\frac{dc_t^i}{dq_t^i}\right) F(\cdot) + c_t^i f(\cdot)\frac{d\bar{u}_{t+1}^i}{dq_t^i} \tag{2.8}$$

It is possible to show that $\partial\psi_t^i/\partial q_t^i > 0$. Without the term ψ_t^i, equation (2.7) would just be the usual marginal condition where price equals marginal (discounted) cost. The marginal bankruptcy cost ψ_t^i places a wedge (increasing in

the level of output) between the price and the marginal cost. The term ψ_t^i has a crucial role in the analysis, and it is a direct consequence of the assumptions made so far. Note that if firms were not equity rationed, they would use this method of financing, removing completely the risk of bankruptcy. The same result would be achieved if the bankruptcy costs c_t^i were zero.

An important result that emerges from the GS framework is that firms have a risk averse behaviour: ψ_t^i is affected by the distribution of the random variable $\bar{u}_t^i$. Mean-preserving spreads in the distribution of $\bar{u}_t^i$ modify firms' behavior. This result is developed by Greenwald and Stiglitz (1990a), who show that the maximisation of expected profits less expected bankruptcy costs generates a behaviour which is equivalent to that of an individual characterised by a decreasing absolute risk aversion.[9]

Although in many other articles the "Stiglitz view" emphasises that risk aversion is an adequate assumption for firms' behavior,[10] it is important to observe that risk aversion is not the *cause* but rather the *consequence* of market failures. In fact, it is the equity market failure that induces firms, when they increase output, to resort to debt financing, increasing the probability of bankruptcy and generating a risk averse behaviour.

The solution to equation (2.7) is what GS call a "risk adjusted supply function"

$$q_t^i = g^i(\underset{-}{w_t}, \underset{-}{r_t}, \underset{+}{a_t^i}, \underset{-}{v_t^i}) \tag{2.9}$$

where the term v_t^i denotes the degree of riskiness of the distribution $F(\cdot)$. Aggregating firms' individual supply functions it is possible to obtain the aggregate supply function.

In order to close the model it is necessary to specify an aggregate demand function: GS assume that the demand side is described by a representative agent characterised by a utility function which is linear in consumption and who maximises her stream of expected incomes.[11] The labour market is com-

[9] For this reason Greenwald and Stiglitz in various articles (1987, 1989, 1990b) replace equation (2.6) with the hypothesis that firms maximise $E[U(a_t)]$, where U is a utility function characterised by decreasing absolute risk aversion.

[10] In addition to the above mentioned papers, see also Greenwald and Stiglitz (1988), Greenwald and Stiglitz (1990b). Other considerations support this claim. First, very often firms are owned by a single risk averse individual and not by a large number of agents with diversified portfolios. Second, even when firms are owned by numerous shareholders and run by professional managers, agency problems (unobservability of managers' actions) imply that managers become partially owners of the equity of the firm. Finally, when a firm goes bankrupt it is difficult to assess whether this is due to external factors or to managers' actions, whose reputation will be inevitably affected. It is therefore reasonable to assume that managers are firmly averse to bankruptcy.

[11] Differently from firms, the representative agent does not face any form of market imperfection.

petitive and there is a market wage that always clears it.[12] From the equilibrium conditions in the labour market and the first order conditions of the representative agent, GS derive a crucial result for their analysis: for any given distribution $F(\cdot)$, the level of output can be expressed only as a function of equity: $q_t = \zeta(a_t)$. The dynamic behaviour of the system can be completely determined by the pattern of a_t and is described by the following difference equation:

$$a_{t+1} = q_t - \left(\frac{P^e_{t+1}}{P_{t+1}}\right)(1+r)(w_t\varphi(q_t) - a_t) - m_{t+1} \tag{2.10}$$

where m_t defines the real value of dividends paid to the consumer.[13]

We are now in the position to show the main implications of the analysis of the "Stiglitz view". First, GS show that the function $\zeta(\cdot)$ is (locally) concave: as a consequence, q_t is affected not only by variations in the level of net worth a_t but also by changes in its distribution. Second, such factors as the financial position of the firm (a^i_t) or the perception about the degree of uncertainty of the environment (v^i_t) affect the level of output. Moreover the multiplier associated with these effects is determined by the marginal bankruptcy cost. GS show that this can lead to a high sensitivity of q_t with respect to a^i_t and v^i_t, implicating that small shocks may determine large fluctuations. Third, as shown by equation (2.10), variations of a_t affect output not only in the current period but also in the subsequent periods. Therefore, there is persistence in output fluctuations. GS also show that, if additional assumptions are satisfied, the model can generate endogenous cycles.[14]

A typical economic cycle can be described in this way: a positive shock generates an increase in net worth a and in output q; at the same time there is an increase in wages (through the increase in labour demand), dividends and bankruptcy costs; these factors set the stage for an inversion of the cycle reducing in turn a and q, until there is a further reduction in wages and bankruptcy costs.

All the above mentioned effects derive from the presence of informational asymmetries in the equity market, given that the credit market was assumed to be competitive. However the "Stiglitz view" underlines that a complete analysis has to include informational failures in the credit market as well. There are therefore two factors that reinforce the conclusions above. First, in the presence of informational asymmetries credit supply can be rationed,

[12] GS suggest also a New Keynesian specification of the labour market based on efficiency wages, which would allow to characterise also unemployment within the model.

[13] The representative agent therefore obtains wealth from three sources: labour income, dividends and the capital gain on a_t.

[14] The model is therefore neoclassical in the sense that the majority of shocks affect output through aggregate supply, but it differs from the neoclassical paradigm in the sense that shocks do not originate from technology but rather from changes in uncertainty and in the equity position of firms.

exacerbating firms' financial problems. In this way the possibility arises of a vicious cycle where adverse shocks worsen firms' financial positions, inducing firms to choose riskier projects and increasing the risk of incurring in credit rationing. Second, banks are a peculiar type of firms where the productive activity consists in lending funds. This is by definition a risky activity and, following the remarks made above, banks too should be risk averse and their behaviour could amplify the effects of credit rationing.

2.2.2 Agency costs and macroeconomic fluctuations

The second approach has its origins in the paper by Bernanke (1983) and was further developed by Bernanke and Gertler (1989) and Bernanke and Gertler (1990) [henceforth BG]. This approach has some similarities with the "Stiglitz view", in that it focuses mainly on informational failures, although the analytical approach is different. In particular, BG develop a general equilibrium framework within which they determine endogenously the institutional structure of financial markets. Note that in a general equilibrium model it is not possible to use the representative agent framework, and one has to tackle the complications arising from the introduction of heterogeneity. Despite the fact that this approach is inherently complex, a simple example from Bernanke and Gertler (1990) allows to derive the main implications.

The population is normalised at 1; a proportion μ is composed of entrepreneurs and a proportion $(1-\mu)$ by non entrepreneurs. There are two periods, a saving period (period 1) and a consumption period (period 2). Each agent receives an initial endowment w_i distributed across entrepreneurs following a distribution $F(w)$, a density function $f(w)$, and a per capita mean of $\bar{w}$. The endowment can be either stored, producing a return r, or invested with a random return $\tilde{R}$.

The investment technology operates in two stages at the beginning of period 1. At stage 1, entrepreneurs evaluate the project: they spend an effort e and learn the probability P of success of each project;[15] P is a random variable with a distribution $H(P)$. At stage 2 the entrepreneur has to decide whether or not to undertake the evaluated project: if the project is undertaken, the entrepreneur invests one unit of endowment, borrowing at the prevailing interest rate if $w < 1$, obtaining a return $R > r$ if the project is successful (with probability P) and 0 if it is not (with probability $(1-P)$). Alternatively, the entrepreneur can simply store w and obtain a certain return of r, at the cost of losing e. The informational structure is the following: lenders cannot observe whether or not the entrepreneur has actually evaluated the project, observe P, or distinguish between entrepreneurs and non entrepreneurs. However $H(P)$ and whether or not the project has failed are common knowledge. All agents are risk neutral.

Given these assumptions, entrepreneurs with $w < 1$ evaluate the project, learn the probability of success and, if they decide to proceed, sign a debit

[15] P can also be thought as a measure of the quality of the project.

contract with the lenders. The debit contract has to specify the repayment to the lenders in case of success of the project (Z_s) in case of failure (Z_u) and also in case the project is not undertaken at all (Z_0).

Defining P^* as the threshold probability for which projects with $P > P^*$ have to be undertaken, and defining $\hat{P} = E(P|P \geq P^*)$, the optimal contract solves the problem:

$$\underset{Z_s,Z_u,Z_0}{Max}\,[(1 - H(P^*))\hat{P}R + rw - e] + \\ -[(1 - H(P^*))(\hat{P}Z_s + (1 - \hat{P})Z_u) + H(P^*)Z_0] \tag{2.11}$$

subject to

$$(1 - H(P^*))(\hat{P}Z_s + (1 - \hat{P})Z_u) + H(P^*)Z_0 \geq (1 - H(P^*))r(1 - w) \tag{2.12}$$

$$rw - Z_0 = P^*(R - Z_s) - (1 - P^*)Z_u \tag{2.13}$$

Equation (2.11) defines the entrepreneur's expected profits: the expected return from evaluating and undertaking/not undertaking the project (first term in square brackets) minus the expected repayment to the lender (second term in square brackets).

Equation (2.12) is the participation constraint for the lender (the expected return on the loan must not be less than its opportunity cost), and (2.13) denotes the incentive compatibility constraint for the entrepreneur: he has to choose P^* such that he is indifferent at the margin between undertaking the project or store his wealth.

BG show that the optimal contract is characterised by the following conditions:

1. If $w \geq 1$ then $P^* = r/R = P^*_{fb}$. In this case the entrepreneur has enough funds to finance the project. No agency problems arise and P^* is chosen such that the expected gain from the project (P^*R) is equal to the opportunity cost (r). It can be shown that this is also the social optimum level of P^* (P^*_{fb}).
2. If $w < 1$ then:
   a) The optimal contract sets: $Z_s = r(1 - w)/\hat{P}$, $Z_0 = 0$, $Z_u = 0$.

   P^* is chosen such that

$$P^* = \frac{\hat{P}rw}{\hat{P}R + r(1 - w)} < \frac{r}{R} \tag{2.14}$$

From (2.14) we can identify immediately the agency problem: not sustaining all the cost of the investment, the entrepreneur has the incentive to undertake negative present value project ($P^* < \frac{r}{R}$). The contract is constructed to minimise this problem, by maximising the opportunity cost of the investment ($rw - Z_0$) and the cost of failure (that is fixing $Z_0 = 0$ and $Z_u = 0$). Several further aspects are noteworthy.

First, from (2.14) it is possible to show that $\frac{\partial P^*}{\partial w} > 0$, that is an increase in the entrepreneur's net worth, by increasing the opportunity cost of proceeding with the investment, increases the average quality of projects undertaken. Hence, there is a negative relationship between agency costs and net worth.[16] This relationship is one of the crucial aspects of the analysis in BG and constitutes the building block of what Bernanke *et al.* (1996) call the *financial accelerator*: to the extent that shocks that hit the economy reduce entrepreneurs' net worth, the effects of the initial shocks on production are amplified. Note that there is a strong similarity with the analysis by GS described in the previous paragraph, where the amplification mechanism of the shocks is based on the marginal bankruptcy cost, a notion very similar to that of agency costs.

Second, since there exists a safe alternative asset for lenders, the optimal contract specifies that a decrease in w, due for example to a recession, requires an increase of the share of the return to the project captured by the lender (see the definition of Z_s). Intuitively, this is what Bernanke *et al.* (1996) refer to as *flight-to-quality*: during recessions lenders reallocate funds from low-net-worth to high-net-worth borrowers.

Third, as in the model of SW, there is a "lemon premium" expressed in the definition of Z_s, which reflects agency costs and is decreasing in $\hat{p}$ (the probability that the project will be successful conditional upon its being undertaken).

Finally, BG show that there exists a threshold value of net worth $w_l > 0$ such that for $w < w_l$ it is not profitable even to evaluate the project. The reason is that if net worth is too low, agency costs become too large, so that the entrepreneur prefers to store his wealth rather than evaluating a project (spending e) with a low expected profit.

The general equilibrium of the economy is simple, and allows to determine endogenously the intermediation system: all entrepreneurs with wealth $w \geq w_l$ evaluate the project, while all the others become lenders.

Per capita total output is given by

$$q = r\bar{w} + \mu \int_{w_l}^{1} [1 - H(P^*(w))](\hat{P}(w)R - r)f(w)dw + \\ + \mu(1 - F(1))(1 - H(P^*_{fb}))(\hat{P}_{fb}R - r) \tag{2.15}$$

The first term of the RHS in equation (2.15) is the average return from storage, the second term is the expected surplus of projects of entrepreneurs with $w_l \leq w < 1$, and the third term is the expected surplus of projects of entrepreneurs with $w \geq 1$. From equation (2.15), another important aspect emerges clearly: q depends not only on the level of net worth (it can be shown that $\partial q/\partial \omega > 0$) but also on its distribution (this is another close similarity with the analysis of GS).

[16] The same result is obtained by SW, as discussed in Sec. 2.2.1.

The general structure of the model presented above is the starting point for the dynamic analysis presented in Bernanke and Gertler (1989). In an overlapping generation framework, every agent receives, when young, a wage that has to be invested in order to provide income for retirement. Some agents, entrepreneurs, have the possibility to implement projects which require external financing. Since it is not possible to observe the outcome of the project without sustaining a cost (*costly state verification*), debt contracts are imperfect, thus generating agency costs which in turn prevent some projects from being implemented. Moreover, since implemented projects provide the labour demand for the future generation of agents, the transmission mechanism linked to financial market imperfections emerges clearly. A negative shock has in fact three effects: (a) it reduces the net worth (ω) of entrepreneurs alive in the current period, reducing the fraction of those who, at any given financing cost (Z_s in the previous model), want to implement the project. In terms of the previous model, it increases the fraction of entrepreneurs characterised by $\omega < \omega_l$. As a consequence, labour demand decreases. (b) It increases the agency cost, inducing part of the lenders to a *flight to quality* which reduces the number of projects implemented in equilibrium. (c) It reduces the wage (net worth) of the next generation's entrepreneurs, generating in this way a persistence effect.

BG show that financial market imperfections can generate an amplification mechanism of the shocks that hit the economy and can also generate endogenous cycles.[17] Moreover, the resulting dynamics are non-linear in the sense that the effects of imperfections depend on the sign, size and timing (phase of the cycle) of the shock.[18]

2.2.3 Assessing the differences

At first sight it seems that the difference between the "Stiglitz view" and the agency cost approach is insignificant. They both reach the same general conclusion that changes in financial conditions amplify and propagate effects of initial real or monetary shocks. Nevertheless, there are some key differences that is worth noticing.[19]

First, the two approaches differ in the way they introduce asymmetric information. In the "Stiglitz view", asymmetric information between the two

[17] See also Bacchetta and Caminal (1995) for a similar analysis.

[18] In the model of Bernanke and Gertler (1989), the effects of informational failures last only one period. Gertler (1992) extends the model to a multiperiod setting, obtaining similar results and underlining that liquidity constraints that hit the economy in one period can generate a reduction of investment for several periods in order to recover an adequate level of liquidity.

[19] Note that several of the conceptual differences between the two approaches outlined in this section apply also to the models surveyed in Sects. 2.3.1 and 2.3.2 where we will investigate the implications of these two modelling strategies for the choice of firms' capital structure.

parties is *precontractual*: in the credit market firms are assumed to have *ex ante* more information about the profitability of their investment projects, and in the equity market managers have *ex ante* superior information about the profitability of firms. This in turn implies that investment projects and firms are *ex ante* different.[20]

The agency cost approach, instead, focuses on *postcontractual* asymmetric information: investment projects are *ex ante* identical, since the distribution of possible outcomes is the same for all projects. *Ex post*, however, projects have different effective returns because during the contractual relationship there is the possibility for the borrower to undertake actions that are unobservable or costly observable by the lender. Because of this postcontractual informational asymmetry, the relationship between lenders and borrowers is interpreted by BG as a standard agency relationship where more attention is paid to the *form* of the contract.

The main problem in the class of models à la Stiglitz is probably the fact that the form of the contract is always assumed and never derived.[21] This creates some difficulties from the theoretical point of view, particularly when considering the great development of the literature which analyses firms' optimal capital structure (Sec. 2.3). If firms' financial structure is an endogenous outcome of the underlying informational structure, it is difficult to think that the same principle should not apply also to the contractual forms and to the institutional structure that emerge in the economy.

The analysis of BG, on the other hand, lies within a stream of literature originated by the work of Townsend (1979) and continued by Boyd and Prescott (1986), Williamson (1986) and Williamson (1987), where the attention is focused mainly on the endogenous determination of the contractual form and of the mechanism of financial intermediation, directly from the assumptions on the informational structure, preferences and technology.[22] A common theme in this literature is the use of a result, due to Townsend (1979), which shows that, in the presence of monitoring costs, the optimal contract is a simple standard debt contract (henceforth we will refer to this approach as *costly state verification*, CSV). The simplicity of the debt contract constitutes on the one hand an advantage, since it greatly simplifies the aggregation procedure (which is usually quite complex in the presence of heterogeneous agents), but on the other hand a limit, since it does not allow to explain richer contractual forms and, in particular, the coexistence of debt and equity financing. In this perspective, while the 1989 model of BG applies extensively the results of Townsend, the 1990 model overcomes some

[20] In the model presented in paragraph 2.2.1, this precontractual difference is not explicit, since the informational asymmetry between firms is determined by the realisation of the price.

[21] As observed above, in the SW model of Sec. 2.2.1 a pure equity contract instead of a standard debt contract would allow to obtain the first best solution.

[22] More formally, in models à la BG the outcome that results from the contractual form is implementable, that is, it satisfies the "revelation principle".

limitations of the CSV approach: in this model the optimal contract is not a standard debt contract, but it is a contract contingent upon the realisation of the state, which allows also the determination of equity contracts.

An additional difference between the two approaches concerns the dimension of the effects of asymmetric information. The notion of marginal bankruptcy cost and of agency costs are very similar: both are affected negatively by the borrower's net worth and by the interest rate (the opportunity cost of investing in a project), and positively by the magnitude of informational asymmetries. Moreover, since the effect of informational failures operates through these costs, they have to be fairly large for financial market imperfections to play a relevant role in explaining macroeconomic fluctuations. In this perspective it is important to distinguish between agency and bankruptcy costs that it is possible to quantify *directly* (monitoring costs and administrative costs linked to bankruptcy procedures) and costs that are quantifiable only *indirectly* (loss of reputation, loss of expected future profits, etc.). The empirical evidence shows that the former are of limited importance (in particular, Warner (1977) finds them to be irrelevant in some occasions), while the latter have potentially great relevance, but suffer from obvious problems due to their precise definition and quantification.[23]

The estimation and definition of agency costs has particular relevance in the CSV approach, where these costs are restricted to pure monitoring costs. BG overcome this problem by extending the circumstances in which asymmetric information operates and enlarging the notion of agency costs to *indirect* elements.

The Stiglitz view places the attention on a factor that is able to amplify these effects: the *risk averse behaviour* of both borrowers and lenders. The introduction of risk aversion can significantly increase the real effects of asymmetric information: not only changes in the net worth, but also shocks that affect the *distribution* of net worth among firms, even if they cancel out on average, can have real effects, as changes in expectations (perception of risk) by agents.[24] More generally, with risk aversion all mean preserving spreads affect firms' decisions. On the lending side, it is mainly the risk averse behaviour of banks that during recessions determines the flight-to-quality mentioned above, in form of shifts from risky investment projects to safe assets.

2.2.4 Further developments

In both the approaches presented so far, the cyclical fluctuations of firms' net worth are determined by changes in cash flow, while no attention is paid to changes in asset *prices*. The effects of changes in asset prices were emphasised by Hart and Moore (1994), and subsequently developed by Kiyotaki

[23] See for example Altman (1984), Warner (1977), and White (1989).

[24] Note that in the BG model presented above, changes in the distribution of w have real effects because they modify the mean, while in the Stiglitz view increases in risk in terms of mean preserving spreads have real effects.

and Moore (1997a,b) [henceforth KM]. This approach has generated a strong theoretical consensus for several reasons. Not only it presents a theory of imperfections in financial markets that does not rely completely on informational failures, but it is also able to link the literature reviewed in the previous sections (and in particular the agency cost approach) with the traditional neoclassical literature (and in particular the models based on liquidity constraints).

Hart and Moore (1994) emphasise the role of uncollateralised assets: they underline that the profitability of a project is often linked to the skills of the entrepreneur that has to undertake it (generally human capital). These skills are unalienable and cannot be used as collateral to secure loans; moreover the entrepreneur can withdraw in any moment his human capital from the project by simply quitting. As a result, Hart and Moore show that some investment projects, even if profitable, will not be financed because lenders try to protect themselves against the risk of human capital loss.

The result that there are assets that cannot be collateralised is exploited in Kiyotaki and Moore (1997a), who build on a simple intuition: in several instances, assets (land in their example) are used as factors of production as well as collateral to secure loans.[25] The higher the degree of leverage of a firm (with respect to the amount of its collateral), the stronger are consequently the credit constraints that the firm faces.

In the KM framework, when the economy is hit by a temporary shock that reduces firms' net worth, two effects operate contemporaneously. The first is a *Wealth Effect*: since debt is backed up by the value of the asset, a reduction of net worth reduces the value of collateral and induces firms to reduce investment. This effect is persistent, since a lower investment in period t reduces revenues in period $t+1$, which in turn reduce firms' net worth. The second is a *Price Effect*: the adverse shock reduces the demand of assets by the constrained firms, producing an excess supply in the asset market. In order to induce an increase in the demand of assets by the unconstrained firms, the price of the assets must fall, determining an additional negative impact on net worth of constrained firms. These two effects ensure amplification and persistency in the transmission of shocks.

Another propagation mechanism is explored in Kiyotaki and Moore (1997b): in the economy there are "customised goods" that some entrepreneurs use as a factor of production and that can be used only by them. There is consequently a difference between the value of these customised goods to everybody else (the market value) and the value to the entrepreneur for whom they are produced.

Now suppose that at date t an entrepreneur places an order to a supplier of a customised good to be delivered in $t+1$ (production of customised goods take one period). In period $t+1$ the good sold to the entrepreneur has a value

[25] Ortalo-Magnè (1996) develops a similar analysis with an application to the US agricultural land market.

of $1+\rho$, while its market price is just 1. Between the supplier and the buyer of the customised good there is a bilateral monopoly relationship. Assuming that the supplier has all the bargaining power at $t+1$, and that there is perfect competition among suppliers, it is efficient for the supplier to provide a loan to the buyer at time t in order to beat the competitors, creating in this way a *credit chain* between firms.

A negative shock that hits the economy makes entrepreneurs unable to meet fully the commitment previously taken with the suppliers. The latter have a stock of customised goods unsold that can only be sold in the market at a loss. The existence of credit chains between buyers and sellers deriving from a customised relationship generates an additional channel of transmission of shocks through the financial market. More importantly, this approach suggests a new way of looking at credit linkages: they are not necessarily due to specific loan contracts but can simply arise endogenously in the production process and, more importantly, their failure is not only due to informational problems, but a crucial role is played by the collateral that secures them.

2.2.5 Empirical evidence

In order to represent a valid alternative to real business cycle theory, the literature surveyed so far had to provide not only theoretical models characterised by solid microfoundations, but also evidence in support of the theoretical claims. As a consequence, following the theoretical contributions, several empirical studies have tried to test the relevant implications.

Since financial market imperfections imply a wedge between the costs of internal and external financing, for any given level of interest rate, high profit firms should tend to invest more than low profit firms. Starting from these considerations, one could augment a traditional investment equation to incorporate some indicator of cash flow.[26] Evidence of a positive correlation between investment and cash flows would lead to the rejection of the complete market assumption.

There is a problem, however, in this procedure: by simply regressing investment on cash flow, it is possible to find a significant positive relationship even in absence of imperfections, given that cash flows may be a proxy for profitability: when a firm's liquidity is high, it is likely that the firm is doing well and it should have good investment opportunities, so that the estimated effect of cash flows on investment is uninformative about the role of asymmetric information.

To overcome this problem, Fazzari *et al.* (1988) compare the investment behaviour of different groups of firms. They divide a large panel of manufacturing firms in three classes according to their dividend-income ratio: class 1 represented firms with the lowest D/Y ratio and class 3 the highest. The

[26] Schiantarelli (1997) provides a comprehensive survey of the empirical literature that tests the presence of financial constraints for investment decisions.

basic idea is that a firm that has a high D/Y ratio can finance investment with internal funds, while a firm with a low D/Y ratio must rely on external finance and is more likely to be liquidity constrained.

Fazzari, Hubbard and Petersen use the following basic regression:

$$\frac{I_{it}}{K_{it}} = aQ_{it} + b(\frac{CashFlow}{K})_{it} + u_{it}$$

where I is investment, K is capital and Q is Tobin's q at the beginning of the period.

The attention is therefore shifted to the *differences* between estimated coefficients of different classes. If financial market imperfections are present, the relationship between cash flows and investment should be stronger for firms that have a higher cost of raising funds. The findings of Fazzari *et al.* (1988) are that adding the variable cash flows to the regression improves significantly the goodness of fit of the overall equation. More importantly, the estimates of b are positive and statistically significant. In particular the estimated coefficients are 0.230 for class 3, 0.363 for class 2 and 0.461 for class 1, suggesting the importance of financial market imperfections mainly for low dividend firms.

Hoshi *et al.* (1991) use a variation of the above approach: they focus on a panel data set of Japanese firms that allows them to distinguish between a group of firms that has a close relationship with banks and a group that has weak banking ties. The former group should not be subject to asymmetric information, while the latter should find greater difficulty in raising capital because of informational problems. Their results fully confirm the ones obtained by Fazzari Hubbard and Petersen.

Gertler and Gilchrist (1994) adopt a different approach: they too divide firms on a/priori considerations, but according to their size: their assumption is that small firms are more likely to be credit constrained than large firms, because of fixed costs associated with issuing publicly traded bonds. They compare the behaviour of small and large firms following a tightening of monetary policy, and find that small firms account for an extremely high share of the decline in sales, inventories and short term debt, suggesting a significant role for liquidity constraints.

An extension of the previous work is provided by Bernanke *et al.* (1996), who split the sample using proxies for credit market access other than firms' size. In particular, they divide firms by "bank dependency",[27] and find that bank-dependent firms have a stronger procyclical behaviour of inventories and short term debt than non-dependent firms, suggesting the influence of liquidity constraints for the first group of firms.

[27] They define a bank dependent firm as "one that has no commercial paper outstanding and has at least 50% of its short term liabilities in the form of bank loans".

An approach closely related to estimating Tobin's q investment equations has been to estimate Euler equations for the capital stock.[28] The Euler equation approach has the advantage of not requiring the calculation of the market value of the firm (this can be difficult especially in developing countries, where stock markets are inefficient), which is instead required by any model based on the Q theory. Examples of the Euler equation approach are the works by Bond and Meghir (1994), Bond *et al.* (1997b), Hubbard *et al.* (1995) and Whited (1992) for developed economies, and Harris *et al.* (1994) and Jaramillo *et al.* (1996) for developing countries. All these studies confirm the findings that proxies for the availability of internal funds are a significant determinant of investment, underlining the significant role of financial market imperfections.

A different approach investigates the existence of liquidity constraints that are particularly binding for small and new firms. Evans and Jovanovic (1989) and Holtz-Eakin *et al.* (1994b), Holtz-Eakin *et al.* (1994a) show that the probability of survival of new small firms depends significantly on their initial endowment of assets (calculated as the market value of assets owned by the entrepreneur) suggesting that liquidity constraints affect considerably the probability of survival of new firms.

Ghosal and Loungani (1996) provide empirical support for the claim advanced in Sec. 2.2.1 that an increase in uncertainty exacerbates informational asymmetries and reduces the investment of firms that face credit constraints. These authors use size as a measure of credit market access, but provide an analysis at industry level (instead of firm level). Their results are particularly interesting: the relation between investment and uncertainty is negative for industries constituted predominantly by small firms, while for all other industries the correlation is zero or even positive.[29]

2.3 Financial market imperfections and corporate capital structure

If the role of financial market imperfections in the explanation of macroeconomic fluctuations has been widely discussed in the literature, their effect on the choice of firms' capital structure has given birth to an equally intense debate. It is fair to say that corporate capital structure is one of the most controversial issues in the finance literature. In 1984, Stewart Myers wrote in a well known paper:

> [...] By contrast we know very little about capital structure. We do not know how firms choose the debt, equity or hybrid securities they issue.

[28] Formally the two approaches are perfectly equivalent, as the Euler equation is derived from the first order conditions of a Q model of investment.

[29] There is also evidence that equity issues are followed by a contraction of share prices, and that bankruptcy costs vary markedly over time (see e.g. Frankel and Montgomery (1991)). This evidence supports the theoretical analysis of Sec. 2.2.1.

> We have only recently discovered that capital structure changes convey information to investors. There has been little if any research testing whether the relationship between financial leverage and investors' required return is as the pure MM theory predicts. In general, we have inadequate understanding of corporate financing behaviour, and of how that behaviour affects security returns. (Myers (1984), p.575)

Since 1984, several contributions have explored this issue. Theories have evolved, empirical methods have been refined, but we can say that we still do not have neither a universal theory of debt-equity choice nor a universal agreement on the empirical relevance of different competing theories. While there is not a universal theory of capital structure choice, there are several useful partial theories that, as we will see in the following sections, have some empirical support, although not decisive.

In particular, the *trade-off theory* states that firms choose debt in order to trade off the tax advantages of debt against its costs in terms of financial distress. Since the focus of this book is on the role of financial market imperfections, we will not explore this strand of the literature.[30] Other theories underline the role played by informational failures either within the firm or between the firm and the other actors in financial markets (lenders, equity holders, debt holders, etc.). In the following we will concentrate on those theories mirroring the distinction made in the previous section: therefore in Sec. 2.3.1 we will investigate the implications of *precontractual* informational failures, while in Sec. 2.3.2 we will investigate the implications of *postcontractual* informational failures that typically are sources of agency costs. Finally, in Sec. 2.3.3, we will analyse the empirical evidence in support of the alternative theories.

2.3.1 Asymmetric information and capital structure choice

The literature surveyed in this section is closely related to the "Stiglitz view" in terms of the assumptions and framework used. Also in this case there is an underlying informational problem, and the contributions in this literature focus on the effects of *ex ante* informational asymmetries. In particular, managers are assumed to have more information than the market about firms' profits and the profitability of investment opportunities. As *ex ante* informational asymmetries can generate adverse selection problems that can lead to strong forms of market failure (in the models presented in Sects. 2.2.1 and 2.2.1 the failure of the market is complete and causes the disappearance of the credit or equity market for some firms), the capital structure is therefore designed in order to minimise these costs.

In order to illustrate this point we present a model, due to Myers and Majluf (1984), that has several similarities with the model presented in paragraph 2.2.1. Let us assume that managers have information that investors and

[30] For a survey on these issues, see Bradley *et al.* (1984).

the market do not have. The firm has an existing asset and one investment opportunity that requires an investment I. This investment can be financed using internal finance, issuing stocks or issuing debt. We define *financial slack* (S) the sum of cash and marketable securities. We assume that $0 \leq S < I$, so that part of the investment has to be financed by equity issues E, and $E = I - S$. The time horizon is three periods: $t-1$, t, and $t+1$. At time $t-1$, the management and the market share the same information; at time t the management receives additional information on the value of the firm's asset and on the investment opportunity; this information is transmitted to the market only at time $t+1$. Both the value of the asset A and the return of the investment opportunity B are random variables (we denote them as $\tilde{A}$ and $\tilde{B}$).

At time $t-1$ their value is therefore the expected net present value $\bar{A} = E(\tilde{A})$ and $\bar{B} = E(\tilde{B})$. At time t both the value of the asset and the value of the investment opportunity are realised, and the managers update the information accordingly. We denote the realisation of A and B as a and b. Given the new information received at time t, managers make decisions acting in the interest of the "old" shareholders, i.e. those who own shares at time t. Managers therefore maximise $V_t^{old} = V(a, b, E)$. Clearly, since the market does not know the realisations a and b, the market value of the shares will generally differ from V_t^{old}. However, the market can extract information observing the behaviour of the managers at time t. We denote the market value of the firm at time t if no new shares are issued as P, and the market values if new shares are issued as P'. Finally, slack S is assumed to be fixed and common knowledge.

Summing up, the firm at time t learns the realisations a and b, and decides whether or not to carry out the investment. If it does, it issue shares to finance the investment, the market observes the firm's behaviour and changes the value P accordingly. At time t, if the firm does not issue new shares, it abandons the investment opportunity, and the value to the owners is

$$V^{old} = S + a \tag{2.16}$$

On the other hand, if the firm decides to carry out the investment project, it issues shares $E = I - S$ and the market changes the price of the firm from P to P'. The value of this operation to the owners is

$$V^{old} = \frac{P'}{P' + E}(E + S + a + b) \tag{2.17}$$

where the RHS defines the share of the value of the firm owned by old shareholders *after* the issue of new shares.[31] Using equations (2.16) and (2.17), the firm will issue new shares only if old stockholders will be better off, that is if

$$\frac{E}{P' + E}(S + a) \leq \frac{P'}{P' + E}(E + b) \tag{2.18}$$

[31] The market value of the firm at time t is $P' + E$, that is the updated value of old shares plus the value of new shares.

i.e. when the share of the increase in value of the firm going to old stockholders exceeds the value of the share of the existing asset plus slack going to the new shareholders. Condition (2.18) can also be written as

$$\frac{E}{P'}(S+a) \leq E+b \tag{2.19}$$

Figure 2.1 represents the situation: the line $\frac{E}{P'}(S+a) = E+b$ divides the joint probability distribution of $\tilde{A}$ and $\tilde{B}$ into two regions: if the realisation (a,b) falls in region M', the firm issues new shares and invests; on the other hand, if (a,b) falls into region M, the firm does nothing.

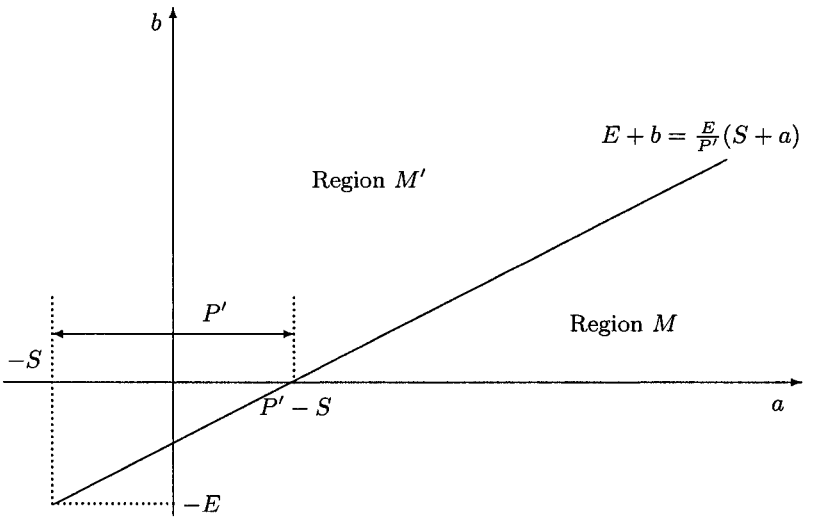

Fig. 2.1. Firm's decision to issue stocks

The higher the value of b, the higher the gain to old stockholders from issuing new shares, while the higher the value of a, the lower the gain to old stockholders from issuing new shares. The reason is that higher a means higher loss to old stockholders deriving from the dilution of ownership. Consider now a positive investment opportunity: if the slack S were sufficient to finance the required investment I, the firm would not have to issue new shares and therefore would not sustain any loss from this decision. The region M would disappear and therefore *any* positive investment opportunity would be undertaken. However, because of issuing shares, the firm sustains a loss in value that *ex ante* is $L = F(M)\bar{B}(M)$, where $F(M)$ is the probability that the outcome (a,b) falls into region M and $\bar{B}(M)$ is the expected value of the investment opportunity conditional on being in region M. This means

that the firm may give up good investment opportunities because of the fact that they have to be financed with new shares. Secondly, consider that conditionally on not issuing new shares the price of the firm is $P = S + \bar{A}(M)$. Now consider the market price of the firm conditional on selling new shares: $P' = S + \bar{A}(M') + \bar{B}(M')$.

It is easy to show that $P > P'$, that is *when the firm does issue shares its market price drops.* The reason is that, from equation (2.19), a firm does not issue shares if $a > P'(1 - \frac{b}{E}) - S$. Since $\frac{b}{E}$ is always positive, the fact that the firm does not issue shares signals that the value of its assets plus slack $(a + S)$ is very high and exceeds P'. Since $P = S + \bar{A}(M)$, it must be the case that $P > P'$. In other words, the decision not to issue new shares is interpreted by the market as good news about the value of the firm (a high), while the decision to issue new shares is interpreted as bad news on the value of the firm (a low), hence the market price drop.

Now suppose that the firm has the option to raise external funds also by issuing debt. Debt in this case is not risk free, otherwise the firm would never give up positive investment opportunities. In order to simplify matters, the choice is either debt or equity. Suppose that the firm issues equity: then its intrinsic value to the old stockholders V^{old} equals the total value of the firm less the value of new shares:

$$V^{old} = a + b + I - E_1 \tag{2.20}$$

where E_1 denotes the market value of new shares at $t+1$. Since the issue price of new shares is $E = I - S$, the equation above can be rewritten as:

$$V^{old} = S + a + b - (E_1 - E) = S + a + b - \Delta E \tag{2.21}$$

This expression shows that V^{old} equals the total value of the firm less the new shareholders' capital gain. Since in case of no investment (and no issue) $V^{old} = S + a$, the firm will issue and invest if

$$S + a \leq S + a + b - \Delta E \qquad \Rightarrow \qquad b \geq \Delta E \tag{2.22}$$

If, instead of using equity, the firm finances investment with debt, the argument is the same as above and the firm invests and issues debt if

$$b \geq \Delta D \tag{2.23}$$

where $\Delta D = D_1 - D$, and D_1 and D play the same role as E_1 and E. From the inequalities above, it follows that an equity issue signals the fact that

$$b - \Delta E > b - \Delta D \qquad \Rightarrow \qquad \Delta E < \Delta D$$

Note that ΔE and ΔD are the gains that are realised by new shareholders or by bondholders at time $t + 1$, when information is revealed. The equilibrium prices at time $t - 1$, P'_E and P'_D, must be such that investors expect $\Delta E =$

$\Delta D = 0$. However, a firm issues stocks only if the price is high enough that $\Delta E < \Delta D$. We know from option pricing theory that ΔD and ΔE have the same sign, but in absolute terms $\Delta D < \Delta E$. Therefore, for ΔE to be less than ΔD, it has to be the case that $\Delta E < 0$, which implies a capital loss for shareholders. It follows that there is no price P'_E at which the firm prefers to issue equity rather than debt.

The results of the simple model presented above can be summarised as follows:

- More profitable firms should borrow less, since they can rely on a greater amount of internal finance.
- Upon announcement of an equity issue, share prices should fall.
- New projects will tend to be financed mainly from internal resources or through the issue of low-risk debt.
- Since debt dominates equity in firms' choices only if it is of low risk, firms with assets that serve as collateral (that reduce debt risk) can be expected to issue more debt than firms with less collateralisable assets.
- Firms where informational asymmetries are higher will be more affected by underinvestment problems and will tend to accumulate more debt over time.

Another implication of the model presented above is what has been called the *pecking order* theory of corporate finance, that generally states that firms prefer internal to external finance and, when they have to resort to external finance, they prefer debt to equity.

In the Myers and Majluf model it is the issue of new shares that conveys new information to the market, resolving part of the informational failure. Other models consider the direct signal provided by the capital structure choice. In Ross (1977), the management has better information than the market since it knows the true distribution of the firm's returns. Managers benefit from an increase in share prices and they are penalised by bankruptcy. Therefore, by choosing a higher debt level, managers signal the firm's higher quality. A crucial implication of this model is that there should be a positive relationship between firms' profitability and the debt/equity ratio.[32]

Leland and Pyle (1977) place more emphasis on managerial risk aversion, mirroring the emphasis placed on this issue by the Stiglitz view (see Sec. 2.2.1). The key insight of this paper is that increasing the amount of debt, the share of firm's equity owned by the management increases. Since equity is risky by definition, this decreases manager's utility due to their risk aversion. Therefore managers can signal their quality by issuing more debt.

One of the drawbacks of this branch of the literature is that, since the emphasis is on the effects of *precontractual* informational asymmetries, there is no explicit treatment of the incentive structure within the firm. In particular,

[32] Poitevin (1989) and John (1987) provide similar models which emphasise the signalling role of debt.

it is always assumed that the interests of the firm's management and its shareholders are perfectly aligned. However, we know that this is not always the case and that informational failures can determine heavy conflicts between the interests of managers and shareholders. The literature surveyed in the next section investigates these aspects.

2.3.2 Agency costs and capital structure choice

As in the models presented in Sec. 2.2.2, a large body of literature has emphasised the effects that informational failures have on the choice of the capital structure through the determination of agency costs. As shown in Sec. 2.2.3, agency costs arise typically because of *ex post* informational asymmetries that generate some sort of conflict of interest. In the models of Sec. 2.2.2, the conflict of interests arises between borrowers and lenders, and is due to the unobservability of some actions undertaken by the borrower. The literature on corporate capital structure has considered a wide range of conflicts internal and external to the firm: the former refer typically to the conflict between managers and shareholders, while the latter to the conflict between equity-holders and bond-holders.

Most of the results of this literature arise from a basic premise: while equity gives a claim on the total return of the firm, debt holders have a claim which, except in the case of bankruptcy, is fixed. Two results follow from this consideration.

The first is the conflict of interests between equity-holders and debt-holders: the former receive all the benefits of any excess of return of implemented investment projects. On the other hand, because of limited liability, when the state of the world turns out to be bad, the latter are the ones who bear most of the consequences of bankruptcy. This result has several implications: in Jensen and Meckling (1976) equity-holders may have an incentive to undertake excessively risky projects at the expense of debt-holders. If debt-holders anticipate this behaviour, however, they will have the equity-holders to pay for this when they issue new debt. Therefore, the conflict between equity-holders and debt-holders generates an agency cost of debt.

Diamond (1989) investigates how the agency cost of debt can be mitigated in a dynamic setting. He shows that allowing the interaction between borrowers and lenders to be repeated over time, it is possible to obtain a reputational equilibrium in which firms will repeatedly choose low risk projects instead of high risk ones, in order to build a reputation and reduce the agency cost of debt. The longer the firm's history in repaying debt, the lower is the borrowing cost. The Diamond's model explains why the cost of capital is firm-specific rather than project-specific.

A similar argument is developed by Hirshleifer and Thakor (1992), who place the emphasis on the manager's personal reputation. In their model, the management is concerned with the reputational effect that derives from successfully implementing a project; on the contrary, failure implies a negative

signal that negatively affects a manager's reputation. Since reputation is a personal feature of the manager, his interests are not aligned with the ones of the shareholders, who do not risk their reputation. Therefore, while the manager maximises the project's probability of success, the shareholders aim at the maximisation of the project's expected return. As a result, the management displays a bias towards safer projects.[33] This "safety bias" reduces in turn the agency cost of debt. Therefore, higher management reputation implies higher safety bias and lower agency costs. The model predicts that, if managers are subject to such reputational effects, the firm's debt-equity ratio will be higher.

The second result that follows from the basic premise stated above is the creation of a conflict of interest also between equity-holders and managers: since the latter do not have the totality of the claim on the firm, they do not capture the entire gain of any value-increasing decision they can make. Therefore, managers may be induced to act in order to increase the resources under their control, instead of maximising the total value of the firm.[34] The use of debt mitigates the conflict of interest between managers and equity-holders in several ways. Holding constant the manager's absolute investment in the firm, the substitution of equity with debt increases the manager's equity share (see Jensen and Meckling (1976)). Therefore, the conflict of interest between manages and equity-holders decreases the higher is the fraction of firm's equity owned by managers.

In Jensen (1986), the management can pursue its private interests by using *free cash flow* (cash flows in excess of that required to fund all projects that have a positive net present value). By issuing debt, the firm commits to its repayment part of future cash flows and therefore reduces the agency cost of free cash flow. The free cash flow theory of capital structure helps to explain some observed facts in financial restructuring, and particularly the documented positive effect on stock market prices of several leverage increasing transactions, like stock repurchases and debt-equity swaps.

Harris and Raviv (1990) emphasise the role of debt as a disciplining device for management and as a carrier of information for investors. In their model, the presence of debt allows investors to liquidate the firm. The use of debt both imposes discipline on managers and conveys information to the investors about the firm's prospects. The model predicts that leverage-increasing operations will raise firm's value and that firms with more tangible assets will have more debt in equilibrium.[35]

Finally, if bankruptcy involves a direct cost to the manager (for example, loss of reputation or loss of the benefits of control), then debt can create

[33] Very similar results are obtained, in a different set up, by the Stiglitz view: for example, in the model of Sec. 2.2.1, it can be shown that the higher the manager's bankruptcy costs, the safer are the chosen projects.

[34] Increasing benefits at their disposal, like the use of private jets, executive cars, etc.

[35] A closely relate model is provided by Stulz (1990).

an incentive to the management to exert more effort and to make less risky investment decisions (see Grossman and Hart (1982)).

2.3.3 Empirical evidence

As underlined in the introduction, the empirical literature so far has not provided compelling evidence of the prevalence of one theory of corporate capital structure over the other. There are several reasons for this. The first is that the different theories yield predictions that are not necessarily mutually exclusive. For example, both the models presented in Sects. 2.3.1 and 2.3.2 predict that firms with assets that can be used as collateral can be expected to issue more debt than firms that have less collateralisable assets. Secondly, many of the variables that the theories identify as determinants of corporate capital structure are difficult to measure: the typical example is the difficulty in measuring the relevance of informational costs.

Nevertheless, econometric studies have found some empirical regularities that confirm several predictions of the theoretical models. Several authors[36] find a negative relationship between profitability-cash flows (the two variables here are considered together since profits play a big role in determining cash flows) and leverage, confirming the predictions of the pecking order theory that firms prefer internal to external finance. There is thus no support for the claim by Jensen (1986) (Sec. 2.3.2) that there should be a positive relationship between leverage and free cash flows, and by Ross (1977) and Leland and Pyle (1977) (Sec. 2.3.1) that the relationship between profitability and leverage should be positive.

Whether due to the emergence of agency costs, or to the presence of asymmetric information, there is ample evidence of a positive relationship between tangible assets and leverage (see for instance Titman and Wessels (1988), Rajan and Zingales (1995) and Banerjee *et al.* (1999)). On the other hand, there seems to be a negative relation between debt and intangible assets. Long and Matiz (1985) find a negative relationship between the level of borrowing and investment rates in R&D, while they find a positive relationship between borrowing and investment in fixed capital.

Both types of models presented in Sects. 2.3.1 and 2.3.2 predict a stock price decrease upon announcements of new equity issues: this prediction finds support in works by Asquith and Mullins (1986) and Masulis and Korvar (1986), among others. More precisely, on the basis of the pecking order theory, we should observe larger price drops in cases where managers' informational advantage is larger. Dierkens (1991) uses different proxies to test for informational asymmetries and finds support for this prediction. Moreover, D'Mello and Ferris (2000) find that the price drop following a new emission is greater for firms with greater dispersion in earnings forecast by analysts.

[36] See Titman and Wessels (1988), Rajan and Zingales (1995), Friend and Lang (1988) among others.

The empirical evidence presented so far does not provide a direct test of a particular theory. It rather presents some evidence that supports some predictions of different theories. In a well known paper, Shyam-Sunder and Myers (1999) test directly the time series predictions of the pecking order theory as opposed to the trade-off theory. Their results suggest that the pecking order theory is a better explanation of the financing behaviour of the firms in their sample. However, these results may suffer from a sample selection bias, as Shyam-Sunder and Myers (1999) consider only mature firms and not growth companies which invest heavily in intangible assets.

A different approach is followed by Graham and Harvey (2001), who conduct a comprehensive survey of 392 CFO in order to describe the current practice of corporate finance. Although survey studies do not have the statistical power of cross sectional or panel exercises, they allow to analyse more deeply the issues at stake. The results of Graham and Harvey are quite surprising, in that they find that executives rely heavily on practical, informal rules when choosing financial structure: debt policy is strongly affected by credit rating and by financial flexibility, while equity policy is affected by earning per share dilution and recent stock prices appreciations. Some of these factors, like the fact that firms have preference over financial flexibility, and that they tend to issue equity when stock prices appreciates, are consistent with the pecking order theory. However, Graham and Harvey find little evidence that what drives managers' choices are concerns about asymmetric information, agency costs and asset substitution.

3

The transformation of the Hungarian financial system

3.1 Introduction

The accession to the European Union (EU) of eight Eastern European countries[1] on May 1st 2004 constitutes a major milestone after the fall of the Berlin Wall. Several commentators observed that this date marked the end of transition for these economies and the beginning of convergence to EU standards. Between 1995 and 2004 average annual growth rates in the region have been around 4.3%, against 2.2% for the EU (15 countries), providing an indication of economic convergence. The integration of Eastern European countries with the EU will be completed with their accession to the Euro zone. Estonia, Lithuania and Slovenia started the procedures for Euro membership on June 1st 2004, the remaining countries (Hungary among them) delayed entry as they needed more time to improve government accounts.

Hungary represents one of the most successful Eastern European transition economies. The fact that it enjoyed partial economic liberalisation under the planned system gave the Hungarian economy an edge at the beginning of transition, allowing it to face a lower initial cost of economic reforms compared to other formerly centrally planned economies. The choices made in terms of strategy and sequencing of reforms also proved to be successful. In contrast to the Czech Republic and Poland, that opted for the so called shock therapy, Hungary choose a gradual approach to economic reform. The results have been extremely positive: since 1993 GDP has risen steadily, unemployment has fallen continuously, labour productivity has grown more than in other Eastern European economies, and international competitiveness has improved.

This chapter reviews the key aspects of the Hungarian transition process in order to provide the institutional and macroeconomic background for the empirical microeconomic analysis conducted in the subsequent chapters.

[1] Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovak Republic and Slovenia.

3.2 Macroeconomic background

Looking at a wide range of macroeconomic indicators, such as output growth, unemployment, credit to the private sector, almost all transitional economies display a remarkably similar pattern. These economies implemented in the same period a similar set of reforms starting from almost identical conditions. However, as it will be shown, there are striking differences in terms of the outcome of the transformation process. In general, considering the last 15 years, we can divide the transition process into three main phases.

Phase 1 is the shock period. It coincides with the first 2-3 years of transition, during which the dominating factor is the transition shock: prices and trade are liberalised and the economy starts to behave like a market economy, being freed by the constraints of the planned system. This is the phase where inefficiencies arise and the costs of transition become evident: inflation rises, output collapses, the credit system crunches, inefficient firms shut down and unemployment increases. Phase 2 covers the implementation of the reforms. After the initial painful phase reforms become effective: firms are privatised, the banking system is recapitalised and reformed, institutional reforms are implemented. Phase 3 is the post-reform period. The performance of the economy during this period is an indicator of whether reforms implemented were effective or not. In the majority of the cases reforms were indeed effective to the point that several Eastern European countries started the procedures for EU accession that led to the enlargement on May 1st 2004.

Output growth

Since the beginning of reforms, the evolution of GDP in transition economies followed a similar U–shaped pattern: after an initial severe contraction that lasted two to four years, GDP stabilised and then started to grow, as illustrated in Fig. 3.1, displaying real GDP dynamics against the number of years since the beginning of reforms.[2] The figure shows that, compared with the Czech Republic, Poland, and the Slovak Republic, the initial output contraction in Hungary was more gradual. However, it also lasted longer than in the other countries. For instance, in the Czech Republic the growth rate turned positive already after two years since the start of transition; in Hungary, instead, it took four years to achieve positive GDP growth.

The initial output contraction was a necessary phase in the transition process: during the communist period output growth was due almost exclusively to massive accumulation of fixed capital while almost no contribution was given by TFP growth. After a positive period during the fifties and the sixties, the diminishing returns on accumulated capital became more and more

[2] Year 0 is defined as the year before the start of reforms, with real GDP normalised to 100. The figure assumes that reforms started in 1990 for Poland and Hungary, and in 1991 for the other countries.

relevant, and by the mid–eighties planned economies were plagued by severe production inefficiencies. Nevertheless the presence of CMEA (Council for Mutual Economic Assistance) trade provided a demand sufficient to sustain production. With the beginning of transition, price and trade liberalisation exposed these inefficiencies, causing a strong depreciation of the existing capital stock and resulting in a fall in output. On the supply side, the restructuring process that state owned enterprises had to undertake implied a sharp contraction in investment rates. Valentinyi (1996) shows that a great part of the Hungarian output fall is explained by a fall in both investment in fixed capital and inventory. On the demand side, the collapse of CMEA trade sensibly reduced foreign demand for domestic products. The fall in real wages (see below) and the high level of uncertainty associated with the outcome of reforms led to a sharp drop in consumption.

With respect to other transitional economies, Hungary started from a privileged position, since its economy had been progressively liberalised already in the early eighties: the share of CMEA trade was one of the lowest in the region and this contributed to reduce the impact of the CMEA collapse on output. Several authors (see among others Calvo and Coricelli (1992b)) stressed that a key determinant of the output contraction was a credit crunch that characterised transitional economies during the early stages of transition. In fact a credit crunch is a natural phenomenon in economies where weak and inefficient financial and banking systems face an uncertain and rapidly transforming economic environment. Hungary experienced a credit crunch in the early 1990s but this appeared to be a consequence of the output fall, rather than one of its causes. As it will be shown in the subsequent chapters, credit factors seem to have played a relevant role only since 1993, following the introduction of the bankruptcy law, and later in constraining the access to external sources of finance for new firms.

In transitional economies the period of reforms sets the stage for achieving sustainable growth in the subsequent years. First, different privatisation strategies lead to different speed of restructuring and firms' performances. In general, privatisation strategies that relied primary on direct sales to foreign investors resulted in deeper restructuring and stronger improvement in performance than other restructuring strategies. Second, credit and banking sector reforms play a crucial role in channeling funds to profitable investment opportunities. In fact, more competitive banking markets have a positive contribution on economic growth. Third, the success of reforms depends crucially on the timing and extent to which hard budget constraints are imposed. In countries where hard budget constraints were imposed earlier and more effectively, agents and firms perceived immediately a correct set of incentives with positive effects on the economy as a whole.

As we will see in the next paragraphs, the reform path chosen by the Hungarian authorities was very effective in all the aspects discussed above, and this explains the positive output performance described in Fig. 3.1. Moreover, the strong GDP growth recorded by the Hungarian economy since the

mid–nineties was explained by two additional factors: a dynamic export sector fueled by strong FDI inflows, and a strong internal demand caused by a surge in public sector wages and government spending. Recently, however, the slowdown of the international economy (mainly the EU) and the restrictive fiscal policies implemented by the government (see below) have dampened these effects, determining a reduction in the growth rate.

Despite the slowdown in recent years, growth in Eastern European countries has been higher than in the EU. It is interesting to assess whether Eastern Europe is catching up with the EU and, if so, at what speed. Figure 3.3 shows the evolution of GDP per capita for selected Eastern European countries.[3] Transitional economies are indeed catching up with the EU average. It is also interesting to observe that Hungary is the only country that did not display any fall in relative GDP per capita with respect to EU countries in the last decade. The speed of convergence is, however, relatively low; even continuing at the growth rate displayed in the recent years it will take more than 20 years for Eastern European countries to catch up with the group of EU–15 countries.

Labour market performance

The U–shaped pattern of output that characterised the early years of transition has been matched by a bell shaped pattern of unemployment. In Hungary unemployment peaked in 1993 at 11.9%, subsequently decreasing to reach 5.9% in 2003 (see Fig. 3.2). Compared with the other transitional economies, the performance of the Hungarian labour market appears to be relatively positive. In the Czech Republic the rate of unemployment rose from 2.6% in 1992 to 8.8% in 2000, falling thereafter to 7.8% in 2003. Poland experienced a reduction in the unemployment rate from 16.4% in 1993 to 8.6% in 1997, but unemployment rose steadily in the following years to reach 19.2% in 2003. In the Slovak Republic the unemployment rate has been high throughout the nineties, reaching almost 20% in 2001.

The positive unemployment rate performance hides an important weakness of Hungarian labour market: the reduction of unemployment seems to have been largely determined by the contraction in labour participation, rather than an actual rise in employment. Labour force participation and employment rates have been decreasing throughout the nineties, and even if there has been a slight rise in the recent years, these indicators remain well below those of EU–15 countries. The Hungarian employment rate was 57% in 2003, against an average of 64% for the EU–15. There are various causes for the low participation rate: the tax rate on labour income is one of the highest in Eastern Europe, creating an incentive to work in the black economy; the early

[3] GDP figures are expressed in purchasing power parity terms, EU–15 values are set to 100.

retirement schemes were quite generous, though they have been tightened recently.[4] Finally, scarce diffusion of part time jobs discouraged female labour participation.

The consequences of the low employment rate are twofold: on the one hand, it puts at risk the the financial sustainability of the pension system, which is now in the process of being reformed, moving from a pay as you go to a fully funded system; on the other hand, it leads to overestimate labour productivity figures when calculated in terms of the number of employed.

Finally, the slow employment growth has been associated with a fast rise in nominal and real wages. Between 2001 and 2003 public sector wages rose by up to 50% (OECD, 2004), benefitting from a major political business cycle that led the Hungarian authorities to increase strongly public spending in the upcoming of the 2002 elections. However, wages lagged productivity throughout the nineties, resulting in decreasing real unit labour costs and improving international competitiveness.

Inflation

As stressed above, in contrast to other Eastern European countries, Hungary started to implement economic reforms early in the eighties. Price liberalisation was one of the first reforms to be implemented and, as a result, at the end of the eighties more that 80% of prices were fully or partially liberalised. This is why the price shock that characterised the beginning of transition resulted in moderate inflation, at a rate of 35% in 1991 against the hyperinflation of the initial months of transition for Poland and the Czech Republic. Apart from 1995, inflation fell steadily throughout the nineties, from 35% in 1991 to 4.7% in 2003.

It must be observed that, while the Czech Republic, Poland and the Slovak Republic all experienced a higher inflationary burst following price liberalisation, they succeeded in disinflating more quickly than Hungary. The cause probably lies in the exchange rate regime, with the above mentioned countries adopting a fixed exchange rate, and Hungary adopting a more flexible regime (crawling peg). As pointed out by Valentinyi (1996) and Vincze (1998) this was due to the different objectives of the Hungarian monetary authorities, who were more concerned with the external constraint than in other countries in the region (i.e. stabilising the real exchange rate). Differently from Poland and the Czech Republic, Hungary did not adopt an exchange rate based stabilisation programme, following instead a money based one. The monetary contraction recorded in the early nineties (as illustrated by the sharp drop in M3 shown in Fig. 3.5) was not successful in reducing inflation. This reflects a rather contradictory approach by the Hungarian monetary authorities in that period. Trying to strike a balance between the internal and the external constraint, a fixed but adjustable exchange rate regime was adopted, in the hope

[4] The employment rate of older workers – age between 55 and 64 – was 28% against a EU average of over 40%.

that such a regime could reconcile some degree of monetary independence with an exchange rate nominal anchor. However, the results of the experiment were highly unsatisfactory. The exchange rate regime was ill-conceived, as the timing (and the extent) of devaluations was infrequent and not regular. In this way the exchange rate regime did not provide a useful nominal anchor for inflation expectations. Moreover, the inability of the government to stabilise public spending fuelled inflation, leading to the 1994 inflation rise. This approach did not help to meet the external constraint either; as shown in Fig. 3.6, the real exchange rate appreciated sharply until 1994.

The stabilisation program adopted in 1995 marked a clear change in Hungarian economic policy. The program included a drastic revision in the exchange rate regime: a crawling peg regime was adopted, where both the timing and the size of devaluations were pre-announced; this provided a clear nominal anchor for inflation expectations. The effects on the inflation rate were significant from the beginning (see Fig. 3.5). It must be stressed that the stabilisation program did not entail a dramatic change in the target of monetary policy. Hungary continued to favour the exchange rate target over the monetary target; however, implementing monetary policy in a framework where targets were explicit and rules transparent, allowed the achievement of both a lower inflation rate and the stabilisation of the real exchange rate. The disinflation was successful also because it was accompanied by a drastic change in the fiscal stance. The tight fiscal policy adopted since 1995 reduced the incentive to deficit monetisation, contributing to improve inflationary expectations.

In June 2001 the National Bank of Hungary (NBH) adopted an inflation targeting framework; simultaneously the exchange rate band was widened from $\pm 2.25\%$ to $\pm 15\%$ around the central parity against the Euro. With this move the Hungarian monetary authority clearly abandoned the exchange rate targeting that had been followed since 1995. The loss of the nominal anchor provided by the exchange rate was compensated by the inflation targeting scheme. Such a monetary framework is today successfully adopted not only by industrialised economies, but also by emerging economies such as Chile and Mexico.

The literature on inflation targeting (see Mishkin and Schmidt-Hebbel (2001) and Jonas and Mishkin (2003)) identifies several channels through which inflation targeting may be a successful disinflationary strategy. First, by making the monetary authority accountable on a specific target, it helps monetary policy to focus more clearly on inflation. Second, by providing a set of rules to which the monetary authority has to comply, it provides a commitment device that can improve the central bank's credibility. Moreover, in this framework the monetary authority needs to undertake a strong effort in being more transparent and this constitutes an additional step towards greater credibility. Third, inflation targeting makes inflation expectations more forward looking, reducing the inflationary inertia, which is a typical feature of "moderate" inflations like the one experienced in Hungary in the recent years.

The initial results of this monetary policy scheme were favourable, with a reduction of the inflation rate from over 9% in 2001 to an average of 5% in 2002 and 2003.

Public finances

The OECD places Hungary among high-tax and high-spending countries. In 2002, Hungary ranked fifth among OECD countries (behind Sweden, Norway, France and Austria) in terms of expenditure to GDP ratio. Table 3.1 reports figures on general government balance, debt and expenditures. Government expenditure rose during the beginning of transition, reflecting the social costs of the initial output collapse. The output drop and the costs of economic reforms had an impact on both the deficit and the public sector debt, which rose progressively.

The tighter fiscal stance taken by the government, following the implementation of the 1995 stabilisation package, improved fiscal conditions: both deficit and public debt have been progressively decreasing. However, the 2002 elections brought about a high level of electoral spending. A large fraction of this spending was due to wage increases for public sector employees; the majority of these workers received a wage raise of 50%, and considering that the public sector accounts for approximately 20% of total employment, the impact on the budget was significant (OECD, 2004). Other electoral spending measures were large increases in social security benefits and fixed capital formation. As a result, in 2002 the deficit to GDP ratio rose to above 9% and the debt to GDP ratio rose from 53.5 to 57.1 between 2001 and 2002. EU membership imposed a fiscal consolidation that started to be implemented in 2003 and is currently under way. It is important to remember that EU membership also implies participation to the Stability and Growth Pact; in fact, immediately after joining the EU, Hungary was subject to an excessive deficit procedure (together with other new members such as the Czech Republic, Poland, the Slovak Republic, Cyprus and Malta).

If Hungary wants to meet Euro membership criteria in a sustainable way, it has to start immediately a process of budget consolidation. This process has to be implemented through both the revenues and expenditures. On the revenue side, the tax base has to be broadened and tax rates lowered in order to reduce the incentives for tax evasion. The reduction of the size of the grey economy is crucially linked to a lowering of the tax rate on labour income, which is one of the highest in Eastern Europe. On the expenditure side, the 2004 budget entails cuts in public sector employment, following high wage increases during 2002 and 2003. In addition, social transfer programmes, though not extremely generous, have a wide coverage and coupled with the low employment rate, undermine the sustainability of the social security system.

Trade, external balance and capital flows

Data on exports and imports, displayed in Fig. 3.7, indicate an increasing integration of Hungary in the world economy. Imports and exports grew from slightly more than 30% of GDP in 1992 to about 80% in 2001. Following the general European slowdown and the appreciation of the Forint, trade relative to GDP contracted during 2001 and 2002

With respect to the geographical distribution, Hungary (as almost every transitional economy) witnessed a significant reorientation of trade from countries that belonged to the former Soviet block to Western European countries. Exports of the manufacturing industry from Hungary to the EU rose by about 200% between 1995 and 2000. In 2000, EU countries absorbed 77% of Hungarian exports and were the origin of 60% of its import (see Fig. 3.9). Germany was Hungary's most significant partner, with a trade share close to 30% (Fig. 3.10). The next main trading partner of Hungary is the group of CEFTA Member States,[5] with a market share of approximately 8% in 2000. Trade with former Soviet republics, that were major commercial partners before the fall of the Berlin wall, now accounts for only 1.6% of exports and 8% of imports (mainly energy sources, such as oil and natural gas).

The positive trade performance of Hungary had its roots in increased international competitiveness. As stressed above, real unit labour costs fell in the second half of the nineties. This was associated to an increase in the labour cost advantage relative to regional competitors like Poland and the Czech Republic. In fact, Oblath and Richter (2002) show that, in 1999-2000, the unit labour cost in Hungary was one of the lowest among Eastern European countries. In the region, only Romania and Bulgaria had lower labour costs.

Table 3.1 and Fig. 3.8 report figures on the current account, foreign direct investment and foreign debt. Between 1990 and 1992 the improvement of the current account and the increase in the flow of foreign direct investment (FDI) allowed a decrease in Hungary's foreign debt. Between 1993 and 1994, however, the current account worsened and turned negative, FDI flows (and capital inflows in general) dropped, and foreign debt rose significantly (from 58.1% of GDP in 1992 to 68.7% in 1994). This led to the implementation of the stabilisation package in 1995. This package, with the devaluation of the currency (9%) and the tight fiscal measures adopted, had positive effects on the current account, that improved from -9.4% of GDP in 1994 to -5.6% in 1995, reaching -2.9% in 1996. Similarly, foreign debt dropped between 1994 and 1995 stabilising between 50% and 60% of GDP. The stabilisation package was also very effective in modifying the composition of net foreign liabilities: the share of debt fell significantly in the second half of the nineties, while the share of equity rose. However the large budget deficit in 1997 and 1998 pushed again the current account deficit to high levels at the end of the nineties.

[5] The Central European Free Trade Agreement comprises Hungary, Poland, Czech Republic, Slovenia, Slovak Republic, Romania, and Bulgaria.

The large current account deficits experienced by the Hungarian economy since the beginning of transition raises the question of their sustainability. Over this matter two competing interpretations have been advanced by the literature (see Roubini and Wachtel (1998)).

On the one hand, there is the view that considers current account deficits as the necessary outcome of the deep structural change undertaken by transitional economies that attracted massive capital inflows, mainly in terms of FDI, on the basis of expectations of future rapid economic growth. According to this view, current account deficits do not convey a negative signal; they are rather the sign that the transition process is managed correctly and is delivering positive outcomes. On the other hand, there is the view that current account imbalances reflect failures and mismanagement during the transition process. According to this view, large current account deficit are a signal of the possible occurrence of balance of payments crises.

The sustainability of current account imbalances is a complex issue that requires to consider and evaluate different economic indicators.[6] In the case of Hungary, there are several indicators that suggest a positive interpretation of the large current account deficits accumulated during the nineties: first, Table 3.1 shows that, after peaking in 1995, the external debt to GDP ratio has been falling steadily. This is a general indicator that measures only the presence of a stock problem. Attempting to interpret sustainability also in terms of flows, Fig. 3.11 shows the ratio of foreign debt to exports and the ratio of interest payments to exports; the first indicator assesses the ability to pay the existing stock of debt with the flow of foreign exchange that is generated by exports; the second indicator measures the ability to cover interest payments with the flows of foreign exchange generated by exports. The two indicators are decreasing, suggesting improvement in both stocks and flows. Moreover, the interpretation of a current account deficit could be different depending on whether this is due to high investment or to low savings. In the former case the return from the investment can be used to repay the deficit, whereas in the latter case the debt is used to finance consumption, which raises the question of sustainability. In this perspective the fall in saving rates experienced by Eastern European economies during the first years of transition raised some concerns; however, as Table 3.1 shows, in Hungary the decrease in savings was a temporary phenomenon associated with the beginning of reforms; in fact, already in 1995 saving rates were higher than their pre-transition levels. The figures in Table 3.1 refer to private savings and need to be integrated with government data in order to provide a complete picture. In fact a budget deficit erodes private savings, contributing to the formation of a current account deficit; the high budget deficits experienced since the mid-nineties gave an

[6] see Milesi Ferretti and Razin (1996) and Milesi-Ferretti and Razin (1998) for theoretical foundations; see also Roubini and Wachtel (1998) for an application to transitional economies.

important contribution to the current account deficit and are a major cause of concern for both Hungarian authorities and foreign investors.

Another interesting insight is provided by looking at how the current account deficit is financed. A country that is financing external imbalances mainly through equity or portfolio inflows is subject to a high degree of vulnerability as capital flows may draw to a sudden stop and experience a quick reversal in the presence of turbulence in financial markets. On the other hand, FDI inflows, having a long term perspective, are more stable, and less subject to sudden stops or reversals. Hungary, as several Eastern European countries, attracted considerable amounts of FDI inflows since the beginning of transition. Over the period 1989-2003, FDI inflows amounted to $33,641 million making Hungary the third largest FDI recipient in Eastern Europe (after Poland and the Czech Republic); however, this figure for the population size Hungary is in second place just below the Czech Republic with $3,400 per capita. Figure 3.8 shows the behaviour of FDI inflows; they peaked in 1995, and fell since then, stabilising at around 3% of GDP. The decrease in FDI figures observed in the second half of the nineties is due to two main factors: on the one hand, Hungarian direct investment abroad rose significantly, reducing the net inflow; on the other hand, with EU accession the Hungarian authorities had to remove tax incentives on FDI firms because not fully compatible with EU regulations.

3.3 Liberalisation, privatisation and financial development

The transition process is a complex combination of socio-political and economic reforms. Large-scale privatisation began in 1990, followed one year later by small-scale privatisation. The process progressed rather slowly until 1992;[7] it then proceeded faster in the second half of the nineties, in particular after the new privatisation law adopted in 1995.

Privatisation determined a dramatic change in the composition of GDP. The private sector share of GDP rose from 30% in 1991 to over 80% in 2000. Cumulative privatisation revenues rose from 0.1% of GDP in 1991 to 15% in 2000. Most of the revenues generated in that period came from foreign investors, through FDI flows.

The Hungarian authorities adopted different privatisation methods: large and medium-sized firms were directly sold to strategic investors. This choice may reflect the importance attached by the authorities to the generation of

[7] Bonin and Wachtel (2000) argue that until legislation to govern privatisation was enacted in 1995, there were serious concerns about the true commitment of Hungarian authorities towards privatisation. As a matter of fact, the peak in privatisations occurred between 1995 and 1996, as the data on cumulative revenues also show.

revenues as well as the attempt to provide firms with better corporate governance and better access to capital and skills (a similar approach was adopted in Estonia, Poland and the Slovak Republic). Small firms were privatised through management-employee buy out, though other methods (i.e. transfers to municipalities or social insurance organisations, debt-equity swaps, sales through insolvency proceedings) were also applied.

Privatisation is an important step in the transition process but in order to be successful it has to be accompanied by several other measures: firms need to restructure to cope with increasing competition, budget constraints have to be hardened, financial and credit markets have to be reformed in order to provide firms' with the necessary instruments to implement their investment strategies.

The banking sector reform proceeded with the sale of control stakes in state-owned banks to strategic foreign investors. As a preliminary step, the recapitalisation of domestic banks was undertaken by the government, with the risk of exacerbating moral hazard problems. However, this strategy allowed the birth of independent banks, autonomous from the state and from the pressures of bad clients. The relevant role of foreign equity in the banking sector contributed to increasing competition and facilitated the introduction of new technologies. The development of the equity market has been significantly more limited than that of the banking sector. The stock exchange and the basic regulatory framework for securities trading were established in 1990, but market capitalisation remained very low throughout the nineties.

The development of the bond market remained essentially limited to government bonds. In the early years of privatisation, the market was largely composed of short-term bonds. Only in 1996 two- and three-year fixed rate bonds were introduced, whilst five year and ten year bonds appeared in 1997 and in 2000, respectively.

The privatisation process and the reform of the corporate sector cannot be separated from the development of an efficient financial and banking sector. However, weak corporate governance, lack of legislation to enforce hard budget constraints and to promote market competition among privately owned firms can seriously jeopardise banks' profitability.

3.3.1 Banking and credit

Figures 3.12 and 3.13 show two basic measures of financial development: the ratio of domestic credit to the private sector relative to GDP and the ratio of credit provided by the banking sector to GDP.

The two indices display a different pattern: the ratio of domestic credit to the private sector relative to GDP has a U-shaped behaviour, with a sharp and prolonged drop until the end of the nineties, and a steady increase in the following years. The ratio of credit provided by the banking sector to GDP fell progressively until 1997 and then stabilised; the fall in this index can be

explained both by the credit crunch in the first years of transition and by the fact that Hungary received large FDI flows.

The severe credit crunch in the initial phase of transition, shared by many other Eastern European economies, has been analysed by several authors,[8] and can be explained by several factors, such as the uncertainty associated with the initial years of transition and the lack of expertise and skill in the banking sector. Moreover, as it will be argued in Sec. 3.4, the credit crunch was also strictly related to the type of reforms implemented in the financial sector and to the bankruptcy law.

The financial liberalisation that accompanied transition involved both the privatisation of existing banks and the entry of new banks. In some countries (namely the Baltic states and Russia) the increase in the number of registered banks was very high and, more importantly, liberalisation in the banking sector was not accompanied by an appropriate reform of the institutional system that could guarantee efficient regulation and adequate supervision. This often determined unscrupulous behaviour and speculation that caused the failure of several banks, undermining private sector confidence.

In Hungary the increase in the number of banks was more gradual. Moreover, a large foreign penetration characterised the Hungarian banking system: already in 1995 over one half of Hungarian banks were foreign-owned, and this proportion reached 80% in 2000 (EBRD, 2004). While foreign penetration in the banking sector is a feature that characterised the transition of several Eastern European countries, the peculiar aspect of Hungary is that foreign bank entry occurred earlier and to a larger extent.

Several reasons explain why the presence of foreign banks could be beneficial for the development of the banking sector as a whole. On theoretical grounds, foreign owners increase capital adequacy ratios, reinforce competition and facilitate the introduction of new technologies. This in turn results in better banking services and lower interest rate spreads. In fact, as shown in Fig. 3.14, the spread between deposit and lending rates fell constantly throughout the nineties, from above 11% in 1992 to less than 3% in 2003. On empirical grounds, Fries and Taci (2002) show that among advanced transition economies the asset share of foreign-owned banks is positively related to real growth in bank loans to private sector customers. Obviously a country can attract foreign capital in the banking and financial sector if it implements a set of institutional and regulatory reforms that provide a stable and sound economic environment. In the case of Hungary, the new banking legislation adopted at the end of 1992, the bankruptcy law implemented in 1992-1993, and banks' recapitalisation in 1993-94 proved to be the major factors that attracted foreign direct investment in the banking sector.

[8] See, among others, Calvo and Coricelli (1993) and Calvo and Frenkel (1991).

As noted by Móré and Nagy (2004), the Hungarian banking sector is now highly competitive in most respects,[9] and is fair to say that a great contribution has been provided by foreign banks' competition. Table 3.2 displays a set of indicators for foreign and domestic banks for some advanced transitional economies. The figures indicate that, differently from the Czech and Slovak republics, in Hungary it did not operate a two tier banking system characterised by efficient and profitable foreign-owned banks and inefficient loss-making domestic banks. Instead, foreign competition increased the efficiency and profitability of the domestic banking system to the point that between 1998 and 2002 domestic banks often resulted on average more profitable that foreign owned banks.

Another important indicator of banking development is the behaviour of the share of bad loans to total loans. Generally, the beginning of the transition process was characterised by a large amount of non-performing loans inherited from the mono-bank system. Table 3.3 shows that, compared to other transitional economies, the share of non performing loans in Hungary fell faster and earlier, providing evidence of an increasing efficiency in the banking system

Bank credit to the private sector relative to GDP remains well below the EU average despite the increase since 1997. In Hungary this index was 29% in 2001 (against an average of 22.9% for Eastern Europe) compared with an average of over 95% for the EU. These figures are relatively low even if compared to countries with similar levels of GDP per capita. Moreover, profitability is also low: when compared with EU countries, banks' return on equity adjusted for inflation is lower than the EU average and this is a feature shared by most Eastern European countries.

In spite of these figures, there are several considerations that suggest an increase in both banks' profitability and the ratio of bank credit to the private sector over GDP in the next future. Generally Eastern European banks are less profitable than EU banks because they lend less and invest a relatively large amount of resources in liquid assets like deposits abroad. This was a natural thing to do during the first years of transition, when credit risk was particularly high. In fact, risk conditions critically reflect regulations and practices affecting creditors rights. The inadequacy of these institutional practices (including the inefficient working of courts involved in legal decision regarding the recovery of credit) is certainly among the key factors preventing credit growth. Moreover, the low levels of real estate prices registered during the initial years reduced the value of collateral that could be used to attract bank financing. Central and Eastern European countries made considerable progress in these areas and Hungary was one of the leading countries, with the reform of the banking sector and the bankruptcy law implemented between 1992 and 1994. It can therefore be expected that Hungary will experience a

[9] Mainly in the loan and deposit markets, although not very competitive in the consumer credit market.

sustained surge in bank credit to the private sector that will fuel domestic investment.

To the extent that credit growth is associated with a worsening in the quality of bank portfolios, several observers have expressed concerns that high credit growth in Eastern European countries could undermine the stability of the banking system.

A growing literature has documented that episodes of financial distress are likely to follow periods of strong credit expansion. Goldfajn and Valdés (1997), Kaminsky and Reinhart (1999) and Drees and Pazarbaşioğlu (1998) show that strong credit growth is typically observed before most banking crises. Moreover, Demirgüç-Kunt and Detragiache (1997) find evidence supporting the hypothesis that lending booms may lead to banking crises. Similarly, Hardy and Pazarbaşioğlu (1998) present robust evidence that credit to the private sector follows a boom-and-bust cycle preceding banking crises. Finally, Gourinchas *et al.* (1999) examine a large number of episodes characterised as lending booms and find that the probability of having a banking crisis rises significantly after such episodes, although it remains below 20 per cent, indicating that while banking crises may be preceded by lending booms, most lending booms are not followed by banking crises. Applying the methodology adopted by Gourinchas *et al.* (1999), Cottarelli *et al.* (2003) try to evaluate whether bank credit to the private sector in in Eastern European countries has been excessive, thus increasing systemic bank risk. Their results do not reveal a worrying signals, although the short time span for which the data are available calls for caution in the interpretation of the results.

3.3.2 Equity market

Equity markets in transition economies are typically relatively underdeveloped, when compared with their western European counterparts. This is a typical feature of developing countries which generally have bank-based financial systems,[10] with capital markets playing only a secondary role. Several reasons explain the underdevelopment of the equity market during the initial phases of transition. First, the initial years of transition have been characterised by an uncertain and risky economic environment that induced the majority of investors to allocate their savings to banks. Second, most of the newly privatised or newly established firms were (and still are) small, without indicators of past performance, and therefore not priceable in competitive terms by official markets. Finally, stock market development has been hampered by the lack of professional skills (traders, regulators, fund managers, etc.).

Figure 3.15 shows that market capitalisation as a share of GDP rose significantly between 1991 and 1999, but started to fall rapidly in 2000-2002, following the general downward trend in worldwide equity markets. Compared

[10] See Berglof and Bolton (2001).

with other transition economies, Hungary has one of the highest rates of market capitalisation to GDP, even though Hungarian authorities did not choose mass privatisation as their primary strategy. In fact, privatisation through direct sales to strategic investors implied that the stock market was initially developed through a small number of Initial Public Offerings (IPOs). The number of listed companies rose from 21 in 1991 to 65 in 2000.[11]

The equity market displays a high level of foreign penetration, with foreign investors representing more than 50% of total capitalisation. The prevalence of foreign investors determined a high volatility of stock market indices during the phases of financial turmoil that characterised emerging markets during the end of the nineties, and in particular the Russian and the Czech crises.

3.3.3 Foreign direct investment

As observed in the previous paragraphs, FDI was a crucial component of Hungary's transition and development. Figure 3.8 displays FDI inflows as a percentage of GDP and as a percentage of gross capital formation. A comparison with other transition economies reveals that the country has been indeed a favoured place for foreign investments.

In general, it is recognised that capital flows from abroad are of key importance for development of transition economies, as they represent a primary source of financing for the corporate sector in an environment where local financial institutions are still weak. Moreover, the productivity gains and technological innovations introduced in foreign-owned firms are generally the source of positive externalities for their industry and the economy as a whole.[12] It is important to consider the factors that contribute to making a country attractive for foreign investment.[13] In the case of Hungary, three factors played a major role: the success of structural reforms, the timing and strategy of the privatisation process, and the incentives created by the government to FDI inflows.

The fact that Hungary's initial conditions were more favourable than in other competing countries can explain the sizeable inflows that this country experienced in the early years of transition. Moreover, the strong commitment to economic reforms and the appropriate transition strategy gave persistence to initial inflows (Sgard, 2001).

In Hungary the primary method of privatisation was direct sales of equity to strategic investors, mostly foreigners. As a consequence, privatisation revenues heavily contributed to FDI inflows since 1992. In other countries, as in Poland and the Czech Republic, sales of assets to foreign investors started

[11] In 2000 the number of listed companies was 221 in Poland, 154 in the Czech Republic and 843 in the Slovak Republic.

[12] See for example Blomström *et al.* (2001).

[13] There is a vast literature analysing the determinants of FDI in Central and Eastern European countries. See, among others, Lankes and Venables (1996), Bevan and Estrin (2000), Resmini (2000), Campos and Kinoshita (2002), Kroska (2001).

later; therefore the size of FDI inflows to Hungary, relative to other transition economies, can also be partly explained by the characteristics (strategy and timing) of the privatisation process.

Finally, Hungary strategically attracted FDI inflows making large use of investment incentives. Firms investing in disadvantaged regions could benefit from a 50% to 100% credit on corporate income tax, for a period of 5 to 10 years, depending on the type of investment. Other incentives were provided in the form of free trade zones and industrial parks for multinational companies. According to the OECD (2004), more than 100 companies were using these zones in 2001 alone. Tax incentives for FDI firms, however, were not fully compatible with EU laws, and they have been gradually removed, although the low corporate tax rate still makes Hungary an attractive place for foreign investment.

3.4 Financial sector reform

Over the last decade, the transformation of the Hungarian financial system has been characterised by two key steps: the banking sector has been significantly reformed, and a severe (and highly controversial) bankruptcy law has been introduced.

3.4.1 The banking sector reform

The restructuring of the banking sector was one of the key elements of the reform of the Hungarian financial system. A two-tier banking system had been already established in Hungary in 1987, when three state-owned banks had taken over commercial functions from the National Bank of Hungary, which retained central banking functions. Under the planned system, the monobank did not operate on the basis of profit considerations, and its portfolio included a high share of non-performing loans, which were inherited by the newly established commercial banks. With the start of transition, new commercial banks entered the market, even though foreign participation remained relatively low until 1994. The average quality of loan portfolios remained low, due to both the absence of an appropriate regulatory framework to enforce prudential lending practices, and the lack of expertise by bank managers, which often resulted in bad lending decisions. As a consequence, a series of banking crises occurred in the early 1990s. The Hungarian authorities reacted with a program of bank consolidation and a strict bankruptcy law aimed at enforcing hard budget constraints.

The consolidation program foresaw first recapitalisation and then privatisation of existing banks. Following recapitalisation, the fraction of bad loans started to fall already in 1994, and it rapidly reached levels comparable to those of Western economies. The privatisation of banks was implemented between 1994 and 1995 with the government selling strategic shares to foreign

banks and other foreign investors. Over the period 1994-2002 direct state ownership fell progressively, while the share of foreign-owned banks rose steadily. In 2002, 91% of commercial banks assets were foreign-owned, indicating one of the highest levels of foreign penetration in the region (see Table 3.2).

It is commonly agreed that the outward-orientation of the banking reform has been one of the key factors that contributed to the establishment of an efficient system of independent and financially strong commercial banks (see e.g. Halpern and Wyplosz (1998), Stephan (1999)). However, the positive effects of foreign penetration are generated to the extent that new entrants are of a sufficiently high quality and that their entry effectively results in greater competition. In some countries, such as Russia, the absence of appropriate legislation and supervision resulted in excessive entry of weak banks (often unscrupulously managed). The extent of the problem became clear with the crises in Russia, Romania and Albania in the second half of the nineties, that imposed heavy costs on households and determined a generalised loss of confidence towards financial institutions. Hungary, together with other Central European countries, adopted an approach of moderate increase in the number of banks, and most of the new entrants were solid foreign banks. Moreover, the prospect of EU accession favoured the introduction of legislation in accordance with high international standards.

3.4.2 The bankruptcy law and its economic effects

The reallocation of resources from unproductive to productive uses is a central feature of the transition from plan to market. Bankruptcy legislation is a court-based, market-oriented approach to achieve allocative efficiency (*ex-post*) and to provide appropriate incentives to agents (*ex-ante*). The experience of Hungary in this respect is of particular interest, given the innovative features of the bankruptcy framework implemented in 1992 (as part of a legislative shock therapy that also included a new banking law), and subsequently amended in September 1993. This framework established two possible tracks, liquidation and reorganisation,[14] both of which in turn allowed for the continuation of the firm (after restructuring). An automatic trigger was imposed that required a firm to file for reorganisation if it was unable to repay any debt within 90 days of the debt becoming due. It has been argued (see Bonin and Schaffer (1999)) that most of the restructuring took place via the liquidation track rather than via reorganisation. Under this view, the reorganisation route was largely irrelevant (and hence not necessary at all) in terms of reallocation. However, its automatic trigger provision appears to have contributed to the credit crunch and to the output decline of the early nineties.

[14] In fact, a third track, final accounting, was included. Final accounting referred to the termination of economic activity of a firm in cases not covered by liquidation.

Key features

Following the output collapse in the early transition phase, many Hungarian firms entered a period financial distress. By 1991, the authorities were mainly concerned with two problems: creditor passivity and soft budget constraints. A bankruptcy law had already been enacted in 1986, but it was not effective for two main reasons. On the one hand, banks (usually senior creditors of distressed firms) were unwilling to trigger bankruptcy procedures, as this would imply an increase in their share of non-performing loan. On the other hand, because of the absence of secondary markets for firms' assets, the liquidation value of firms was rather law. As a consequence, soft budget constraints resulted from the decision of banks, other firms, and the state to extend credit or to tolerate arrears.

On the basis of data on bad loans and queued payables, the government considered commercial banks and state-owned firms as the main sources of soft budget constraints.[15] As a consequence, it engineered a reform of the bankruptcy code with the primary objective of improving payments discipline and to harden budget constraints, especially via a limitation of inter-enterprise debt arrears. The code allowed for either liquidation or reorganisation. Liquidation could be started either by the debtor or by a creditor, and it involved a transfer of control from the incumbent management to a court-appointed liquidator. Within two years from the beginning of the procedure, the liquidator had to sell firms' assets in order to satisfy in the best possible way the claims of creditors. During liquidation, the firm remained active, and the bankruptcy code was designed to provide an incentive for the liquidator to maximise the continuation value of the firm. For example, the reward of the liquidator was established as a percentage on total gross revenues, and not just on revenues from assets sale. Within this framework, debtor and creditor could reach an agreement at any stage of liquidation; in this way, even if it filed for liquidation, a firm could still be restructured.

The reorganisation track was intended to provide the debtor with a temporary protection from creditors (90 days), and offer an opportunity to renegotiate debts and start restructuring. During the reorganisation period, the incumbent management remained in control of the firm and proposed a plan to be approved by creditors. Generally the plan was negotiated in advance with creditors. If the deadline expired without an agreement among the parties, the court started liquidation. The crucial aspect of the reorganisation track was its automatic trigger provision: managers of a firm were required to file for reorganisation if overdue on any claim by more than 90 days. Mitchell (1998a) and Bonin and Schaffer (1999) emphasise the peculiarity of this automatic trigger: it was not based on a measure of insolvency, but rather on a measure of illiquidity.[16] Therefore, even profitable and viable firms would be

[15] As we will stress below the state itself played a major role in generating soft budget constraints by tolerating large volumes of tax arrears.

[16] See also Ábel and Bonin (1994), Gray *et al.* (1996), Mitchell (1998b).

forced to enter reorganisation if they had overdue payables, independently of their size. Indeed, this provision was extremely tough, even by western European standards. Automatic triggers exist in the bankruptcy codes of some countries (i.e. Germany and UK), but they are essentially based on an excess of liabilities over assets (that is, on measures of insolvency). As observed by several authors, (see e.g. Bonin and Schaffer (2002)), the severity of the bankruptcy law was probably excessive, as it represented one of the major causes of the credit crunch that the Hungarian economy experienced in 1992-1993. As a consequence, the bankruptcy law has been amended in late 1993, one of the most important changes being the abolition of the automatic trigger. Despite these changes, the reforms implemented in 1992-1993 provided Hungary with one of the strictest banking and bankruptcy regimes in Eastern Europe.

Moreover, some of the concerns by the Hungarian authorities that were at the basis of the bankruptcy law were somewhat misplaced. We have emphasised that the focus placed on interenterprise arrears was motivated by the sharp increase in the amount of queued payables. These were supposed to represent payables that had already been sent to debtors' banks, but that were not paid because the debtor did not have sufficient funds on its accounts. However Bonin and Schaffer (1995) cite evidence that about 60% of queued payables were represented by tax arrears and social security payments, while debts to other firms accounted for only 20% (the remaining being represented by payables to banks). Thus, it seems that inter-enterprise credit was not the main source of soft budget constraints. A second piece of empirical evidence that motivated the bankruptcy law was represented by the sharp increase in non-performing or problematic loans as a percentage of total loans. Although official data on the bad loans to total loans ratio are not available prior to 1993, several studies show that in 1991 bad loans were not higher than 10% of total credit to the enterprise sector, a figure certainly not dramatic (see for example Bonin and Schaffer (1999)). Ironically, the bankruptcy law actually worsened banks' bad debt problem, since firms entering reorganisation enjoyed protection from creditors (including banks) for 90 days. Therefore, for three months they did not service their bank debt, and in addition bank debts of firms that entered liquidation from reorganisation had to be classified as non-performing or bad loans.

Overall, it is fair to say that the liquidation track appears to have been more successful than the reorganisation track, and this without the need to impose a draconian provision such as the automatic trigger. The proportion of firms involved in reorganisation and liquidation was large, accounting for a considerable share of Hungarian economic activity. However, while the liquidation track had some pro-continuation features, the reorganisation track did not. In particular, a provision to grant top priority to debts accumulated during the reorganisation period was missing. As a consequence, firms in reorganisation, that already had liquidity problems, were cut off from credit markets. Moreover, to avoid the effects of the automatic trigger and the ad-

verse consequences of reorganisation, several firms tried to pay their debts in the first months of 1992. All this contributed to the 1992 severe credit crunch.

3.5 Looking ahead: Hungary and the Euro

Hungary's accession to the European Union entails benefits but also obligations: among these, there is EMU membership. Unlike the UK and Denmark, the 10 countries that became part of the EU in 2004 cannot opt out of the EMU. Therefore, for them joining the EU means joining EMU and eventually adopting the Euro. These countries, however, will have great flexibility in this respect. There is no specified deadline for joining ERM II (fluctuation band of $\pm 15\%$) nor a date by which they should adopt the Euro. In the group of ten accession countries, Slovenia, Estonia and Lithuania have already joined ERM II in June 2004, with the intention of being the first countries to enter the Euro zone by 2006. For Hungary and the remaining countries the issue is the optimal timing in the approach to the adoption of the Euro.

Technically, in order to join the Euro a country must meet the Maastricht requirements over deficit, debt, inflation and interest rates, and its exchange rate must remain for at lest 2 years within the fluctuation bands of ERM II. In general, accession countries are in a position that is no worse than that of several EU countries prior to Euro membership, such as Italy, Spain, Greece. In the case of Hungary, the most critical aspect is constituted by the budget deficit that, in recent years, has been well above the threshold prescribed by the Stability and Growth Pact.

The optimum currency area literature has indicated that the *ex ante* prerequisite for joining a monetary union is the respect of what are known as the "Mundell criteria". The adoption of a single currency and therefore of a common monetary policy thus depends on two main issues. First, if countries have synchronised business cycles, they have little need for independent monetary policies. Second, even if business cycles are asymmetric, the exchange rate can be replaced by other variables in its role of shock absorber. In general, in the presence of high wage flexibility and labour mobility, the need to resort to exchange rate movements to absorb asymmetric shocks is less stringent.

The research conducted so far highlights that the shocks prevailing in Eastern European countries are generally uncorrelated with those prevailing in the Euro zone (Horvath and Ráftai, 2004; Babetskii *et al.*, 2004), and that Eastern European labour markets do not possess the flexibility to allow the absorbtion of asymmetric shocks (Fidrmuc, 2004; Huber, 2004). The evidence therefore seems to be against the early adoption of the Euro by the accession countries. However, it is well known that the Euro zone was not an optimal currency area before the introduction of the Euro. Therefore, looking at macroeconomic indicators and labour market features, Eastern European countries are now in a position that is not dissimilar to the one that characterised EU countries prior the adoption of the Euro. Indeed, as pointed out by Frankel and Rose (1998),

the optimality criterion could be reached *ex post* rather than *ex ante*. According to this view, the optimality of the currency area is endogenous: even if an area does not possess the prerequisite for being classified as optimal, when the common currency is introduced it acts like a structural break which forces changes in agents' behaviour producing *structural convergence* due to higher similarity in the way labour, goods and capital markets work. Indeed Fatàs (1997) shows that the EMS has increased cross-border output correlation as well as reduced within-border comovements, significantly reducing the need for exchange rate movements.

The costs of a monetary union are directly related to the ability of the exchange rate to act as a shock absorber. This is primary an empirical issue that has been analysed by Borghijs and Kuijs (2004) for the case of Eastern European economies. In particular, a structural VAR model was estimated for the Czech Republic, Poland, Hungary and the Slovak Republic, with the results indicating that the exchange rate appears to have served more as a propagator of monetary and financial shocks than as an absorber of real shocks. In this perspective, the loss of exchange rate flexibility for accession countries should be fairly small.

As for the issue of the timing of the introduction of the common currency, there are two main arguments that support the view that acceding countries should wait before introducing the Euro. The first argument runs as follows: since many accession countries have moved recently towards higher exchange rate flexibility (e.g. the Czech Republic, Hungary, Poland, Slovenia and the Slovak Republic) a period of time before the introduction of the Euro would allow to identify more precisely the equilibrium real exchange rate in order to define central parities. This argument is contrasted by the fact that, as stressed by Coricelli (2003), there may be a bias in exchange rate movements prior to EMU membership that could distort produce a bias the estimated equilibrium exchange rate. In fact ERM II bands only allow a revaluation and not a devaluation of the central parity, so that countries will have an incentive to implement policies aimed at a strong currency (a look at Fig. 3.16 shows in fact that, since the wider bands have been introduced, the Forint has always fluctuated in the lower region of the band).

The second argument is related to the Balassa-Samuelson effect. This has to do with the fact that countries that display higher productivity increases (and therefore grow at high rates) should experience an increase in the relative price of tradable over non tradable goods, that is the real exchange rate. In the presence of sticky prices, the Balassa-Samuelson effect, which is an equilibrium phenomenon, could be achieved through nominal exchange rate appreciation. As a consequence, it has been argued that Eastern European countries displaying a higher growth rate than countries of the Euro zone, should maintain exchange rate flexibility for some time in order to allow the Balassa-Samuelson effect to operate. This argument is however subject to criticism for two main reasons. First, it has been estimated that with the existing growth rates the real exchange rate appreciation due to the Balassa-

Samuelson effect is of the order of magnitude of 1-2% per year; at such slow rates it does not make a big difference to delay EMU entry for a few years. Second, and more importantly, the argument above ignores that the Balassa-Samuelson effect is an equilibrium phenomenon that has to do with relative prices: without exchange rate flexibility the burden of the adjustment will fall on domestic prices that will have to grow faster in countries displaying higher productivity growth. If anything, as stressed by Coricelli (2003), the presence of the Balassa-Samuelson effect indicates that the inflation criteria contained in the Maastricht treaty should be amended in the case of Eastern European countries. They should target not the inflation rate of the EU average, but the inflation rate of the countries that are displaying higher inflation because they are growing faster (notably Portugal, Ireland and Spain). In this way Eastern European countries will have enough flexibility in domestic inflation rates to make the Balassa-Samuelson work also within the Euro area.

3.6 Conclusions

During the last decade Hungary has undergone a microeconomic and macroeconomic transformation which, by the second half of the 1990s, enabled the economy to enjoy a period of sustained growth. From the policy perspective, the key turning point was the economic stabilisation programme launched in spring 1995, which brought about a genuine change in the Hungarian economy, rapidly improving competitiveness, internal and external equilibrium and debt service indicators. Although the restrictive measures implemented under the stabilisation programme had costly economic and social consequences, the stability displayed in recent years by the Hungarian economy provides a clear *ex post* justification for the stabilisation programme. The strength of the economy and the soundness of economic reforms created a favourable environment for large FDI inflows since the beginning of transition, making Hungary the highest recipient of FDI in the region in per capita terms. Nowadays, Hungary is one of the most dynamic and promising economies among the new European Union members. Nevertheless, several issues need to be addressed in order to complete the reform process. The most pressing is certainly fiscal consolidation, that constitutes a pre-requisite to join the Euro area in the future.

Table 3.1. Hungary: selected macroeconomic indicators

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GDP*	−11.9	−3.1	−0.6	2.9	1.5	1.3	4.6	4.9	4.2	5.2	3.8	3.5
Private consumption	−5.6	0.0	1.9	−0.2	−7.1	−3.4	1.7	4.9	4.6	5.0	5.9	9.3
Public consumption	−2.7	4.9	27.5	−12.7	na	−4.2	5.7	−0.3	2.2	1.2	5.3	4.8
Gross fixed investment	−10.4	−2.6	2.0	12.5	−4.3	6.7	9.2	13.3	6.6	7.7	5.0	8.0
Unemployment	7.4	9.3	11.9	10.7	10.2	9.9	8.7	7.8	7.0	6.4	5.7	5.8
Labour force*	−3.7	−3.3	−9.0	−3.3	−2.6	−1.2	−1.3	0.4	2.1	0.6	−0.4	0.2
CPI*	35.0	23.0	22.5	18.8	28.2	23.6	18.3	14.3	10.1	9.8	9.2	4.8
Curr. Account/GDP	0.8	0.9	−9.0	−9.4	−5.6	−3.9	−4.5	−7.2	−7.9	−8.7	−6.2	−7.2
Ext. Debt/GDP	67.8	58.1	63.7	68.7	70.4	61.1	51.9	56.9	61.1	64.9	65.5	56.6
Household Savings**	16.4	16.3	9.9	12.7	15.6	19.4	20.1	21.3	17.4	16.0	17.7	17.7
Government Balance	−2.9	−7.2	−6.6	−8.4	−6.7	−5.0	−6.6	−8.0	−5.6	−3.0	−4.4	−9.3
Government Expenditure	55.4	59.6	57.5	58.7	52.2	48.2	50.9	50.4	47.4	47.0	51.8	50.7
Government Debt	na	79.0	90.4	88.2	86.4	72.8	63.9	61.9	61.2	55.3	53.5	57.1

* annual % change.
** % of disposable income.
Source: EBRD.

Table 3.2. Domestic vs foreign banks in selected transitional economies

	1998	1999	2000	2001	2002
Hungary					
Foreign Bank Assets*	62.50	68.30	70.10	70.00	90.70
Return on Assets (foreign banks)	0.70	0.00	0.90	1.40	1.50
Return on Assets (domestic banks)	−5.90	1.10	1.40	1.50	0.20
Return on Equity (foreign banks)	7.70	−0.20	10.80	16.90	18.10
Return on Equity (domestic banks)	−96.20	17.80	18.90	20.20	1.70
Czech Republic					
Foreign Bank Assets*	28.10	41.90	72.10	89.10	85.80
Return on Assets (foreign banks)	0.62	0.72	0.88	0.73	1.30
Return on Assets (domestic banks)	−0.57	−0.93	0.14	0.62	−0.09
Return on Equity (foreign banks)	10.60	10.10	18.00	16.90	28.90
Return on Equity (domestic banks)	−12.80	−16.30	2.40	10.80	−1.80
Poland					
Foreign Bank Assets*	17.40	49.30	72.60	72.10	70.90
Return on Assets (foreign banks)	2.00	1.10	1.30	0.90	0.50
Return on Assets (domestic banks)	0.30	0.90	0.60	0.90	0.40
Return on Equity (foreign banks)	18.20	11.10	15.10	9.90	4.60
Return on Equity (domestic banks)	5.40	13.10	10.30	21.10	8.10
Slovak Republic					
Foreign Bank Assets*	33.43	32.67	42.06	89.85	95.96
Return on Assets (foreign banks)	1.44	1.09	1.88	1.32	1.21
Return on Assets (domestic banks)	−1.40	−6.26	−0.42	−1.28	0.07
Return on Equity (foreign banks)	52.68	31.25	56.42	30.97	31.90
Return on Equity (domestic banks)	−33.43	−79.41	−5.21	−6.41	0.93

* share of commercial bank assets.
Source: Mérö and Endrész (2003).

Table 3.3. Bad loans as a percentage of total loans: selected transition economies

	1995	1996	1997	1998	1999	2000	2001	2002	2003
Hungary	25.6	17.6	10.3	7.2	3.6	3.1	3.0	4.9	3.8
Slovak Republic	12.2	30.3	41.3	44.3	32.9	26.1	24.3	11.2	9.1
Czech Republic	na	na	32.9	22.7	24.5	20.4	14.1	8.5	5.0
Poland	36.4	34.0	23.9	11.8	14.9	16.8	20.5	24.7	25.1

Source: EBRD Transition Report, various issues.

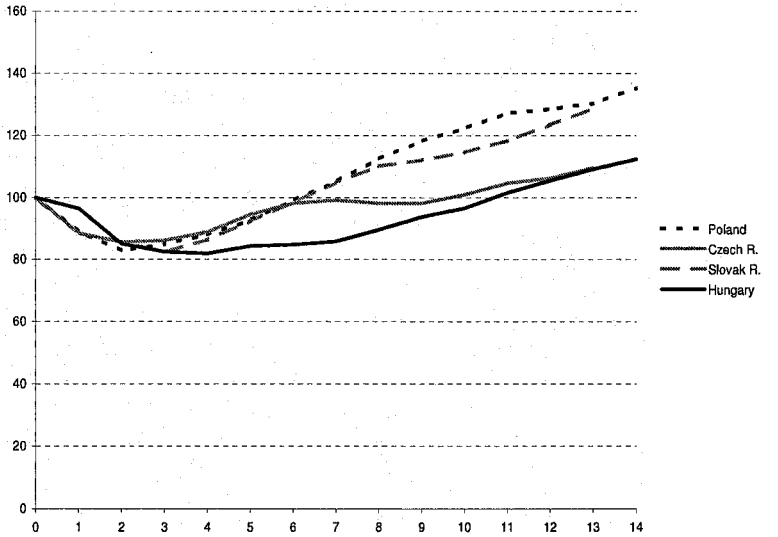

Fig. 3.1. Real GDP in selected transitional economies. *Source*: Datastream.

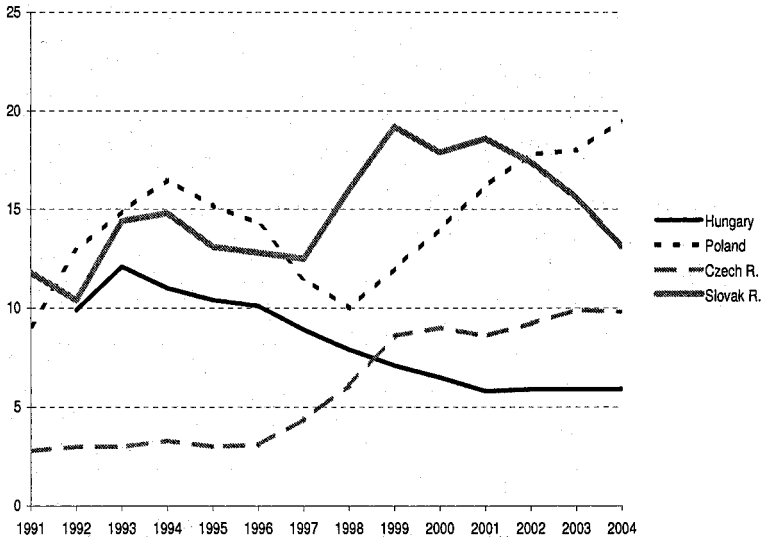

Fig. 3.2. Unemployment rate in selected transitional economies. *Source*: Datastream.

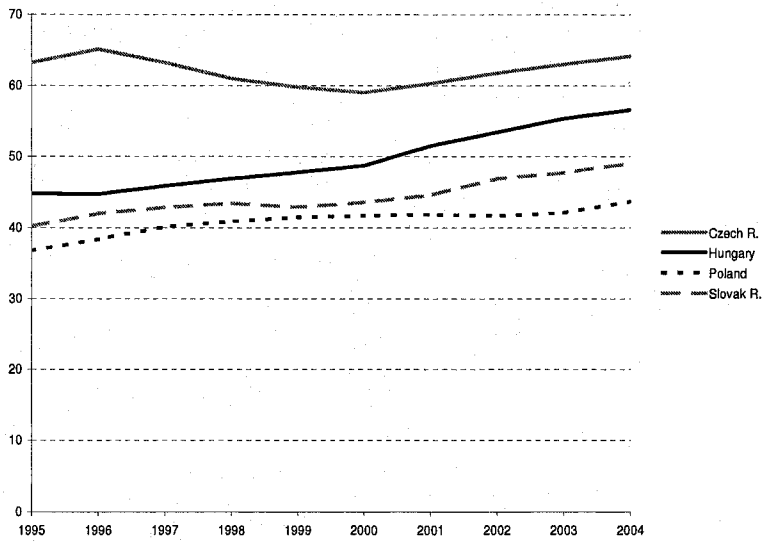

Fig. 3.3. GDP per capita, PPP terms. EU 15 average = 100. *Source*: World Bank.

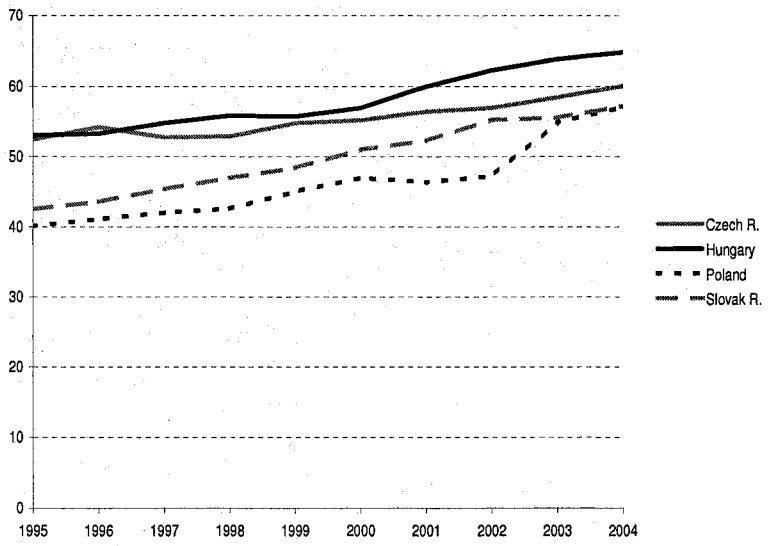

Fig. 3.4. Labour productivity. EU 15 average = 100. . *Source*: Datastream.

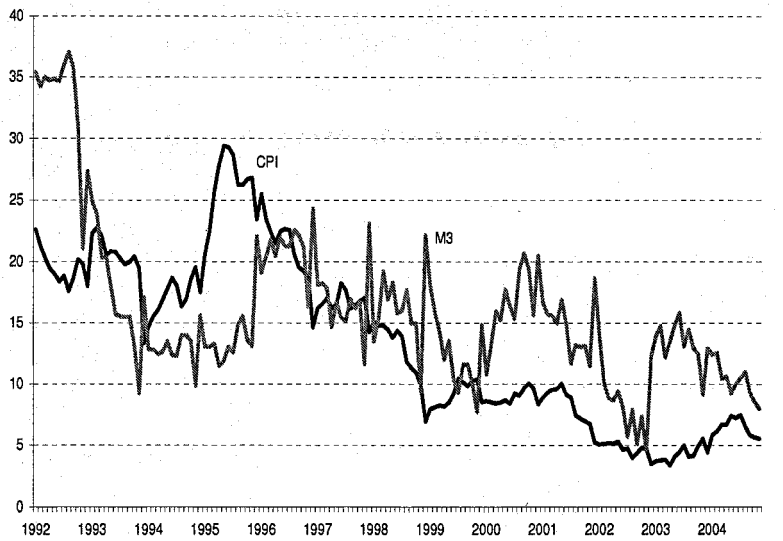

Fig. 3.5. Inflation and M3 growth rate. *Source*: National Bank of Hungary.

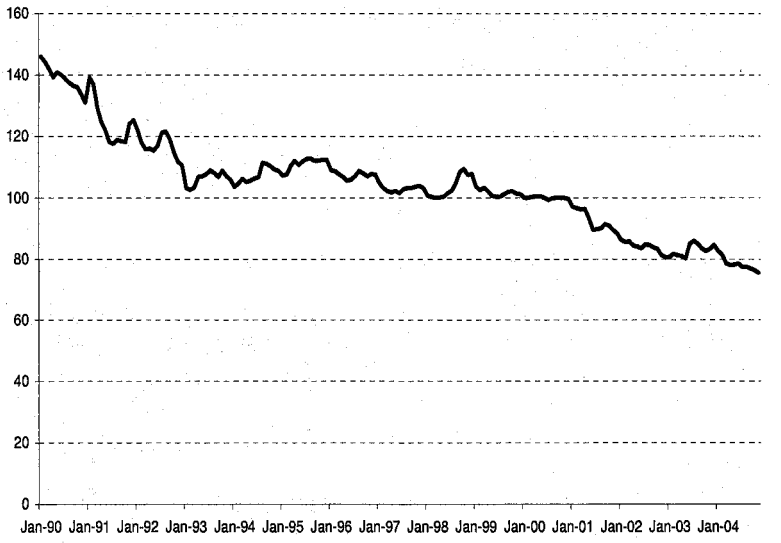

Fig. 3.6. Real effective exchange rate, CPI based. *Source*: National Bank of Hungary.

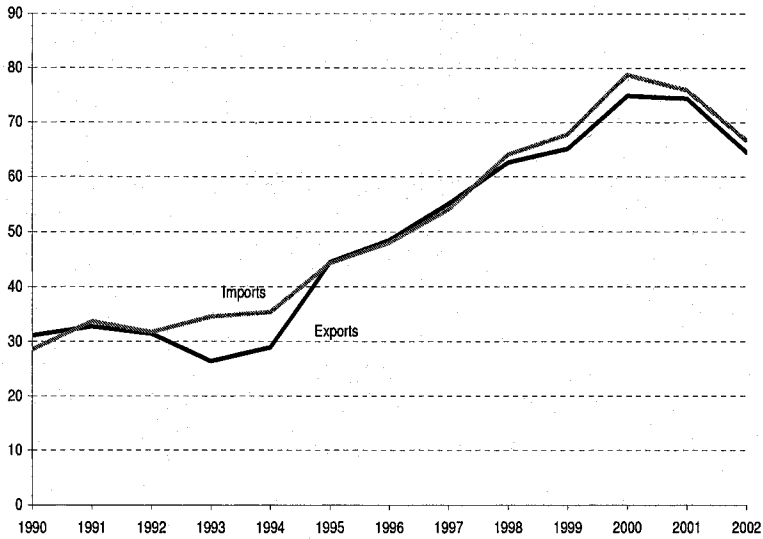

Fig. 3.7. Imports and exports as a fraction of GDP. *Source*: World Bank.

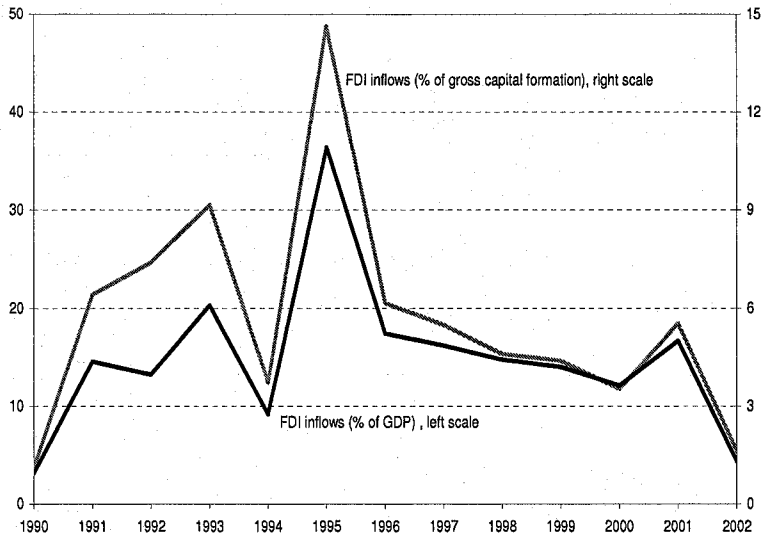

Fig. 3.8. FDI inflows, as a percentage of GDP and fixed capital formation. *Source*: World Bank.

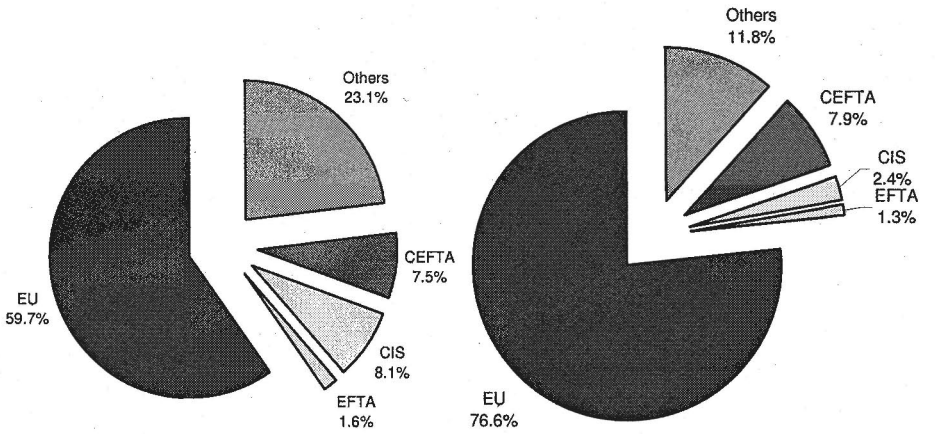

Fig. 3.9. Distribution of imports and exports by origin and destination, year 2000. *Source*: IMF DOTS.

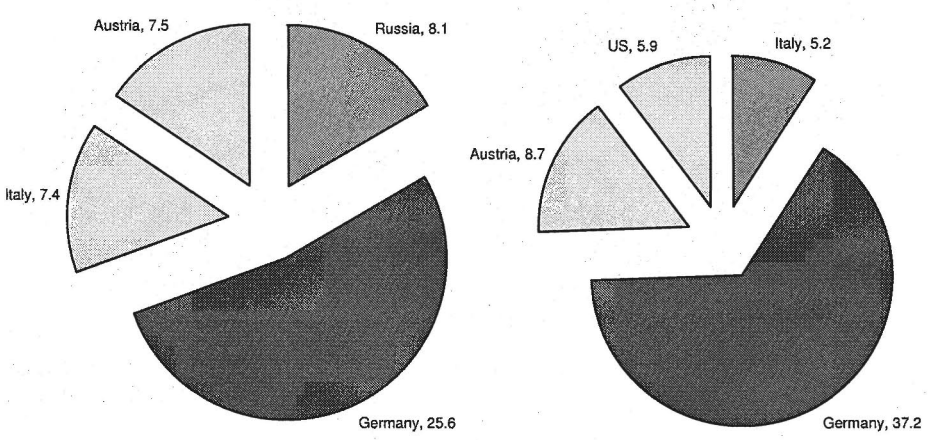

Fig. 3.10. Main trading partners, imports and exports (% of totals), year 2000. *Source*: IMF DOTS.

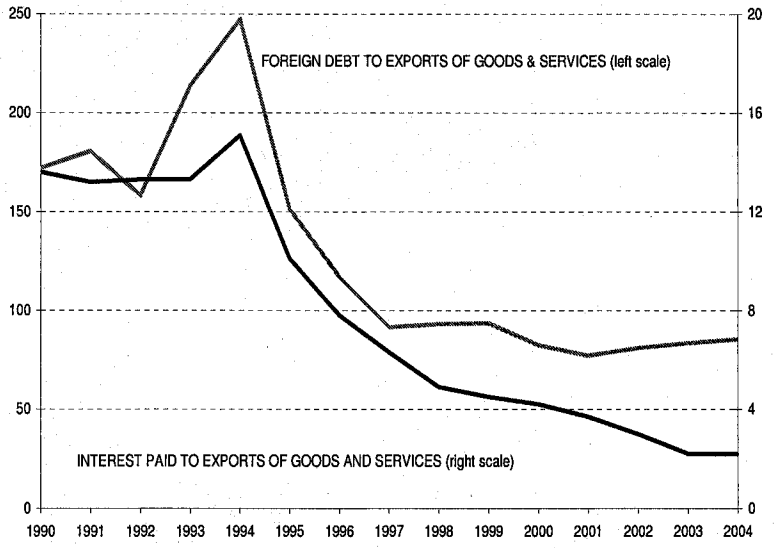

Fig. 3.11. Foreign debt and interest payments as a percentage of exports. *Source*: World Bank.

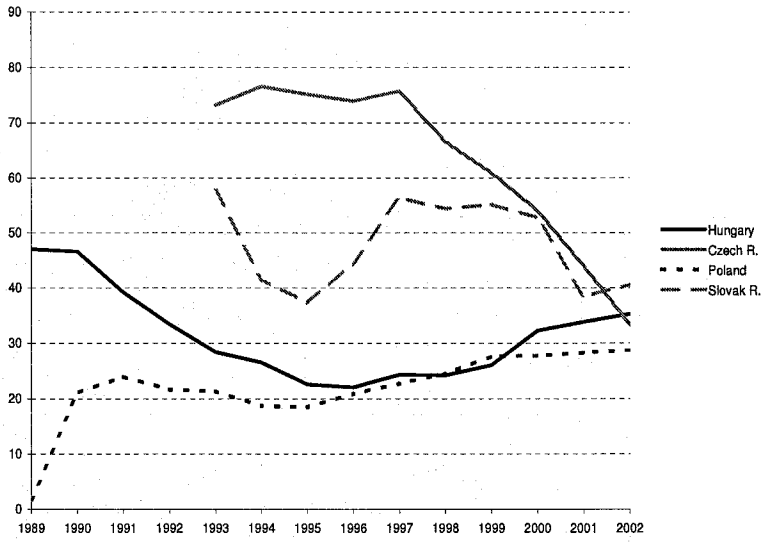

Fig. 3.12. Domestic credit to the private sector (% of GDP). *Source*: World Bank.

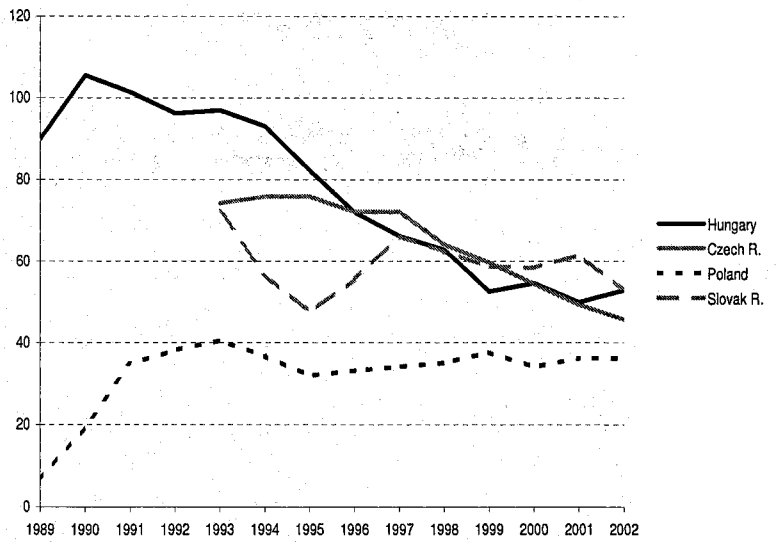

Fig. 3.13. Domestic credit provided by the banking sector (% of GDP). *Source*: World Bank.

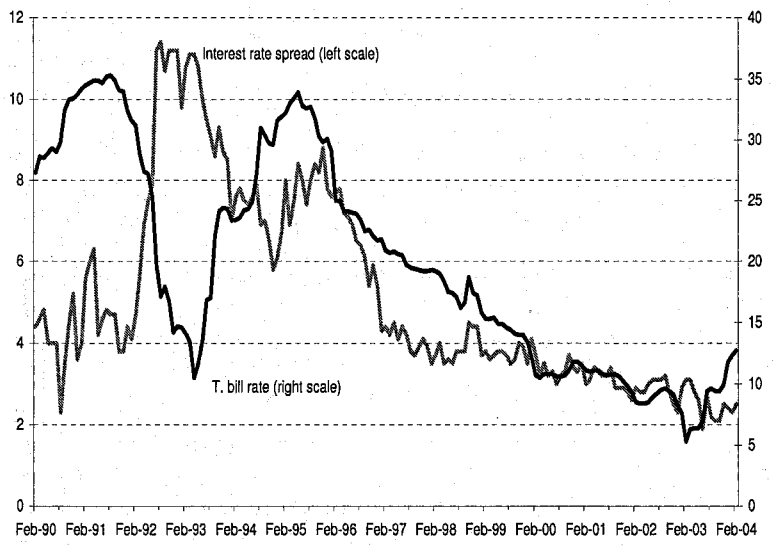

Fig. 3.14. Interest rate spread and government bond yield. *Source*: Datastream.

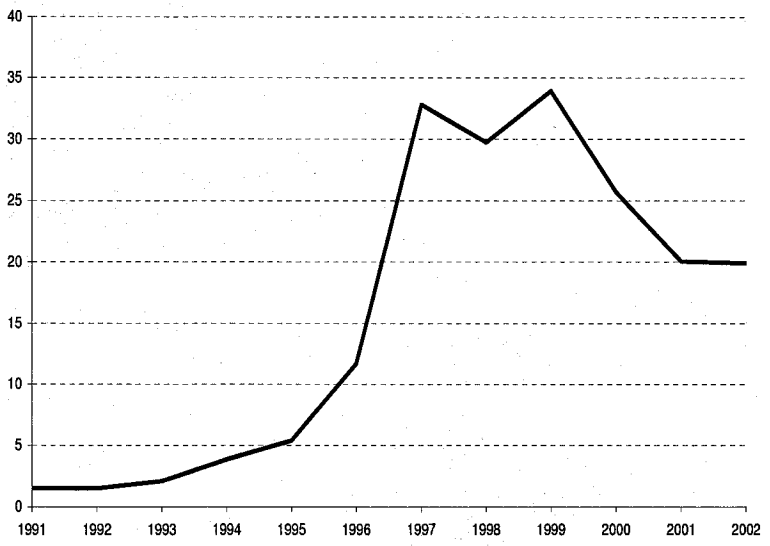

Fig. 3.15. Stock market capitalisation (% of GDP). *Source*: World Bank.

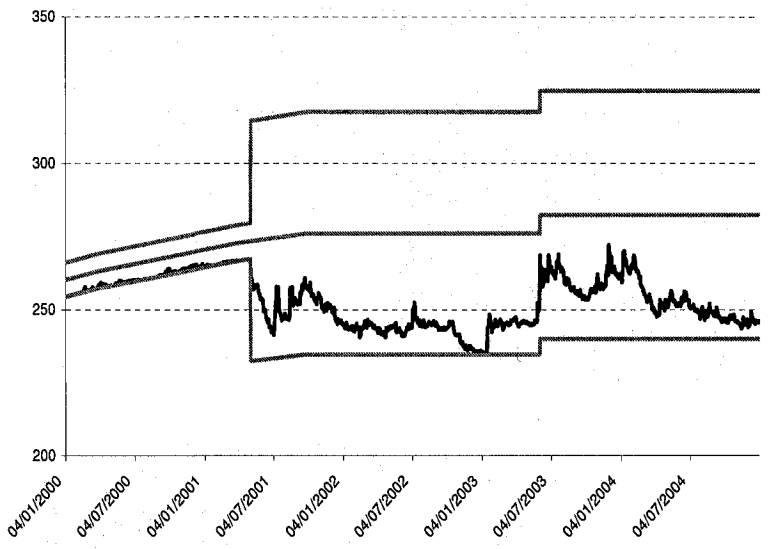

Fig. 3.16. Forint/Euro exchange rate and exchange rate bands. *Source*: National Bank of Hungary.

4

Patterns of corporate financial positions

4.1 Introduction

This chapter investigates empirically the behaviour of the distribution of corporate financial positions in Hungary in the transition period, focusing on indicators of leverage, liquidity, profitability and efficiency. We analyse company accounts data for an unbalanced panel of about 18,000 Hungarian non-financial firms between 1989 and 1999. This data set allows to characterise the static and dynamic features of the distribution of financial positions for a large cross section of firms and to assess the impact of the transition process on the financial stability of the Hungarian corporate sector.

At the beginning of the transition process there was widespread concern that the shift to a market economy could lead to serious problems for the financial and corporate sector. The working of the financial system under the planned system was so different in terms of objectives and instruments, that many feared that both the supply and the demand side of the credit market would not survive the changes entailed by the transition process.[1] It is therefore particularly important to assess the effects of the transition process on the financial structure and performance of firms.

Three main questions will be addressed. First, we examine the static pattern of corporate financial structures in the 1990s, assessing the extent to which Hungarian firms rely on internal as opposed to external finance, debt or equity, short-term or long-term debt, loans or other types of debt. We also investigate the pattern of indicators of performance (profitability and efficiency), and their relationship with financial structure. Second, we analyse whether there are significant differences in financing patterns among various classes of firms. In particular, we focus on disaggregations by ownership (state-owned, private domestic, foreign), size (small, medium, large) and industry (Agriculture, Construction, Manufacturing, Utilities, Trade). Third, we study

[1] See e.g. Colombo and Driffill (2003), Stephan (1999), Halpern and Wyplosz (1998).

how the distribution of corporate financial positions evolved over time, examining both external shape dynamics and intra-distribution mobility.

We find that in the 1990s Hungarian firms made relatively little use of external debt, and that a large fraction of them did not use bank credit, while making extensive use of commercial credit. The results also indicate that Hungarian firms made little use of long-term debt to finance their assets and, as a consequence, were highly vulnerable to shocks affecting their financial position. Profitability was quite low in international comparison, reflecting on the one hand the severe impact of the recession of the early nineties, and on the other hand the overall impact of firms' restructuring in the transition process.

These results for the overall sample are largely robust to the disaggregation into sub-samples defined according to ownership, size and industry. On average, state-owned firms have lower leverage than private firms and, within the latter group, foreign firms are significantly more leveraged than private domestic firms. State-owned firms also display higher financial debt ratios than domestic private firms, and are the ones characterised by the highest pressure of interest expenses. As for liquidity, the debt structure is similar across ownership types. Profitability is lowest for state-owned firms, in terms of either return on assets or return on equity, reflecting low efficiency as measured by both asset turnover and gross margin. Large firms have lower mean and median debt-asset ratios than small and medium firms, and are characterised by a higher bank debt and coverage ratio. Small firms tend to have a higher fraction of short term debt. Profitability is negatively related to size, largely reflecting a higher asset turnover ratio for small firms.

As for the evolution over time of the distribution of financial positions, the average debt-asset ratio rose between 1989 and 1992, to remain virtually stable after the introduction of the new bankruptcy law. The average debt structure declined gradually throughout the sample period. The high percentage of short term debt appears to be mainly inherited from the past, rather than the outcome of the transition period. The profitability indicators display a procyclical behaviour, following closely the dynamics of the aggregate cycle. Intra-distribution mobility is quite low for all the financial ratios considered, with the only exception of profitability indicators.

The chapter is structured as follows. Section 4.2 briefly reviews the recent empirical literature on corporate financial structures. Section 4.3 provides a description of the set of financial indicators used in this study. Sections 4.4 and 4.5 analyse the sectional distribution of individual financial ratios in the whole sample of firms and by sub-samples (ownership, size and industry), respectively. Section 4.6 examines the distribution dynamics of individual financial ratios.

4.2 Related literature

The influential work by Modigliani and Miller (1958) provided a theoretical basis for the argument that real and financial decisions of firms are separable. Their work demonstrated that, with perfect capital markets, no taxes or transaction costs, and symmetric information, the market value of a firm does not depend on its financial structure or dividend payout decisions: share prices are determined entirely by the firm's expected profitability. These irrelevance propositions imply that there is no optimal capital structure and, more generally, that there is complete separation between financial decisions and real activity.

In the following three decades, this view has been gradually challenged by a number of studies showing that the costs of internal and external finance may differ under more realistic assumptions about taxation, costs of financial distress, agency costs and transactions costs (see e.g. Jensen and Meckling (1976), Bradley *et al.* (1984), Williamson (1988)). More recently, the economics of asymmetric information has provided solid microeconomic foundations for the role of financial positions in determining real decisions (see e.g. Ross (1977), Myers (1984), Myers and Majluf (1984)).[2]

As a consequence of the renewed theoretical interest for corporate financial decisions, a rich body of empirical literature has developed recently, investigating the observed patterns of corporate financial structures and relating them to the new theoretical concepts. A number of studies tried to identify the stylized facts of corporate financial structure, focusing on either long-run trends (see e.g. Taggart (1985), Masulis (1988), Yli-Olli and Virtanen (1989)), or cross-country comparisons (see e.g. Mayer (1989), Borio (1990), Remolona (1990), Bloch and Laudy (1993), Rajan and Zingales (1995), Kneeshaw (1995), Corbett and Jenkinson (1996), Rivaud-Danset *et al.* (2001)).

Among studies adopting a long-run perspective, Taggart (1985) examined the historical evolution of US corporate financial patterns, finding that leverage has increased steadily since World War II, while internal finance has been falling since the 1930s, although new share issues were a more significant source of finance in the past. Masulis (1988) also found that in the United States internal finance has fallen steadily since World War II.

More recently, among studies adopting a comparative perspective, Rajan and Zingales (1995) find that German and British firms have the lowest levels of leverage, and that leverage is positively related to size in all G7 countries with the exception of Germany. Mayer (1989) finds that there are significant differences in the corporate financial structures of firms in the United States and United Kingdom, and in the other G7 countries. Among the features common to all G7 countries, retained profits are the main source of finance, equity markets are not an important source of finance for non-financial firms, while bank loans are the main source of external finance. It should be observed,

[2] See Chap. 2 for a survey of this literature.

however, that the results of these studies are highly sensitive to the choice of databases, financial indicators, adjustment and harmonisation procedures, and period of observation.[3]

Another group of studies investigated the pattern of corporate debt structures across firms or across industries in individual countries, relating financial structures to firms' characteristics such as size, capital intensity, product characteristics, profitability, income volatility, tangibility.[4] While most early studies focused on developed countries (see e.g. Long and Malitz (1985), Titman and Wessels (1988), Goudie and Meeks, 1986), more recently many authors investigated the role and determinants of capital structures in developing countries (Singh and Hamid (1992), Singh (1995)) and transition economies (Cornelli *et al.* (1996), Schaffer (1998), Colombo and Revoltella, 2003).

In the past decade, a number of studies focused on the financial positions of Hungarian firms. Bonin and Schaffer (1995) provided an assessment of the banking and bankruptcy reforms on the basis of a survey of 200 manufacturing firms between 1991 and 1994. Hersch *et al.* (1997) studied the relationship between the characteristics of small private sector Hungarian firms and their access to bank loans. More recently, Colombo (2001) and Csermely and Vincze (2003) examined the determinants of corporate financial decisions, finding evidence of imperfections that constrain firms in the achievement of their optimal capital structure. Bishop *et al.* (2002) investigated the determinants of equity structures in a sample of large Hungarian firms.[5]

It is important to observe that most empirical studies of firms' financial positions have generally relied on either aggregate indicators or cross-sectional averages for firm-level data. Aggregate measures, however, are not informative about the distribution of debt burdens across firms, whereas in assessing the fragility of capital structures it is the leverage and liquidity of firms in the upper tail of the distribution that are relevant, rather than average measures: in the presence of asymmetric information, the representative agent framework becomes inadequate.

As a consequence, some authors have extended the analysis to specific classes of firms (e.g. the median, or the 90th percentile) in order to capture the dynamics of the relevant parts of the distribution (see e.g. Bernanke and Campbell (1988), Bernanke *et al.* (1990), Seth (1992), Warshawsky (1992), Stanca *et al.*, 1999). Following the approach adopted in this literature, the analysis presented in this chapter focuses on the static and dynamic features of the *whole* distribution of corporate financial positions, in order to explicitly take into account the heterogeneity of firms.

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[3] See Rivaud-Danset *et al.* (2001) for a comprehensive survey of the literature on cross-country comparisons of corporate financial structures.

[4] For an early study of US corporate financial structure, see Chudson (1945).

[5] Halpern and Körösi (2000) estimated frontier production functions to investigate the impact of competition on the efficiency of the corporate sector. See also Major (2003) for a stochastic frontier analysis of the performance of small Hungarian firms.

4.3 Methodology

The investigation of firms' financial positions presented in this chapter is based on four classes of financial ratios: leverage, liquidity, profitability and efficiency ratios. Solvency ratios provide information on the exposure to external debt (leverage). Several debt ratios are commonly used in the literature, as there is no generally satisfactory indicator, and the choice depends on the objective of the analysis (see Rajan and Zingales (1995)). In the following, we use both stock and flow measures of leverage. The first stock indicator is the debt-asset ratio (DA), defined as total debt over total assets. The second stock indicator is the financial debt ratio (BDA), defined as debts that bear financial charges over total net assets (total assets net of accounts receivables). This is essentially a measure of leverage net of commercial credit, as the latter reflects transaction volumes rather than financing choices. As for the flow measure of leverage, we use the (inverse of the) coverage ratio (COV), i.e. the ratio of interests paid by the firm over earnings before interest, taxes and depreciation, an indicator measuring the pressure exerted by interest payments on current cash flows.[6]

Liquidity ratios provide information on the time structure of debt and the firm's ability to meet its short term obligations. In the present analysis, we report two liquidity indicators. First, the debt structure ratio (SDD), defined as short term debt over total debt, a measure of the extent to which firms rely on short versus long-term credit to finance their activity. This ratio, measuring the proportion of total debt due within the current year or the next accounting period, indicates the necessity for firms either to repay the debt out of current earnings or to refinance it. A high debt structure ratio may de due to a shortage of working capital which is being met by high levels of operating credit. Second, the (inverse of the) current ratio (CR), defined as current liabilities over current assets, indicating the firm's ability to meet its short term obligations with its current assets.

Profitability can be measured using several indicators, with results being highly sensitive to the measure selected. In this study we use two profitability indicators. The first is the return on investment (ROI), defined as earnings before interest and taxes (net operating profit – the margin after paying the cost of materials, operating charges, labour costs and depreciation) over total assets. This measure is not influenced by financial choices, as they do not affect neither the numerator nor the denominator. The second indicator is the return

[6] We also considered an alternative definition, interest costs over current assets (ICA), due to the high variability of operating profits and the high number of firms with negative or zero operating profit in the sample. This definition is also suggested by the fact that if current income has a large transitory component, current assets may provide a better indication of a firm's ability to meet its interest obligations (Bernanke and Campbell (1988)). However, similar results were obtained using the two definitions, so that we report only the results for the first definition (COV).

on equity (ROE), defined as after-tax earnings over equity. This is a measure of the profitability of own funds, reflecting not only economic performance but also financial choices, as can be seen explicitly in the following decomposition:

$$\frac{NI}{EQ} = \frac{EBIT}{A} * \frac{A}{EQ} * \frac{NI}{EBIT} \tag{4.1}$$

where NI = net income, EQ = equity, $EBIT$ = earnings before interest and tax, A = total assets. The expression in (4.1) can also be written as

$$\begin{aligned} ROE &= ROI * \left(\frac{A}{A-D}\right) * \left(\frac{EBIT - INT}{EBIT}\right) \\ &= ROI * \left(\frac{1}{1-DA}\right) * \left(1 - \frac{1}{COV}\right) \end{aligned} \tag{4.2}$$

where DA = debt-asset ratio and COV = coverage ratio. Efficiency ratios measure how efficiently a firm uses its resources. In this study we focus on the efficiency of assets and sales. Our first indicator is the asset turnover ratio (ATR), defined as sales over total assets, providing a measure of *capital* efficiency. The second indicator is the gross operating margin (GMR), defined as earnings before interest and taxes over sales. This is a measure of the *economic* efficiency of firms' turnover, as it does not take into account the assets used to generate turnover. The relationship between these two indicators and ROI can be shown in the following decomposition:

$$\begin{aligned} ROI = \frac{EBIT}{A} &= \\ &= \frac{EBIT}{S} * \frac{S}{A} \\ &= GMR * ATR \end{aligned} \tag{4.3}$$

All financial ratios were calculated using book-values of the relevant variables, given that the rapid economic and institutional changes that affect the structure of financial markets in transitional economies make it impossible to obtain market value measures of firms' debt and assets, particularly in the initial years of reforms. In assessing these ratios it should also be observed that, since the Hungarian Act on Accounting allows for asset valuation at historical costs, book values are likely to understate the market values of firms' assets (see Csermely and Vincze, 2003).

4.4 Sectional distributions in the overall sample

This section illustrates the characteristics of the sectional distribution of the individual financial ratios for the overall sample of non-financial firms in the period 1989 to 1999. Descriptive statistics are reported in Tables 4.1-4.4, while

distribution densities are displayed in Figs. 4.1-4.2. We report results for both the unbalanced and balanced samples of firms, the latter being composed the firms surviving throughout the sample period.

Table 4.1 reports descriptive statistics for the distribution of financial ratios in the whole sample. The debt-to-asset ratio (DA) indicates that Hungarian firms have lower mean and median leverage (0.48 and 0.42, respectively) than their counterparts in developed and developing countries.[7] The distribution has large variability and is positively skewed (as shown in Fig. 4.1), due to the presence of highly indebted firms. The average bank debt ratio (BDA) is remarkably low (0.12) by international standards. As shown by the distribution percentiles, this reflects the fact that almost half of the firms in the sample do not use bank debt to finance their investment. Taken together, the results for the two stock indicators of leverage suggest that in the 1990s Hungarian firms made relatively little use of external debt, and that a large fraction of firms did not use bank credit, while making extensive use of commercial credit. This pattern is also reflected in the low incidence of interest expenses on operating profit. The distribution of the coverage ratio (COV) displays a low mean value (0.25) that actually hides a bimodal distribution, with almost half of the firms paying no interests, and a large fraction facing either an incidence greater than one or negative cash flow (Figs. 4.1-4.2).

Turning to the liquidity indicators, the average debt structure ratio (SDD) is remarkably high (0.91), both in absolute terms and when compared with other countries, indicating that Hungarian firms made little use of long-term debt to finance their assets (see also Figs. 4.1-4.2). Indeed, the distribution percentiles of the debt structure show that more than half of the firms in the sample rely exclusively on current liabilities. Such a high exposure to short term debt indicates that firms were highly vulnerable to shocks affecting their financial position. The current ratio (CUR) indicates that this peculiar debt structure, based on a prominent role for short-term liabilities, is matched by a similar asset structure: both the mean and the median current ratio are well below one. However, more than 10 per cent of the firms in the sample display current ratios greater than one, indicating serious liquidity problems.

The profitability indicators are characterised by an almost symmetrical distributions around their respective average values ($ROI = 0.08$ and $ROE = 0.25$). Both mean and median values are quite low in international comparison, reflecting on the one hand the severe impact of the recession of the early nineties, and on the other hand the overall impact of firms' restructuring in the transition process. For both indicators a substantial fraction of the firms in the sample display zero or negative profitability. The higher median return on equity (0.14) relative to the median return on assets (0.08) reflects the low incidence of interest payments. Note that the return on equity can be

[7] Rajan and Zingales (1995) find that the average median (mean) ratio of non-equity liabilities to total assets in the G7 countries is 0.64 (0.66), ranging between 0.54 (0.57) and 0.73 (0.72).

decomposed as follows:

$$ROE = ROI * \left(\frac{1}{1-DA}\right) * \left(1 - \frac{1}{COV}\right) \tag{4.4}$$

so that we obtain $0.14 \simeq 0.08 * 2.4 * 0.96$. The return on assets reflects a relatively high mean (1.85) and median (1.47) asset turnover ratio and a relatively low gross margin ratio ($ATR = 0.04$ and $GMR = 0.05$, respectively).

Table 4.2 reports descriptive statistics for the distribution of financial ratios in the balanced sample of firms surviving throughout the sample period. Most of the features discussed above are qualitatively robust to the sample choice. The median (and mean) current ratio and return on equity, however, are sensibly lower. Leverage, in terms of both non-equity liabilities and financial debt, is also lower in the balanced sample. Distribution densities for the balanced sample also provide a pattern consistent with the results for the unbalanced sample for each of the financial ratios considered (Figs. 4.1-4.2).

Tables 4.3-4.4 report pair-wise correlations among the set of financial indicators under investigation, for the unbalanced and balanced samples, respectively. The debt-asset ratio is strongly positively correlated with the current ratio (0.63), indicating that, on average, more highly leveraged firms are also the ones facing higher pressure to meet short term obligations with current assets. Leverage is correlated positively with the return on equity (0.35) but negatively with the return on investment (-0.15). The financial debt ratio is strongly negatively correlated with the debt structure ratio (-0.53 in both the balanced and unbalanced sample).

4.5 Sectional distributions by sub-sample

This section illustrates the characteristics of the sectional distribution of the individual financial ratios obtained by disaggregating the sample in groups of firms defined according to ownership, size, and industry (Tables 4.5-4.13). Average values for individual financial ratios by sector-ownership and sector-size are reported in Figs. 4.3-4.20.

The information on the composition of the equity base allows to distinguish three types of firms by *ownership*: state-owned, domestic private and foreign firms. This disaggregation is particularly important for transitional economies, as it allows to investigate differences in the behaviour of old state-owned firms and the fast-growing private sector. As reported in Table 4.5, state-owned and foreign firms represent 17 per cent and 18 per cent of the sample, respectively, while the rest of the sample is composed of private domestic firms (both private and cooperative).

The results in Table 4.5 indicate that state-owned firms have lower leverage than private firms and, within the latter group, foreign firms have debt levels significantly higher than private domestic firms. It should be observed

that this pattern is also observed within each sector (Fig. 4.3), with the only exception of Agriculture, where private firms have the lowest leverage. Interestingly, however, state-owned firms display higher financial debt ratios than domestic private firms, and are the ones characterised by the highest pressure of interest expenses. The same pattern also applies to individual sectors: leverage is always highest in foreign firms and, with the exception of the Trade sector, lowest in private domestic firms (Figs. 4.3-4.5).

As for liquidity, the debt structure is similar across ownership types, relatively lower in Agriculture and higher in Construction (Fig. 4.6). The current ratio indicates highest (lowest) exposure to short-term liabilities for foreign (state) firms (Table 4.8). This pattern is common to all sectors with the only exception of Agriculture (Fig. 4.7). Profitability is lowest for state-owned firms, in terms of both return on assets (5% against 10% for private firms) and return on equity (11% as opposed to 27% and 29% for private and foreign firms, respectively). This result is observed within each sector, and is particularly evident in the Construction industry. The low profitability of state-owned firms reflects low efficiency as measured by both asset turnover (1.58 against 2.0 for private firms) and gross margin (2% as opposed to 4% and 6% for private and foreign firms, respectively).

Size

We divided the sample of firms by size in order to check whether systematic differences in the patterns of financial structure emerge when comparing small and large firms.[8] We used employment as the dimension variable and defined *small* firms those with less than 50 employees, *large* firms those with more than 250 employees, and *medium* firms those between 50 and 250 employees.[9] On the basis of this definition, small firms represent more than a third of the sample, large firms about 17 per cent, while almost half of the sample is composed of medium-size firms.

Large firms have lower mean and median debt-asset ratios than small and medium firms (Table 4.5), both in the overall sample and within each sector (Fig. 4.12). However, they are characterised by a higher bank debt ratio (0.17 as opposed to 0.12 and 0.9 in medium and small firms, respectively) and a much higher interest coverage ratio. Small firms tend to have a higher fraction of short term debt. Despite the fact that small firms have a higher debt asset ratio, their interest coverage is lower than for large firms. These two features are common to all industries (Figs. 4.12 and 4.14). Profitability, measured as either return on investment or return on equity, is negatively related to size. This result is largely attributable to a higher asset turnover ratio for

[8] See Rivaud-Danset *et al.* (2001) for a comparison of the financial structure of small and large manufacturing firms for nine European countries in the period 1990 to 1996.

[9] Alternative size definitions based on sales or total assets produced similar results.

small firms, whereas the gross margin is virtually unchanged across classes of firms.[10]

Industry

Industry identification codes allow to break down the overall sample of non-financial firms by one-digit industry groups. Manufacturing and Trade are the largest groups, representing about 42 and 30 per cent of the sample, respectively. The remaining firms are distributed among Construction (13%), Agriculture (10%) and Utilities (6%), which includes Transport and Communication (Table 4.5).

The debt-to-asset ratio is highest in Construction and Trade, and substantially below average in Agriculture. However, focusing on financial debt, this pattern is reversed and Manufacturing is the sector with highest average leverage. This result is also confirmed by the distribution of the interest coverage ratio, whose mean and median are remarkably high for Agriculture. As for liquidity, the average values of debt structure and current ratio are above 90 and 80 per cent, respectively, for all sectors except Agriculture. Profitability is highest in Construction, lowest in Agriculture, and close to the overall average in the remaining sectors. This pattern reflects similar features for the distribution of the asset turnover ratio, whereas the gross margin ratio displays an opposite sectoral pattern.

4.6 Distribution dynamics

This section describes the distribution dynamics of individual financial ratios between 1989 and 1999. We first examine the evolution of the external shape of the distribution, and then the intra-distribution mobility. In particular, Tables 4.14-4.22 report descriptive statistics (mean, standard deviation, median and 90th percentile) over time for both the unbalanced and balanced samples (in the first four and next four columns of the tables, respectively). Distribution dynamics are characterised in Figs. 4.21-4.22 by means of box percentile graphs for the floating and fixed sample, respectively.[11] The intra-distribution mobility for each financial indicator is described in Figs. 4.23-4.30 by means of stochastic kernels.

External shape dynamics

In the unbalanced sample the average debt-asset ratio rises from 0.35 in 1989 to 0.51 in 1992, to remain virtually stable thereafter (Table 4.14). In the

[10] The relation with the results obtained for the ownership disaggregation reflects the fact that large firms are generally state owned while small firms are mainly private.

[11] These graphs report the first, second (median) and third quartile as a box, and the minimum and maximum of the distribution as a line.

balanced sample this ratio displays a more stable pattern, falling in the first half and rising in the second half of the sample period. The financial debt ratio grows gradually throughout the sample period, both in the balanced and unbalanced sample (Table 4.15). The average interest coverage ratio grows steadily in the first half of the sample, to reach a peak at 0.35 in 1993, and decline gradually thereafter. A similar behaviour is observed for the median of the unbalanced distribution and for both the mean and median of the balanced distribution (Table 4.16).

The average debt structure declines gradually throughout the sample period, from 0.95 to 0.89, while the median is constant, given that for more than half of the firms in the sample the only form of debt is short term (Table 4.17). As emphasised in the introductory chapter, in the presence of the high uncertainty that characterises the early phases of the transition process, firms are exposed to both macroeconomic and microeconomic shocks that make very difficult the assessment of their future profitability. This, in turn, induces banks to be very cautious in their lending behaviour, taking mostly short positions with firms. As a consequence, high values of short term debt compared to total debt can be a natural consequence of the beginning of the transition process.

The figures reported in the tables, however, suggest that such a high percentage of short term debt is mainly inherited from the past, rather than the outcome of transition itself. The fractions of short term debt are highest in 1989, and they decline thereafter, suggesting that firms are trying to lengthen the duration of their debt as transition progresses. On the other hand, it should be observed that the evolution of the current ratio suggests that while short term debt decreased as a fraction of total debt, it actually increased progressively throughout the sample as a fraction of current assets, with its mean (median) rising from 0.49 (0.46) in 1989 to 0.89 (0.76) in 1999 (Table 4.18).

The profitability indicators display a procyclical behaviour, following closely the dynamics of the aggregate cycle. The average return on investment drops from 0.15 to 0.02 between 1989 and 1992, to rise thereafter to 0.11 in 1999 (Table 4.19). The standard deviation rises to reach a peak in 1992 and fall gradually thereafter. An analogous pattern is observed, although less marked, in the balanced sample. The average return on equity drops from 0.26 in 1989 to 0.18 in 1993, to rise thereafter to 0.25 in 1999 (Table 4.20).

Intra-distribution mobility

We now turn to the characterisation of intra-distribution mobility. Denote with F_t the time t sectional distribution of firms' financial positions. This distribution evolves over time both in its external shape and in the relative positions of different elements of the cross-section (intra-distributionally). Both these dynamics can be represented by a stochastic kernel (see Quah, 1996a). Define $f_t(A) = \int M_t(y, A) f_{t-1}(dy)$, where y is any subset of the state space

A, f_t is the probability measure corresponding to F_t, and M_t is a sequence of stochastic kernels. If the state space, and thus F_t, is discrete, then M_t is a Markov chain transition probability matrix. Figures 4.23-4.30 display, for each financial ratio, stochastic kernels (and the corresponding contour plots) obtained by averaging over one-year transitions between 1989 and 1999.

The debt-asset ratio (Fig. 4.23) displays high persistency, as most of the density lies along the main diagonal: over time firms tend to remain in the same part of the distribution of their debt exposure. Persistence is more pronounced at the lower and upper range of the distribution, where some indication of mean-reversion can also be observed (as indicated by contour plots). Mobility is extremely low for the financial debt ratio and for the debt structure (Figs. 4.24-4.25), reflecting the fact that throughout the sample period almost half of the firms in the sample have no financial debt, and more than half of the firms have only short term debt. The current ratio displays low mobility in the lower end of the distribution, but rising mobility as we move to higher starting values. The upper range of the distribution displays both high mobility and a tendency to revert towards the mean of the distribution.

The profitability indicators display similar patterns of mobility (Figs. 4.27-4.28). While a high number of firms remain at the zero level, relatively high mobility can be observed for the remaining firms for both the return on assets and the return on equity. The contour plots also indicate a tendency to mean reversion. A similar mobility pattern is observed for the gross margin, as expected, while the distribution of the asset turnover ratio reveals a relatively high degree of persistence, particularly marked at its lower end, indicating that over time the least efficient firms tend to remain in the same part of the distribution.

Table 4.1. Financial ratios: overall sample (unbalanced)

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Debt Ratio	0.48	0.32	0.11	0.26	0.42	0.63	0.90	72153
Bank Debt Ratio	0.12	0.19	0.00	0.00	0.01	0.12	0.38	72269
Coverage Ratio	0.25	0.36	0.00	0.00	0.04	0.26	1.00	73260
Debt Structure	0.91	0.16	0.67	0.94	1.00	1.00	1.00	73303
Current Ratio	0.81	0.64	0.21	0.44	0.67	0.93	1.50	72234
Return on Assets	0.08	0.18	−0.10	0.03	0.08	0.14	0.29	72053
Return on Equity	0.25	0.48	−0.13	0.05	0.14	0.32	0.84	71690
Asset Turnover	1.85	1.44	0.37	0.91	1.47	2.29	3.87	72381
Gross Margin	0.04	0.20	−0.10	0.02	0.05	0.10	0.19	70833

Columns 3 to 7 report distribution percentiles.

Table 4.2. Financial ratios: overall sample (balanced)

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Debt Ratio	0.37	0.22	0.12	0.22	0.32	0.44	0.69	7293
Bank Debt Ratio	0.09	0.14	0.00	0.00	0.03	0.10	0.27	7458
Coverage Ratio	0.22	0.31	0.00	0.00	0.06	0.23	0.79	6600
Debt Structure	0.90	0.16	0.65	0.90	1.00	1.00	1.00	7326
Current Ratio	0.63	0.45	0.21	0.39	0.55	0.74	1.07	7007
Return on Assets	0.09	0.12	−0.02	0.05	0.08	0.12	0.23	7238
Return on Equity	0.14	0.27	−0.05	0.04	0.09	0.17	0.42	7216
Asset Turnover	1.86	1.19	0.49	1.10	1.61	2.37	3.55	7293
Gross Margin	0.06	0.12	−0.01	0.02	0.04	0.08	0.17	6611

Table 4.3. Financial ratios correlations: overall sample (unbalanced)

Var.	DA	BDA	COV	SDD	CUR	ROI	ROE	ATR	GMR
DA	1.00	0.33	0.16	−0.03	0.62	−0.23	0.32	0.24	−0.26
BDA	0.33	1.00	0.31	−0.53	0.16	−0.03	0.01	−0.06	−0.02
COV	0.16	0.31	1.00	−0.14	0.24	−0.41	−0.27	−0.16	−0.33
SDD	−0.03	−0.53	−0.14	1.00	0.04	−0.03	0.02	0.12	−0.06
CUR	0.62	0.16	0.24	0.04	1.00	−0.26	0.13	0.05	−0.31
ROI	−0.23	−0.03	−0.41	−0.03	−0.26	1.00	0.45	0.25	0.63
ROE	0.32	0.01	−0.27	0.02	0.13	0.45	1.00	0.31	0.18
ATR	0.24	−0.06	−0.16	0.12	0.05	0.25	0.31	1.00	0.00
GMR	−0.26	−0.02	−0.33	−0.06	−0.31	0.63	0.18	0.00	1.00

Table 4.4. Financial ratios correlations: overall sample (balanced)

Var.	DA	BDA	COV	SDD	CUR	ROI	ROE	ATR	GMR
DA	1.00	0.33	0.11	−0.02	0.63	−0.15	0.35	0.31	−0.20
BDA	0.33	1.00	0.31	−0.53	0.20	−0.01	0.03	−0.04	−0.01
COV	0.11	0.31	1.00	−0.14	0.22	−0.43	−0.34	−0.18	−0.35
SDD	−0.02	−0.53	−0.14	1.00	0.03	−0.03	0.01	0.14	−0.07
CUR	0.63	0.20	0.22	0.03	1.00	−0.21	0.11	0.05	−0.23
ROI	−0.15	−0.01	−0.43	−0.03	−0.21	1.00	0.53	0.27	0.64
ROE	0.35	0.03	−0.34	0.01	0.11	0.53	1.00	0.31	0.29
ATR	0.31	−0.04	−0.18	0.14	0.05	0.27	0.31	1.00	−0.02
GMR	−0.20	−0.01	−0.35	−0.07	−0.23	0.64	0.29	−0.02	1.00

Table 4.5. Debt Ratio: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.39	0.28	0.09	0.20	0.33	0.49	0.78	12531
Private	0.48	0.32	0.12	0.26	0.42	0.64	0.91	46089
Foreign	0.55	0.31	0.15	0.34	0.52	0.71	0.95	13533
Size								
Small	0.56	0.33	0.13	0.34	0.55	0.76	0.96	26659
Medium	0.44	0.30	0.11	0.23	0.37	0.57	0.87	33423
Large	0.38	0.25	0.11	0.22	0.34	0.48	0.72	12071
Sector								
Agriculture	0.24	0.18	0.08	0.14	0.20	0.28	0.45	7236
Construction	0.54	0.32	0.12	0.33	0.53	0.72	0.93	9597
Manufacturing	0.49	0.31	0.13	0.28	0.44	0.62	0.90	30934
Utilities	0.41	0.32	0.07	0.18	0.35	0.56	0.86	4373
Trade	0.53	0.32	0.14	0.31	0.49	0.71	0.94	20013

Sample: unbalanced.

Table 4.6. Bank Debt Ratio: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.11	0.17	0.00	0.00	0.02	0.13	0.34	12681
Private	0.10	0.17	0.00	0.00	0.01	0.10	0.34	46236
Foreign	0.17	0.24	0.00	0.00	0.03	0.22	0.55	13352
Size								
Small	0.09	0.18	0.00	0.00	0.00	0.03	0.35	27186
Medium	0.12	0.19	0.00	0.00	0.04	0.13	0.38	33192
Large	0.17	0.19	0.00	0.03	0.10	0.21	0.45	11891
Sector								
Agriculture	0.11	0.11	0.00	0.04	0.08	0.13	0.24	6699
Construction	0.07	0.16	0.00	0.00	0.00	0.02	0.26	9946
Manufacturing	0.14	0.21	0.00	0.00	0.02	0.17	0.45	31051
Utilities	0.09	0.17	0.00	0.00	0.00	0.06	0.29	4564
Trade	0.11	0.19	0.00	0.00	0.00	0.11	0.38	20009

Sample: unbalanced.

Table 4.7. Coverage Ratio: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.29	0.38	0.00	0.00	0.09	0.38	1.00	12648
Private	0.24	0.35	0.00	0.00	0.04	0.24	1.00	46886
Foreign	0.24	0.36	0.00	0.00	0.03	0.21	1.00	13726
Size								
Small	0.16	0.31	0.00	0.00	0.00	0.06	0.84	27870
Medium	0.28	0.37	0.00	0.00	0.09	0.33	1.00	33557
Large	0.34	0.37	0.00	0.05	0.18	0.45	1.00	11833
Sector								
Agriculture	0.40	0.38	0.00	0.10	0.26	0.53	1.00	6899
Construction	0.17	0.32	0.00	0.00	0.00	0.09	1.00	10169
Manufacturing	0.25	0.36	0.00	0.00	0.04	0.26	1.00	31244
Utilities	0.15	0.29	0.00	0.00	0.01	0.09	0.65	4622
Trade	0.25	0.36	0.00	0.00	0.04	0.27	1.00	20326

Sample: unbalanced.

Table 4.8. Debt Structure: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.92	0.15	0.69	0.94	1.00	1.00	1.00	12789
Private	0.92	0.15	0.69	0.95	1.00	1.00	1.00	47149
Foreign	0.89	0.19	0.56	0.92	1.00	1.00	1.00	13365
Size								
Small	0.94	0.14	0.76	1.00	1.00	1.00	1.00	27506
Medium	0.90	0.17	0.64	0.91	1.00	1.00	1.00	33800
Large	0.88	0.17	0.63	0.86	0.97	1.00	1.00	11997
Sector								
Agriculture	0.85	0.16	0.61	0.78	0.90	1.00	1.00	7085
Construction	0.96	0.11	0.86	1.00	1.00	1.00	1.00	10101
Manufacturing	0.91	0.17	0.65	0.93	1.00	1.00	1.00	31276
Utilities	0.91	0.17	0.64	0.96	1.00	1.00	1.00	4554
Trade	0.92	0.16	0.68	0.98	1.00	1.00	1.00	20287

Sample: unbalanced.

Table 4.9. Current Ratio: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.72	0.58	0.21	0.40	0.60	0.82	1.31	12625
Private	0.81	0.65	0.21	0.44	0.67	0.93	1.50	46166
Foreign	0.89	0.67	0.25	0.53	0.77	1.01	1.64	13443
Size								
Small	0.88	0.69	0.21	0.50	0.75	0.99	1.65	26640
Medium	0.78	0.64	0.21	0.42	0.63	0.90	1.47	33471
Large	0.71	0.52	0.22	0.42	0.61	0.83	1.26	12123
Sector								
Agriculture	0.48	0.42	0.14	0.25	0.36	0.53	0.92	7183
Construction	0.85	0.63	0.26	0.51	0.74	0.97	1.49	9791
Manufacturing	0.85	0.68	0.23	0.47	0.70	0.96	1.61	30857
Utilities	0.80	0.63	0.23	0.45	0.66	0.90	1.45	4464
Trade	0.84	0.63	0.25	0.50	0.72	0.95	1.51	19939

Sample: unbalanced.

Table 4.10. Return on Assets: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.05	0.16	−0.12	0.02	0.06	0.11	0.20	12790
Private	0.09	0.19	−0.10	0.03	0.08	0.15	0.31	45685
Foreign	0.10	0.18	−0.10	0.03	0.10	0.17	0.32	13578
Size								
Small	0.10	0.21	−0.13	0.02	0.09	0.17	0.36	26502
Medium	0.08	0.17	−0.10	0.03	0.08	0.13	0.27	33378
Large	0.07	0.14	−0.06	0.04	0.08	0.12	0.21	12173
Sector								
Agriculture	0.06	0.12	−0.07	0.03	0.07	0.10	0.16	7277
Construction	0.09	0.21	−0.13	0.03	0.09	0.17	0.35	9494
Manufacturing	0.09	0.19	−0.12	0.03	0.09	0.16	0.31	30573
Utilities	0.09	0.17	−0.05	0.04	0.08	0.14	0.28	4539
Trade	0.08	0.18	−0.10	0.03	0.07	0.13	0.28	20170

Sample: unbalanced.

Table 4.11. Return on Equity: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.11	0.39	−0.17	0.03	0.08	0.15	0.39	12623
Private	0.27	0.49	−0.12	0.05	0.15	0.37	0.90	45798
Foreign	0.29	0.49	−0.14	0.08	0.21	0.40	0.89	13269
Size								
Small	0.36	0.54	−0.11	0.08	0.26	0.54	1.04	26498
Medium	0.21	0.45	−0.14	0.04	0.12	0.26	0.71	33148
Large	0.11	0.33	−0.13	0.04	0.09	0.16	0.35	12044
Sector								
Agriculture	0.05	0.24	−0.14	0.01	0.06	0.10	0.18	7255
Construction	0.36	0.56	−0.11	0.07	0.25	0.52	1.07	9635
Manufacturing	0.25	0.48	−0.15	0.06	0.16	0.35	0.83	30450
Utilities	0.23	0.42	−0.04	0.05	0.12	0.27	0.73	4516
Trade	0.26	0.49	−0.13	0.05	0.14	0.35	0.88	19834

Sample: unbalanced.

Table 4.12. Asset Turnover: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	1.58	1.27	0.29	0.79	1.26	1.90	3.33	12781
Private	2.00	1.52	0.42	0.96	1.60	2.52	4.17	46040
Foreign	1.60	1.21	0.35	0.87	1.33	1.92	3.14	13560
Size								
Small	2.12	1.62	0.27	1.05	1.81	2.74	4.44	26596
Medium	1.77	1.35	0.43	0.90	1.40	2.16	3.64	33620
Large	1.47	1.10	0.42	0.80	1.16	1.68	2.96	12165
Sector								
Agriculture	0.85	0.59	0.39	0.61	0.76	0.93	1.32	7296
Construction	2.28	1.55	0.38	1.32	2.07	2.90	4.43	9773
Manufacturing	1.71	1.25	0.45	0.97	1.41	2.02	3.36	31220
Utilities	1.76	1.53	0.26	0.73	1.34	2.14	4.01	4515
Trade	2.24	1.62	0.31	1.15	2.00	2.93	4.49	19577

Sample: unbalanced.

Table 4.13. Gross Margin: distribution by sub-sample

Variable	Mean	St.D.	10th	30th	50th	70th	90th	N.Obs.
Ownership								
State	0.02	0.21	−0.12	0.02	0.05	0.08	0.16	12428
Private	0.04	0.19	−0.09	0.02	0.05	0.09	0.19	45431
Foreign	0.06	0.21	−0.10	0.03	0.07	0.13	0.25	12974
Size								
Small	0.05	0.23	−0.11	0.02	0.05	0.10	0.21	25769
Medium	0.04	0.18	−0.11	0.02	0.05	0.10	0.18	33118
Large	0.05	0.17	−0.06	0.03	0.06	0.10	0.18	11946
Sector								
Agriculture	0.06	0.18	−0.11	0.04	0.09	0.13	0.21	7136
Construction	0.03	0.21	−0.12	0.02	0.05	0.09	0.18	9659
Manufacturing	0.04	0.21	−0.12	0.03	0.06	0.11	0.21	30161
Utilities	0.07	0.18	−0.04	0.04	0.07	0.11	0.21	4457
Trade	0.03	0.19	−0.07	0.01	0.03	0.07	0.16	19420

Sample: unbalanced.

Table 4.14. Distribution dynamics: Debt Ratio

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.35	0.25	0.30	0.74	0.35	0.20	0.33	0.62	6114
1990	0.42	0.27	0.36	0.84	0.38	0.22	0.33	0.70	5985
1991	0.45	0.30	0.38	0.90	0.36	0.23	0.30	0.71	5975
1992	0.51	0.37	0.44	0.97	0.36	0.23	0.29	0.71	9331
1993	0.47	0.32	0.40	0.92	0.35	0.24	0.28	0.72	6832
1994	0.48	0.32	0.43	0.92	0.36	0.23	0.30	0.70	6911
1995	0.50	0.32	0.44	0.94	0.36	0.22	0.30	0.70	6976
1996	0.51	0.33	0.45	0.93	0.37	0.21	0.32	0.66	6903
1997	0.52	0.32	0.48	0.92	0.37	0.21	0.34	0.68	5851
1998	0.51	0.30	0.48	0.90	0.38	0.23	0.35	0.71	5761
1999	0.50	0.28	0.48	0.88	0.40	0.24	0.35	0.74	5514
Overall	0.48	0.32	0.42	0.90	0.37	0.22	0.32	0.69	72153

Table 4.15. Distribution dynamics: Bank Debt Ratio

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.05	0.09	0.00	0.17	0.04	0.08	0.00	0.14	6127
1990	0.07	0.11	0.00	0.22	0.06	0.10	0.01	0.18	6119
1991	0.07	0.12	0.00	0.24	0.07	0.11	0.01	0.21	6114
1992	0.10	0.17	0.00	0.33	0.09	0.14	0.04	0.25	9539
1993	0.13	0.19	0.03	0.42	0.09	0.14	0.03	0.27	6799
1994	0.13	0.20	0.03	0.42	0.09	0.14	0.04	0.28	6889
1995	0.15	0.22	0.04	0.47	0.10	0.14	0.04	0.30	7134
1996	0.16	0.23	0.04	0.51	0.10	0.14	0.04	0.29	5999
1997	0.15	0.22	0.04	0.48	0.11	0.16	0.04	0.32	5995
1998	0.15	0.22	0.05	0.47	0.11	0.16	0.04	0.34	5903
1999	0.15	0.21	0.05	0.46	0.11	0.16	0.03	0.32	5651
Overall	0.12	0.19	0.01	0.38	0.09	0.14	0.03	0.27	72269

Table 4.16. Distribution dynamics: Coverage Ratio

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.06	0.11	0.00	0.22	0.04	0.08	0.00	0.14	5939
1990	0.16	0.28	0.00	0.57	0.10	0.20	0.00	0.30	6086
1991	0.26	0.38	0.00	1.00	0.17	0.30	0.00	0.63	6061
1992	0.26	0.40	0.00	1.00	0.28	0.37	0.07	1.00	9459
1993	0.35	0.41	0.15	1.00	0.28	0.34	0.13	1.00	7015
1994	0.29	0.38	0.08	1.00	0.27	0.33	0.13	1.00	7127
1995	0.30	0.37	0.12	1.00	0.27	0.33	0.11	1.00	7123
1996	0.26	0.35	0.08	1.00	0.24	0.31	0.11	0.77	6914
1997	0.24	0.34	0.06	1.00	0.23	0.30	0.09	0.64	5985
1998	0.23	0.33	0.06	1.00	0.23	0.31	0.07	0.90	5895
1999	0.24	0.33	0.08	1.00	0.25	0.33	0.10	1.00	5656
Overall	0.25	0.36	0.04	1.00	0.22	0.31	0.06	0.79	73260

Table 4.17. Distribution dynamics: Debt Structure

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.95	0.11	1.00	1.00	0.97	0.09	1.00	1.00	5927
1990	0.95	0.12	1.00	1.00	0.96	0.09	1.00	1.00	6094
1991	0.95	0.11	1.00	1.00	0.97	0.08	1.00	1.00	6097
1992	0.93	0.14	1.00	1.00	0.88	0.17	0.96	1.00	9483
1993	0.91	0.17	1.00	1.00	0.87	0.18	0.98	1.00	6951
1994	0.90	0.17	1.00	1.00	0.88	0.17	0.99	1.00	7050
1995	0.90	0.17	1.00	1.00	0.88	0.17	0.99	1.00	7129
1996	0.90	0.17	1.00	1.00	0.89	0.16	1.00	1.00	7044
1997	0.89	0.18	1.00	1.00	0.87	0.18	0.99	1.00	5986
1998	0.88	0.19	1.00	1.00	0.88	0.17	0.98	1.00	5900
1999	0.89	0.18	1.00	1.00	0.89	0.17	0.99	1.00	5642
Overall	0.91	0.16	1.00	1.00	0.90	0.16	1.00	1.00	73303

Table 4.18. Distribution dynamics: Current Ratio

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.49	0.32	0.46	0.94	0.54	0.29	0.53	0.93	6105
1990	0.62	0.40	0.56	1.09	0.59	0.31	0.56	0.98	5997
1991	0.74	0.55	0.63	1.39	0.60	0.34	0.57	1.01	5987
1992	0.85	0.69	0.71	1.63	0.58	0.36	0.49	1.00	9342
1993	0.85	0.67	0.69	1.65	0.61	0.43	0.51	1.07	6849
1994	0.85	0.65	0.71	1.63	0.62	0.43	0.51	1.09	6949
1995	0.87	0.71	0.71	1.64	0.64	0.50	0.52	1.12	6980
1996	0.89	0.73	0.72	1.69	0.67	0.50	0.55	1.13	6906
1997	0.89	0.69	0.74	1.63	0.66	0.49	0.55	1.08	5845
1998	0.89	0.68	0.74	1.64	0.69	0.54	0.58	1.17	5762
1999	0.89	0.65	0.76	1.58	0.76	0.60	0.65	1.35	5512
Overall	0.81	0.64	0.67	1.50	0.63	0.45	0.55	1.07	72234

Table 4.19. Distribution dynamics: Return on Assets

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.15	0.13	0.11	0.34	0.13	0.10	0.11	0.25	6109
1990	0.12	0.15	0.10	0.32	0.13	0.10	0.11	0.26	5950
1991	0.06	0.18	0.06	0.29	0.09	0.12	0.07	0.23	5962
1992	0.02	0.23	0.04	0.27	0.07	0.12	0.07	0.20	9354
1993	0.05	0.17	0.05	0.24	0.07	0.11	0.05	0.18	6857
1994	0.06	0.16	0.06	0.24	0.07	0.11	0.06	0.20	6896
1995	0.09	0.18	0.09	0.30	0.09	0.12	0.08	0.25	6977
1996	0.09	0.18	0.09	0.31	0.09	0.14	0.08	0.25	6770
1997	0.10	0.18	0.10	0.31	0.09	0.12	0.08	0.24	5858
1998	0.11	0.17	0.10	0.32	0.08	0.13	0.07	0.24	5779
1999	0.11	0.15	0.10	0.30	0.07	0.13	0.07	0.21	5541
Overall	0.08	0.18	0.08	0.29	0.09	0.12	0.08	0.23	72053

Table 4.20. Distribution dynamics: Return on Equity

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.26	0.27	0.15	0.69	0.21	0.20	0.17	0.42	5993
1990	0.28	0.38	0.15	0.86	0.23	0.26	0.16	0.49	5931
1991	0.21	0.47	0.09	0.86	0.15	0.30	0.08	0.42	5921
1992	0.23	0.68	0.08	1.07	0.12	0.34	0.05	0.48	9330
1993	0.18	0.50	0.08	0.82	0.11	0.27	0.06	0.42	6822
1994	0.23	0.49	0.11	0.83	0.12	0.28	0.07	0.41	6880
1995	0.26	0.49	0.14	0.88	0.14	0.25	0.08	0.44	6963
1996	0.28	0.47	0.17	0.85	0.14	0.28	0.08	0.43	6742
1997	0.28	0.43	0.20	0.81	0.13	0.24	0.08	0.40	5835
1998	0.29	0.43	0.21	0.78	0.11	0.25	0.08	0.41	5756
1999	0.25	0.39	0.20	0.70	0.09	0.25	0.08	0.38	5517
Overall	0.25	0.48	0.14	0.84	0.14	0.27	0.09	0.42	71690

Table 4.21. Distribution dynamics: Asset Turnover

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	1.38	1.12	1.10	3.12	1.95	1.41	1.57	4.11	6131
1990	1.97	1.37	1.55	4.03	2.18	1.33	1.77	4.21	6019
1991	1.88	1.41	1.42	3.90	1.94	1.12	1.62	3.50	6023
1992	1.67	1.50	1.21	3.81	1.73	1.08	1.50	3.17	9547
1993	1.65	1.41	1.23	3.65	1.69	1.09	1.49	2.99	6828
1994	1.81	1.47	1.39	3.87	1.75	1.11	1.56	3.15	6887
1995	1.96	1.52	1.55	4.08	1.81	1.11	1.61	3.31	6963
1996	2.01	1.53	1.60	4.12	1.84	1.14	1.65	3.38	6889
1997	2.08	1.46	1.77	4.06	1.84	1.13	1.69	3.44	5837
1998	2.08	1.42	1.80	4.04	1.89	1.19	1.74	3.48	5748
1999	1.97	1.32	1.72	3.79	1.80	1.21	1.60	3.34	5509
Overall	1.85	1.44	1.47	3.87	1.86	1.19	1.61	3.55	72381

Table 4.22. Distribution dynamics: Gross Margin

	Unbalanced sample				Balanced sample				
Year	Mean	St.D.	50th	90th	Mean	St.D.	50th	90th	N.Obs.
1989	0.17	0.25	0.10	0.33	0.12	0.19	0.07	0.22	5685
1990	0.07	0.10	0.06	0.18	0.08	0.08	0.05	0.18	5998
1991	0.03	0.14	0.04	0.17	0.05	0.09	0.04	0.15	5967
1992	−0.04	0.31	0.03	0.17	0.04	0.10	0.04	0.15	9117
1993	0.01	0.20	0.04	0.17	0.04	0.10	0.04	0.14	6787
1994	0.03	0.16	0.04	0.17	0.05	0.10	0.04	0.14	6849
1995	0.04	0.18	0.05	0.19	0.06	0.11	0.05	0.17	6900
1996	0.05	0.17	0.06	0.20	0.05	0.12	0.05	0.15	6690
1997	0.06	0.14	0.06	0.20	0.05	0.10	0.04	0.16	5725
1998	0.06	0.14	0.06	0.20	0.05	0.11	0.04	0.16	5672
1999	0.07	0.13	0.06	0.21	0.04	0.12	0.04	0.17	5443
Overall	0.04	0.20	0.05	0.19	0.06	0.12	0.04	0.17	70833

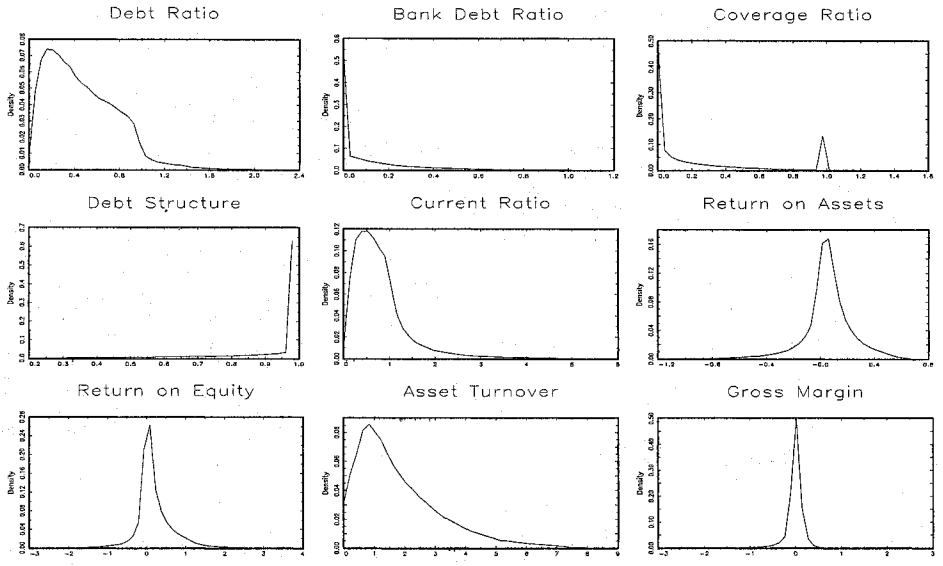

Fig. 4.1. Financial ratios: distribution density (unbalanced sample)

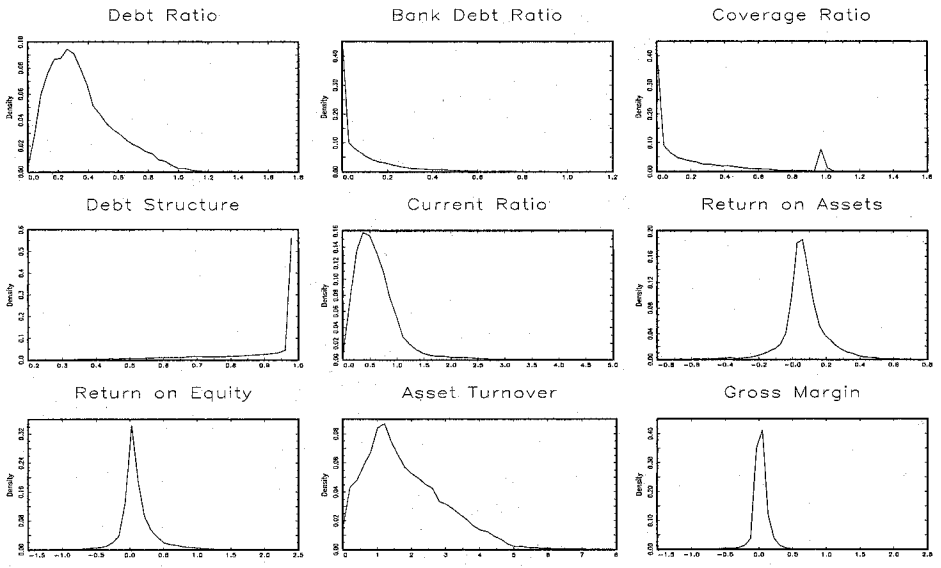

Fig. 4.2. Financial ratios: distribution density (balanced sample)

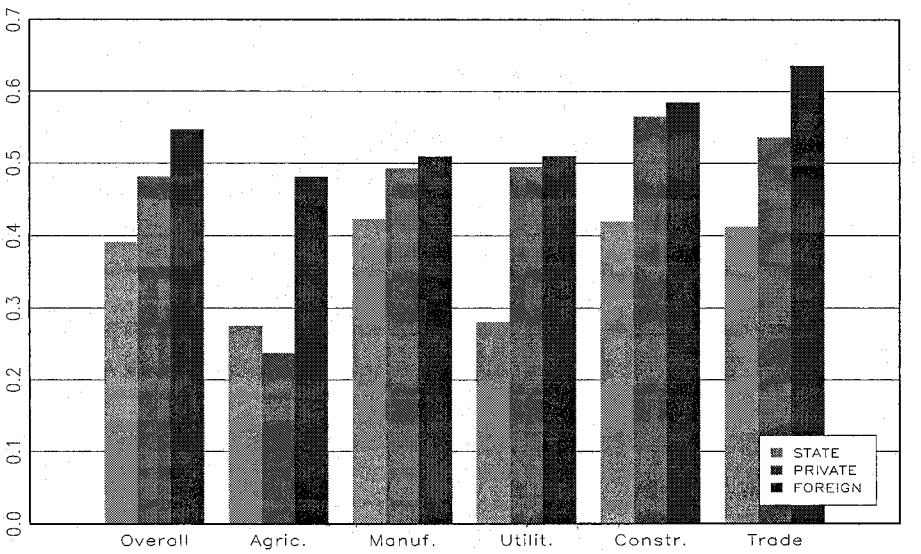

Fig. 4.3. Averages by sector and ownership: Debt Ratio

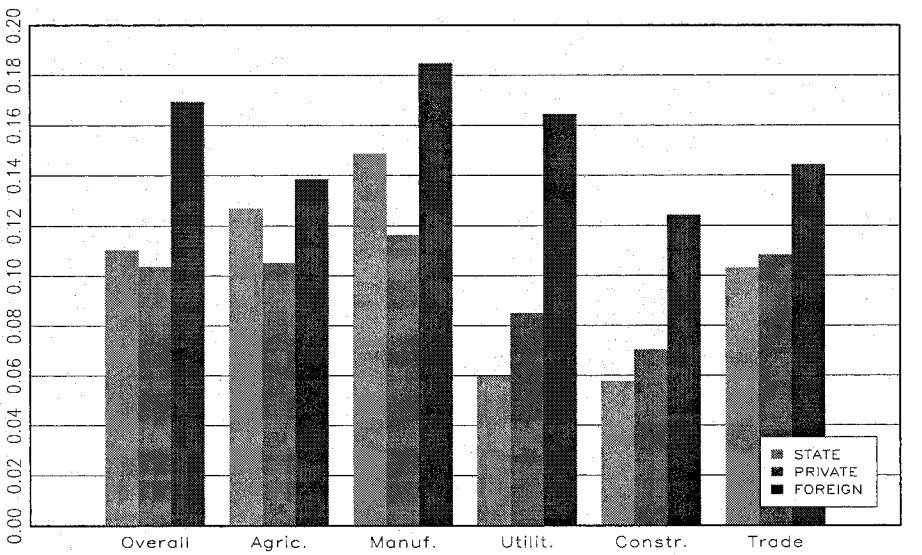

Fig. 4.4. Averages by sector and ownership: Bank Debt Ratio

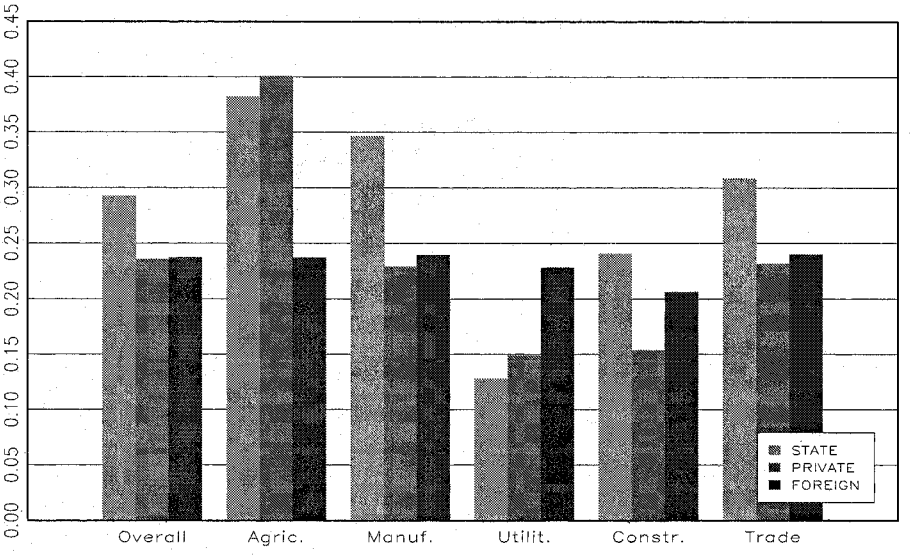

Fig. 4.5. Averages by sector and ownership: Coverage Ratio

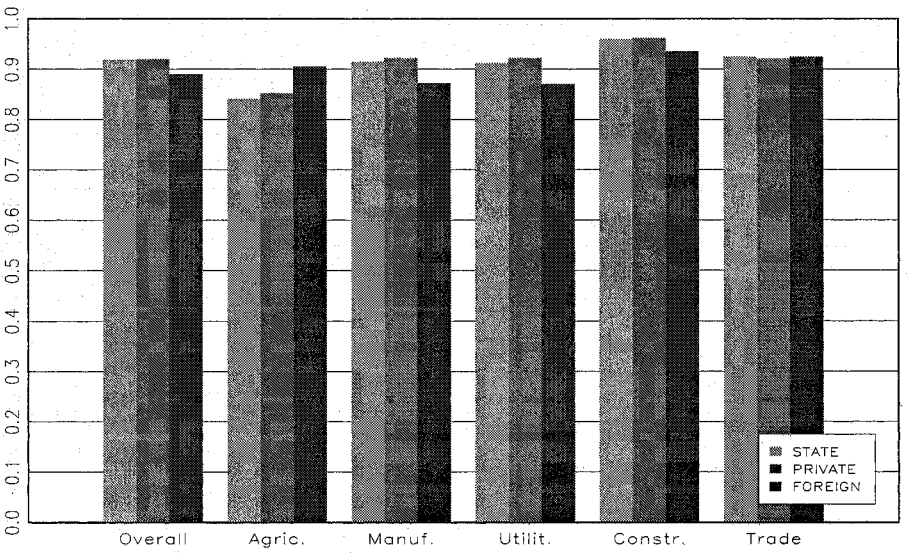

Fig. 4.6. Averages by sector and ownership: Debt Structure

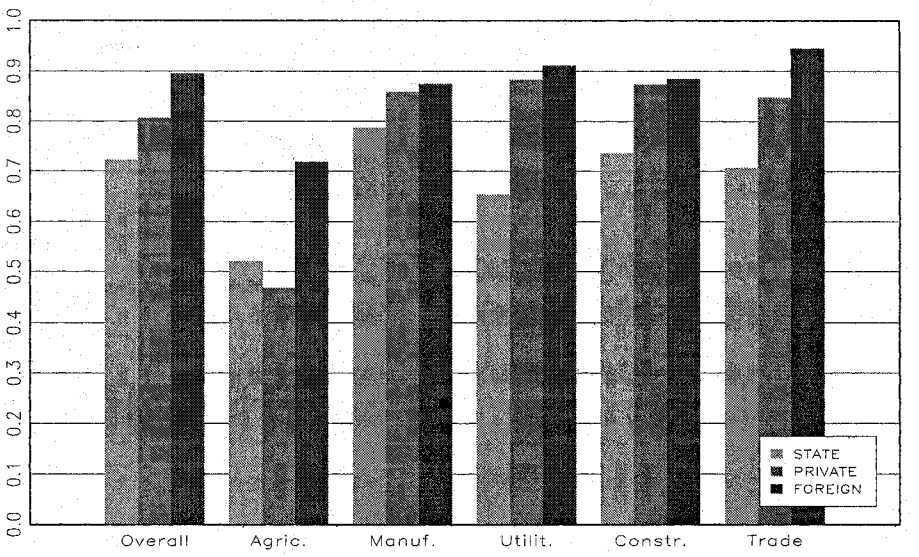

Fig. 4.7. Averages by sector and ownership: Current Ratio

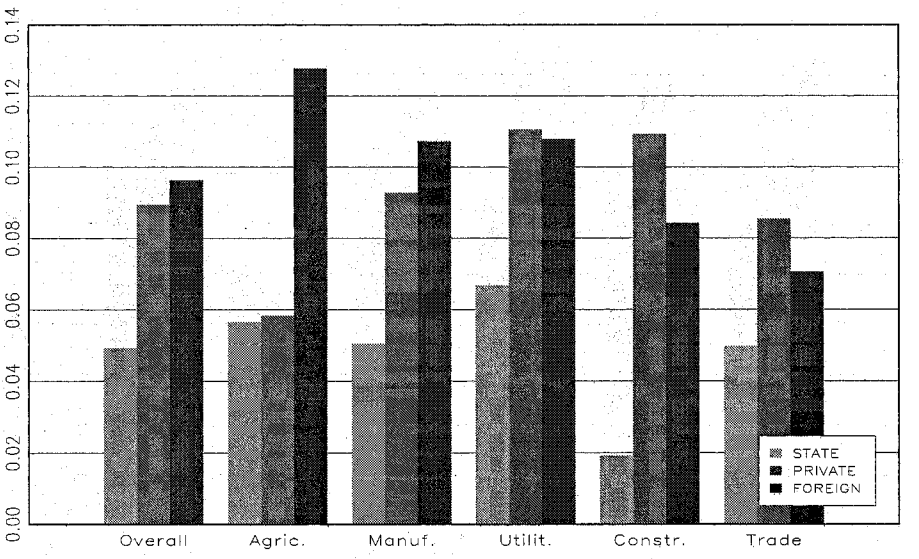

Fig. 4.8. Averages by sector and ownership: Return on Assets

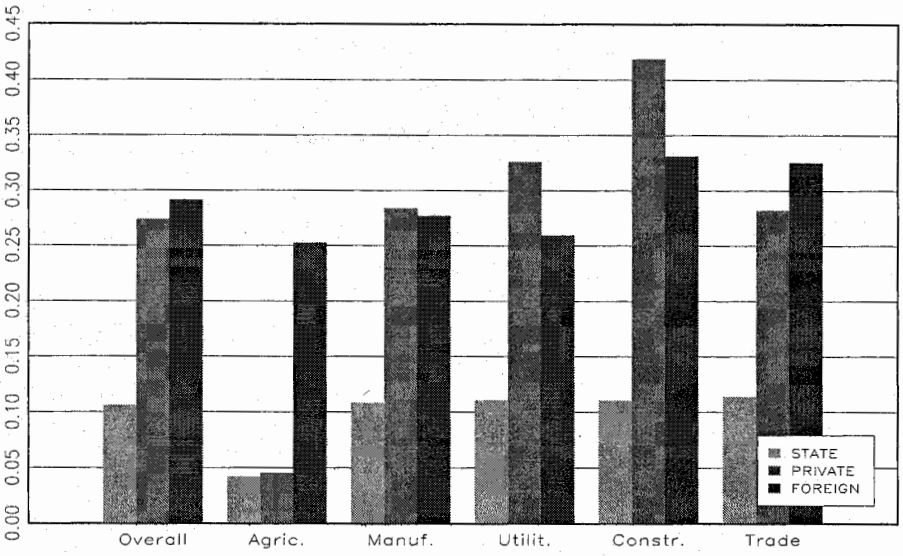

Fig. 4.9. Averages by sector and ownership: Return on Equity

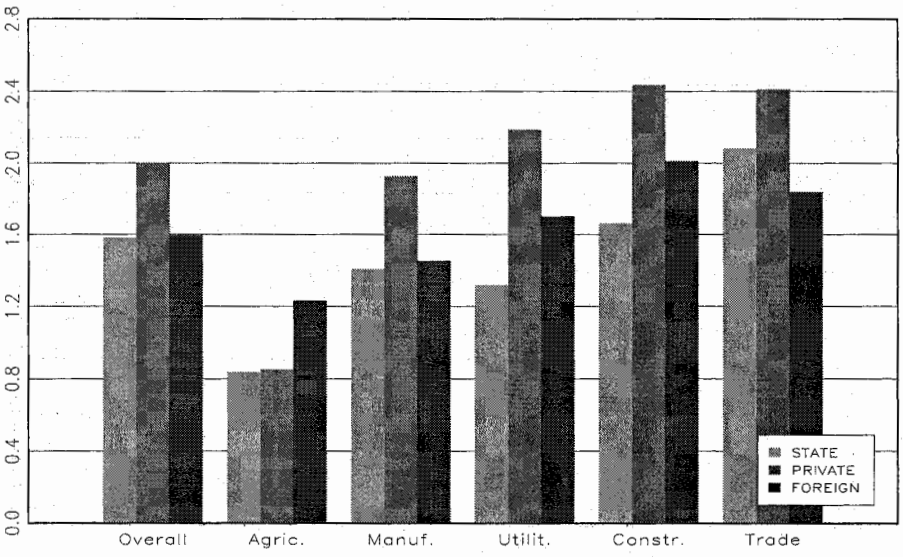

Fig. 4.10. Averages by sector and ownership: Asset Turnover

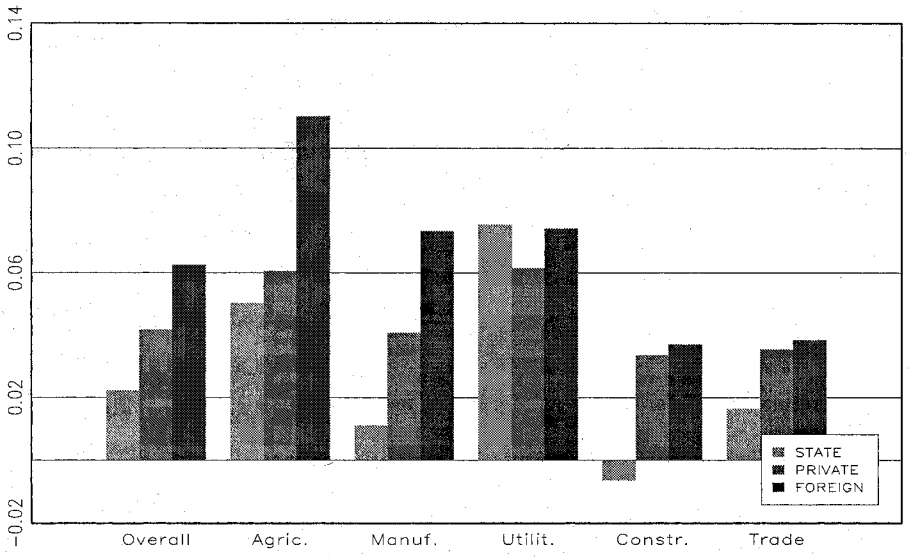

Fig. 4.11. Averages by sector and ownership: Gross Margin

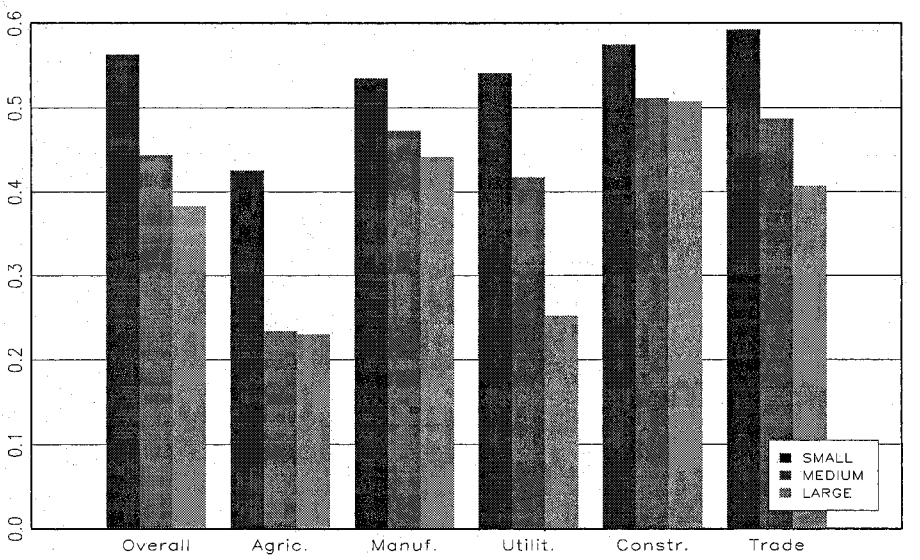

Fig. 4.12. Averages by sector and size: Debt Ratio

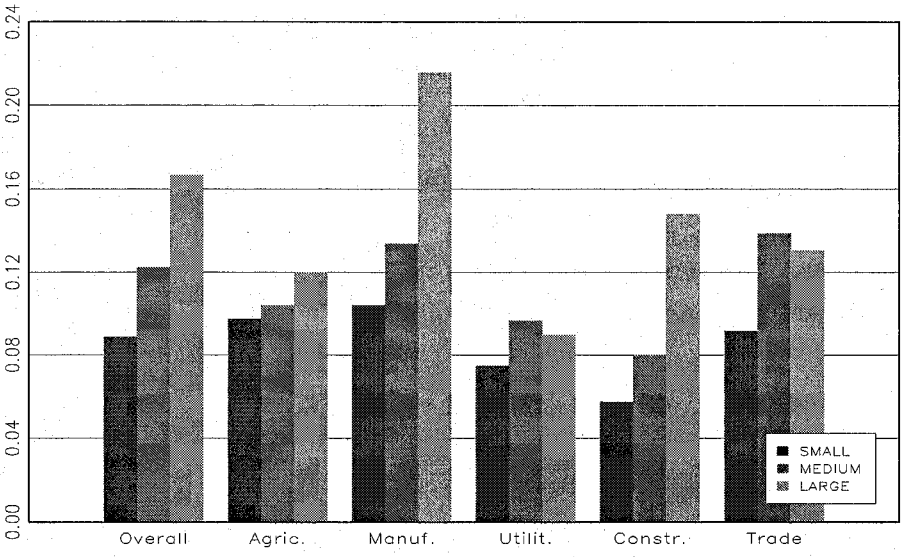

Fig. 4.13. Averages by sector and size: Bank Debt Ratio

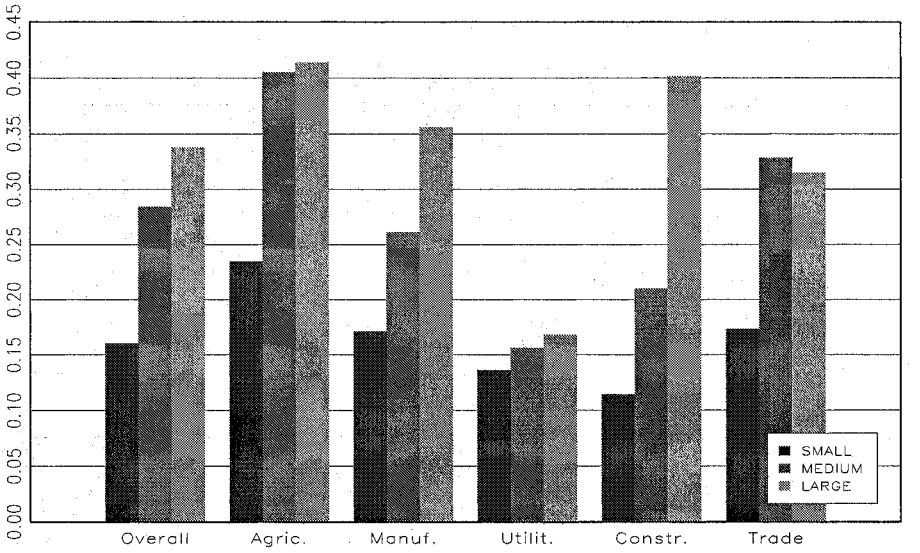

Fig. 4.14. Averages by sector and size: Coverage Ratio

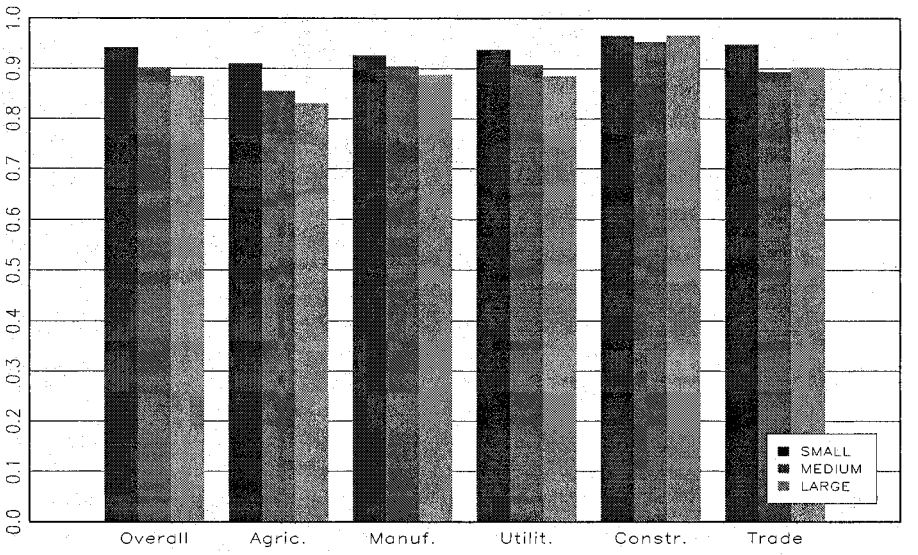

Fig. 4.15. Averages by sector and size: Debt Structure

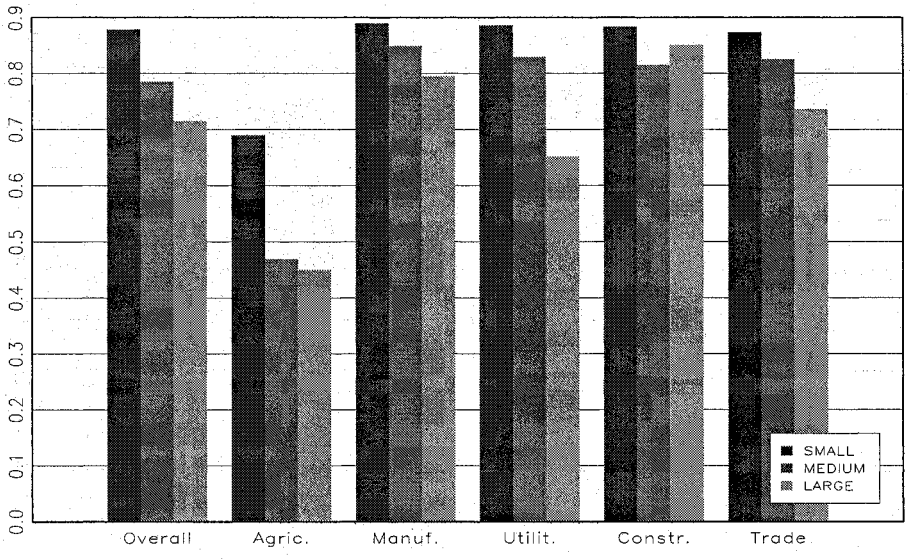

Fig. 4.16. Averages by sector and size: Current Ratio

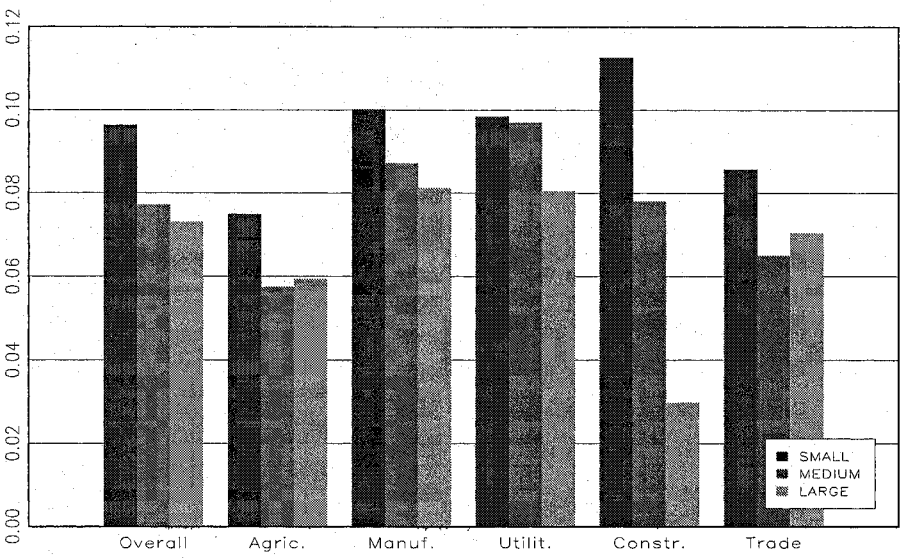

Fig. 4.17. Averages by sector and size: Return on Assets

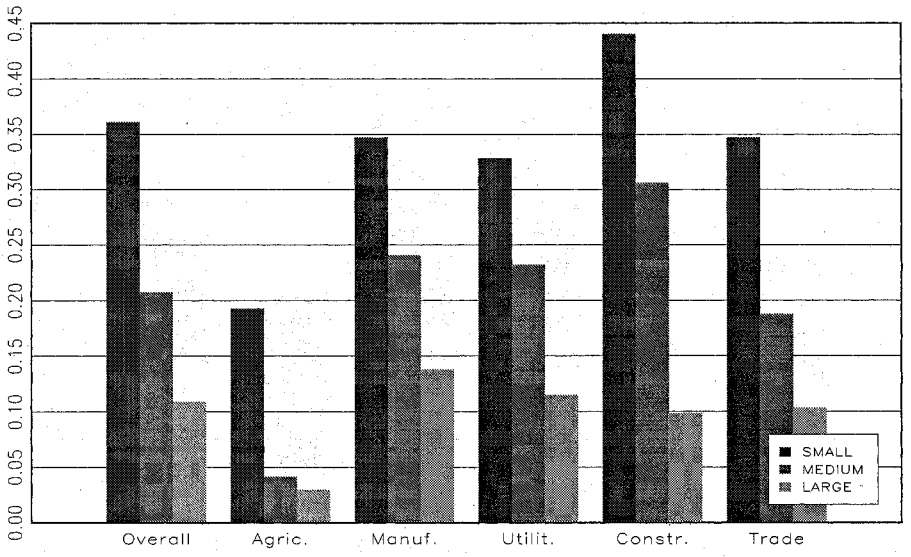

Fig. 4.18. Averages by sector and size: Return on Equity

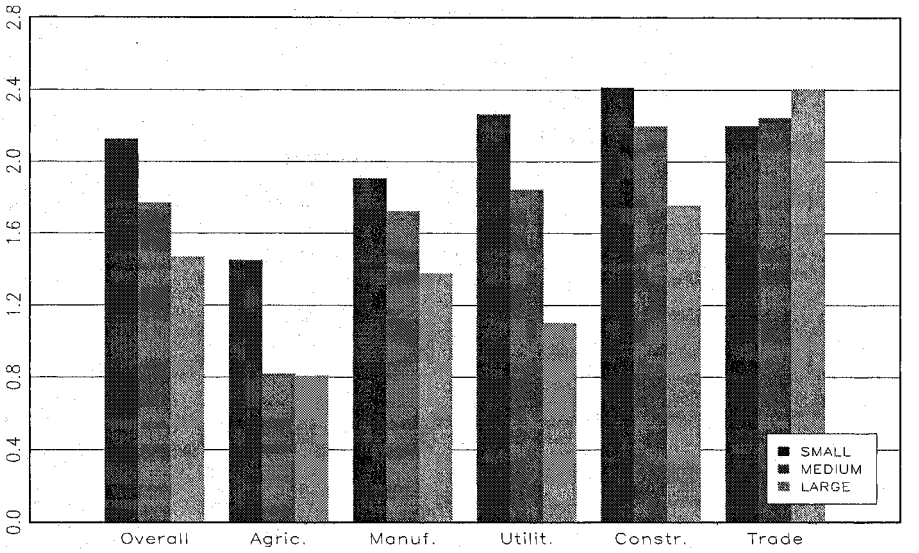

Fig. 4.19. Averages by sector and size: Asset Turnover

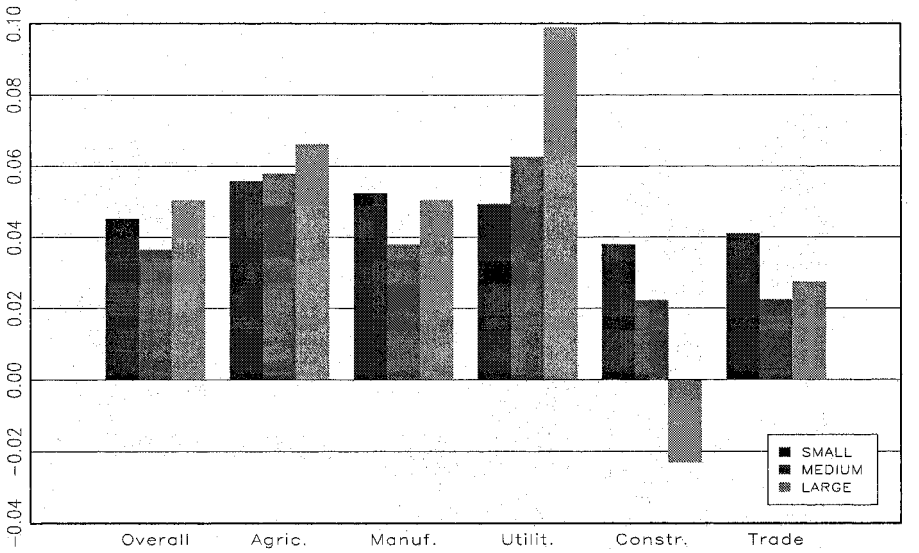

Fig. 4.20. Averages by sector and size: Gross Margin

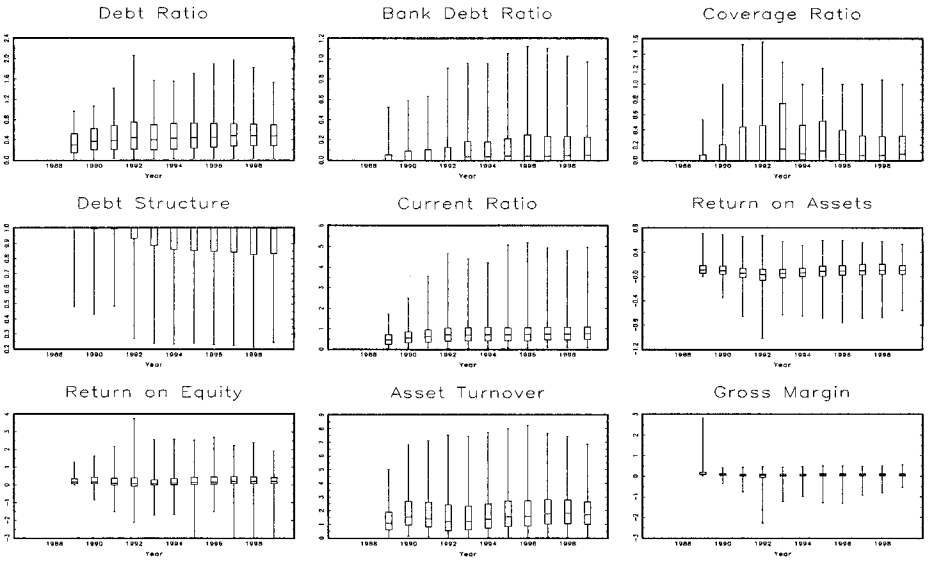

Fig. 4.21. Financial ratios: distribution dynamics (unbalanced sample)

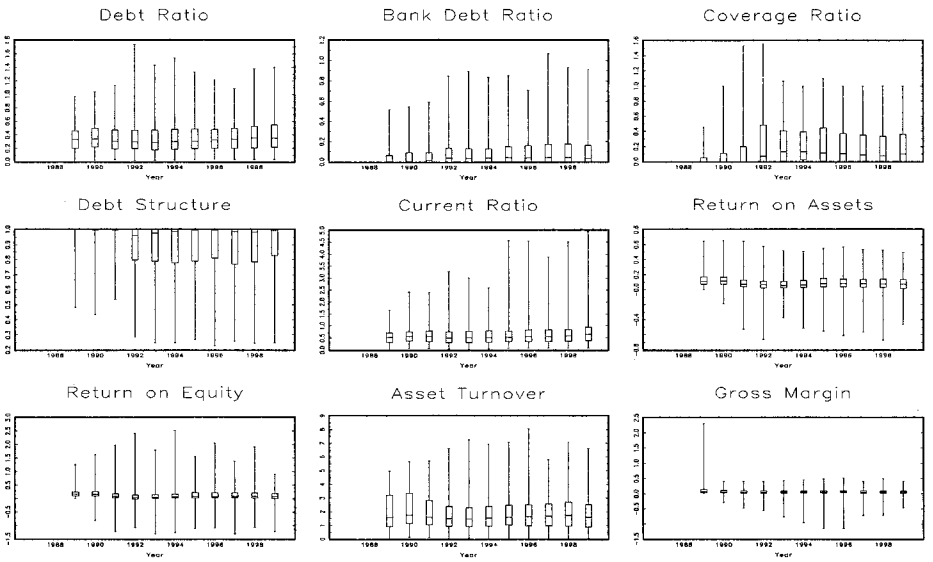

Fig. 4.22. Financial ratios: distribution dynamics (balanced sample)

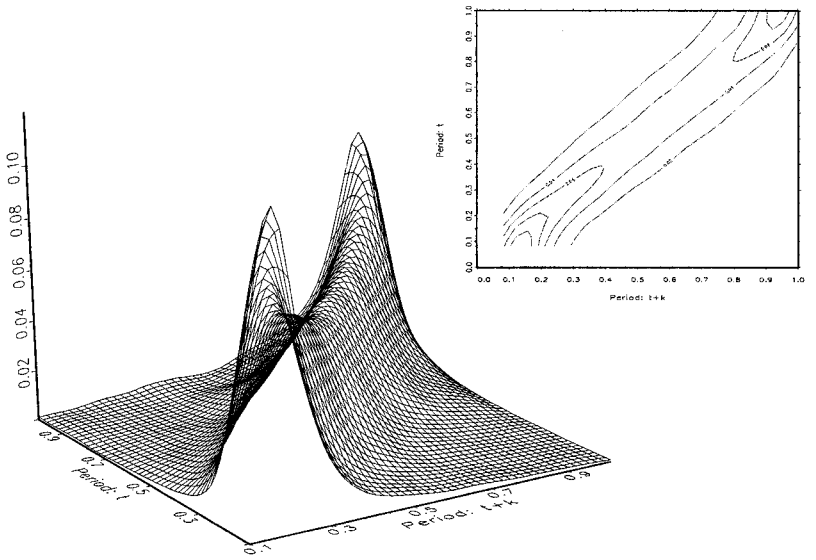

Fig. 4.23. Stochastic kernel: Debt Ratio

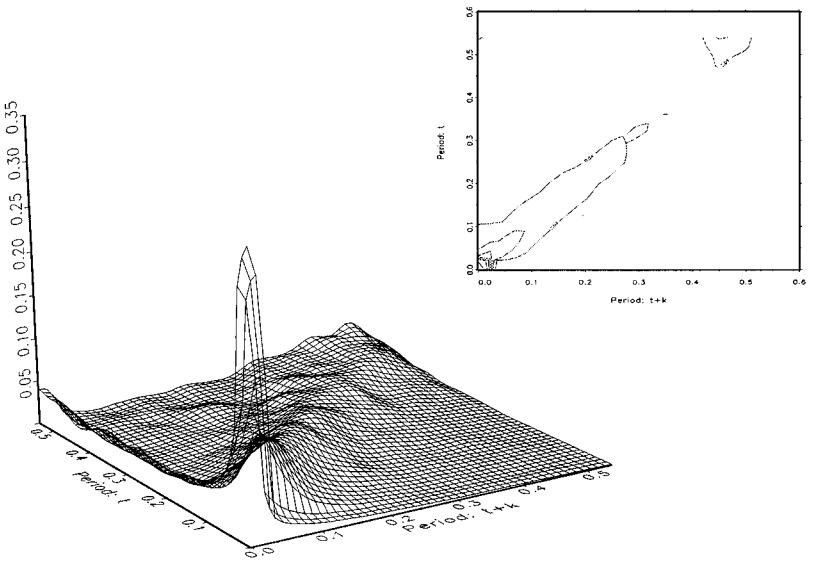

Fig. 4.24. Stochastic kernel: Bank Debt Ratio

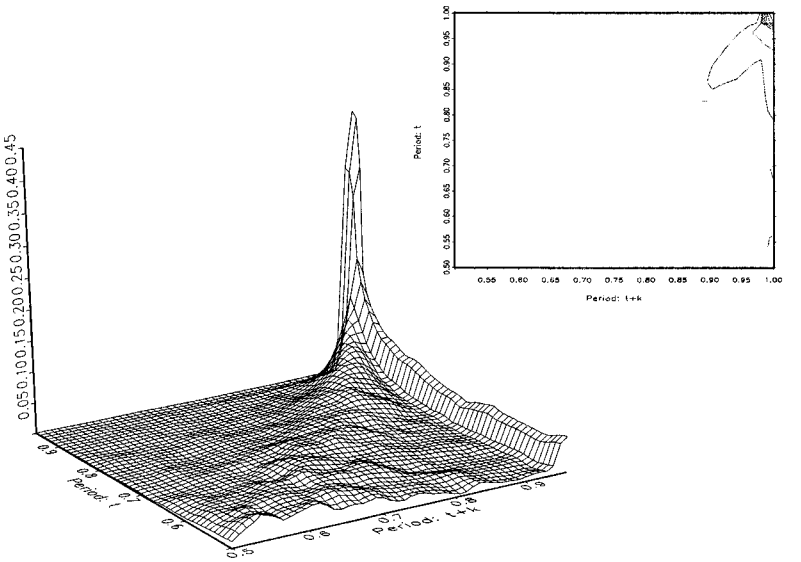

Fig. 4.25. Stochastic kernel: Debt Structure

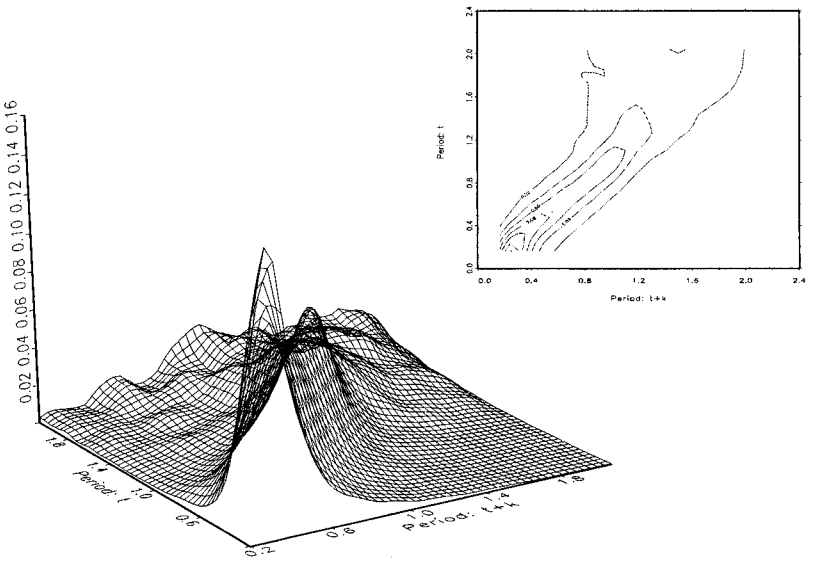

Fig. 4.26. Stochastic kernel: Current Ratio

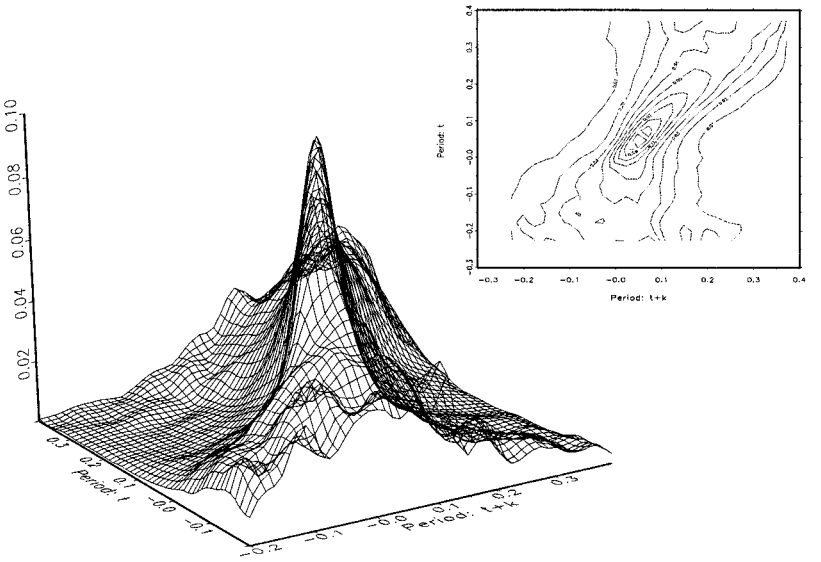

Fig. 4.27. Stochastic kernel: Return on Assets

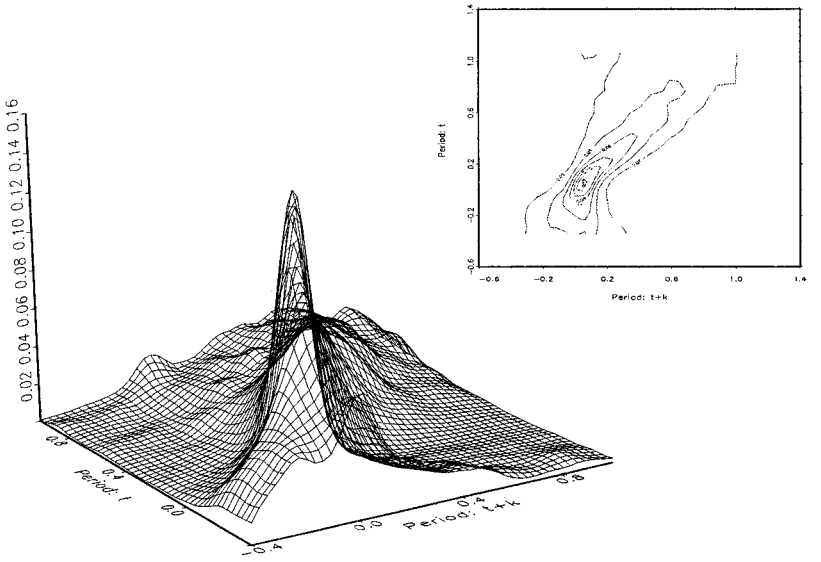

Fig. 4.28. Stochastic kernel: Return on Equity

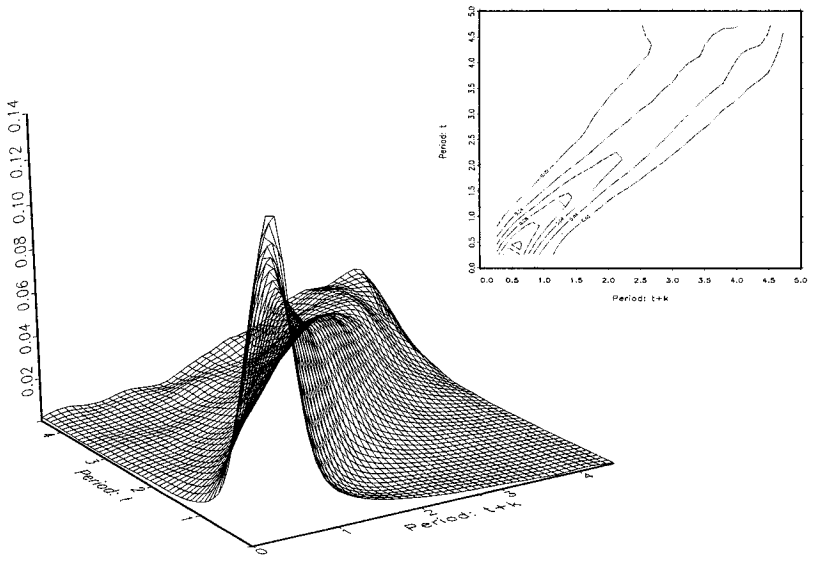

Fig. 4.29. Stochastic kernel: Asset Turnover

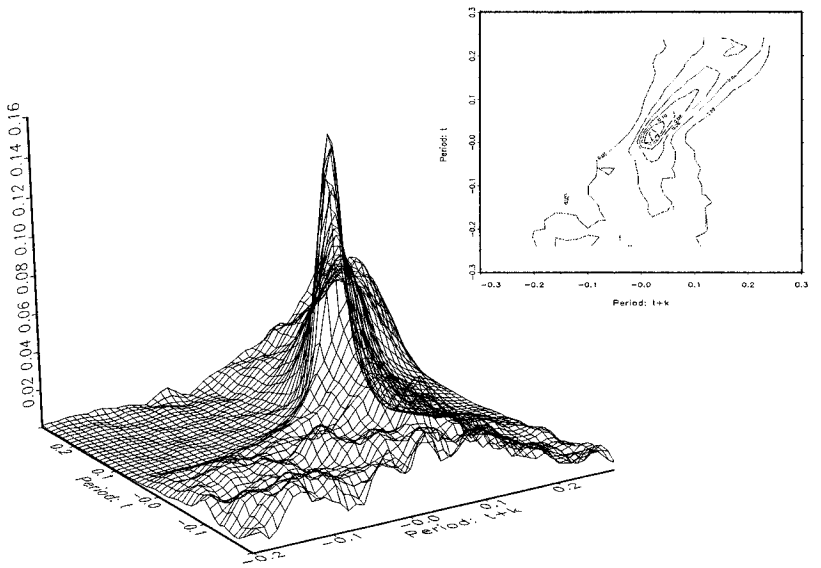

Fig. 4.30. Stochastic kernel: Gross Margin

5

The determinants of corporate capital structure

5.1 Introduction

Following the descriptive analysis of financial ratios in the previous chapter, this chapter investigates the determinants of corporate capital structure and, in particular, bank debt. This analysis also aims at revealing the existence of constraints on firms' choices, thus providing information on the degree of imperfections that characterise credit and financial markets in Hungary. It should be noted, however, that our analysis does not represent a direct a test for the presence of financial market imperfections. It is rather an empirical investigation of firms' capital structure that can *indirectly* reveal the presence of such imperfections.

The empirical literature on capital structure choice is vast, mainly referring to industrialised countries (see e.g. Titman and Wessels (1988) and Rajan and Zingales (1995)), but also to Eastern European economies: Cornelli *et al.* (1998) for Hungary and Poland, Revoltella (1998) for the Czech Republic, and Carare and Perotti (1997) for Romania. Nevertheless, while in all the above mentioned works the analysis is conducted on cross-section data, we analyse panel data spanning over 10 years of the transition process. The panel structure of the data set and the size of both the sectional and time dimensions can considerably improve our understanding of the determinants of firms' capital structure in transition economies.

The chapter is organised as follows: Sec. 5.2 introduces the theoretical framework, Sec. 5.3 describes the data set and provides some descriptive statistics, Sec. 5.4 discusses the methodology, and Sec. 5.5 presents the results.

5.2 The theory

As emphasised in chapter 2, the analysis of corporate capital structure assumes relevance mainly in the presence of financial market imperfections. It is

because of such imperfections that different financing methods become imperfect substitutes and determine the existence of an optimal capital structure. We have also argued that there are two good reasons why these imperfections are likely to be particularly severe in Eastern Europe.

The first is that in the planned system, banks did not carry out monitoring or risk assessment activities: they were lending to firms what was stated in the plan, but they were not actually concerned with the creditworthiness of the borrower, given that the solvency of the whole system was guaranteed by the state. As a consequence, even if there existed a relationship between borrowers and lenders, this relationship was largely uninformative. With the beginning of transition, lenders had to learn to be concerned about the creditworthiness of borrowers. However, on the one hand the former did not have any experience in monitoring activity, and on the other hand the latter did not have a credit history or reputation to rely on.

The second reason is the economic instability that characterised the early stages of transition. In an unstable economic system, current performance is a poor indicator of future performance. Therefore, not only borrowers did not have a reputation deriving from the past, but they also had great difficulties in building one *ex novo*. In this context, the informational problems that are likely to emerge may cause severe forms of credit rationing and constrain firms in their capital structure decisions.

In this section we analyse from a theoretical perspective the factors that are likely to affect the capital structure of firms. We will not consider theories based on tax considerations, that give rise to what are called static trade/off models.[1] We focus instead on the theories that emphasise the relevance of informational failures, known also as *pecking order* theories (see Harris and Raviv, 1991). The reason for such a choice is twofold: firstly, as recently shown by Shyam-Sunder and Myers (1999), the pecking order theory describes extremely well corporate structure decisions, while the same does not apply to tests of the static trade-off theories. The second and more important reason is that the measure of debt used in the present analysis is short term debt. It is well known that tax rates are more likely to affect long term debt decisions rather than short term ones.

Nevertheless, it should be noted that "pecking order" theories have to be amended in order to be applicable to the context of Eastern Europe. In particular, the limited size of equity markets in transitional economies has so far excluded an important element in the choice about the capital structure, whereas the widespread use of trade credit, inherited from the planned system, has introduced an additional determinant of firms' decisions. In addition, ownership characteristics may also constitute an important factor.

[1] These models identify an optimal capital structure that arises from trading off the tax advantages of borrowing and the bankruptcy costs caused by an excessive level of debt (see Bradley *et al.*, 1984).

We distinguish between demand-side and supply-side determinants of the capital structure. It should be noted, however, that while this distinction is very important at the theoretical level, it is not easily difficult to be captured at empirical level, as it will become clear in the following.

Supply side

Collateral A positive relationship is expected between tangibility and debt (see Harris and Raviv, 1991). Assets that serve as collateral provide an explicit guarantee over debts and reduce the risk of investment for the banks. We use the ratio of fixed to total assets as a measure of collateral. This measure requires the precise definition and evaluation of fixed assets. This problem is particularly relevant in transitional economies, where fixed assets are often inherited from the planned system, in which prices did not represent a proper measure of value and there was not an efficient secondary market where assets could be traded. We therefore expect this variable to be more informative in the later years of our sample.

Profitability and growth opportunities If current profits are a good indicator of future profits, we should observe a positive relationship between profits and debt Ross (1977). At the same time, if a firm displays good growth opportunities, banks should be more keen to lend to it. We measure the profitability of a firm by the ratio of after tax profits over total assets and its growth opportunities by the ratio of investments over total assets.

Size A positive relationship between firm size and leverage is commonly assumed. Large firms tend to have diversified activities which reduce the risk of bankruptcy. Moreover, reputational reasons induce large firms to be more averse to bankruptcy than small firms. In transitional economies, an important factor to be considered is the implicit bailout clause that can exist for large state-owned firms. These firms are often considered "too big to fail", both because their bankruptcy could have a destabilising effect on the whole economic system and because the loss in terms of employment could be socially unacceptable. The existence of an implicit bailout clause may in turn trigger some perverse behaviour by the banks, who may "gamble for bailout" by refinancing loss-making state-owned firms (see Berglöf and Roland (1995), and Berglöf and Roland, 1997). We measure size with two indicators: one that captures the economic dimension (the logarithm of net sales), and the other capturing the political and social dimension (employment).

Ownership Generally, in transitional economies more competitive firms are mainly new private firms, which are the first to react to the changing environment and to the new standards imposed by international competition. These firms should have better prospects of growth relative to traditional state-owned enterprises. We should therefore expect banks to favour private firms in their lending behaviour. On the other hand, the shield determined by market power, reduces the risk of lending to state-owned firms. Moreover, there is the issue of the implicit bailout clause for large companies that

contributes significantly to reducing investment risk. Whether banks' debt is positively or negatively related to firms' ownership depends on the importance of the growth effect relative to the risk effect.

A different issue is represented by *foreign ownership*: foreign-owned firms, or firms in which foreign companies have a significant share, should certainly represent the best possible investment opportunity for the banks. These firms have a substantially lower bankruptcy risk and are quicker in adjusting to international standards in terms of product quality and internal efficiency. Ownership is measured with two dummies: one indicating if a firm is state owned, and another indicating a foreign share greater than 15%.[2]

Demand side

Cash Flows If there is a "pecking order" in firms' financing decisions, the use of internal resources is preferred to bank debt. As a consequence, firms with higher cash flows will be characterised by reduced leverage, as they substitute external with internal finance. Our measure of cash flows is given by profits before tax, interest and depreciation.

Interenterprise Debt The issue of interenterprise debt has been controversial. Several authors argued that, during the early stages of transition, interenterprise arrears could be a major channel through which soft budget constraints operated Calvo and Coricelli (1994). Later studies (Bonin and Schaffer (1995), Schaffer, 1998) showed that firms learned quickly to implement hard budget constraints in granting commercial credit and that interenterprise debt did not constitute a form of soft budget constraint. But interenterprise debt can still convey some information about the capital structure of firms. In the absence of soft budget constraints associated with interenterprise arrears, the observation of a negative relation between bank debt and interenterprise debt can be a signal of the existence of a pecking order of firms' financial decisions (firms with no access to bank credit would resort to trade credit as a substitute). We measure interenterprise debt as the ratio of the net trade credit position (payables minus receivables) to total assets. As for tangible assets, we expect this variable to show a different behaviour between the beginning and the end of the sample.

5.3 Data and descriptive statistics

As customary for studies on corporate capital structure, we concentrate our analysis on the manufacturing and service sector.[3] Large firms are over-

[2] We also experimented higher thresholds (i.e. 25%) for foreign ownership, without any significant change in the results.

[3] The data set presents the same features and limitations described in the data appendix. It has to be stressed that the results presented in this chapter are largely invariant to the choice of the sample of analysis.

represented relative to the real economy (see the firms' distribution by employment classes reported in Tables 7.8 and 7.10). The data set is an unbalanced panel, with a high turnover of firms due to a large number of entries and exits. In order to check the robustness of the results to the composition of the sample, we report the results for two samples of firms: a balanced sample and an unbalanced sample, the former being the sample of firms for which we have continuous consecutive observations from 1989 to 1999. Tables 5.1 and 5.2 report descriptive statistics for the relevant variables for the two samples of firms.[4]

Employment and ownership structure

The ownership structure of the firms in the sample changed considerably during the period under investigation.[5] The share of state-owned firms dropped from over 20% in 1989 to 11% in 1999, while the share of private firms rose from 49% in 1989 to almost 60% in 1999.[6] This pattern of ownership is quite common in transitional economies.

The mean values of the principal variables by ownership categories (Tables 5.3-5.5) are consistent with some of the priors discussed in the theoretical section. State owned firms are on average larger than joint ventures and private firms. On average state-owned firms are making losses, while joint ventures are more profitable than private firms. This observation can signal the fact that foreign-owned firms restructured more and are therefore more profitable, but also that foreign firms presumably bought shares in better (and more profitable) firms. In the initial years of the sample state-owned firms seem also to have an easier access to financing sources than private firms: both their cash flows and bank debt are higher. This feature, however, is no longer present in the second half of the sample. Joint ventures and private firms invest more than state-owned firms. Finally, state-owned firms display a much lower variability of the variables considered over the time period. This reflects probably two facts: first, the turnover in and out of the sample is lower for state-owned firms than for private firms; second, state-owned firms are less exposed to market competition than private firms.

The amount and distribution of debt

One of the most critical features of Eastern European financial markets was the initial stock of debt with which firms and banks started the transition

[4] The following consistency checks were applied to the data: we dropped from the sample firms which presented negative values for sales, employment, debt (short and long term). In order to control for the presence of outliers we also dropped firms for which any of the variable of interest fell below the 2.5th percentile or above the 97.5th percentile of its distribution.

[5] See Table 7.11 in the data appendix.

[6] The fall in the share of cooperatives in 1994 is due to a change in the definition of cooperatives implemented by the Central Statistical Office at the end of 1993.

process. The presence of a high stock of debt that some firms might be unable to repay, may force banks to roll over the debt in order to keep the firms viable and at the same time keep open the option of having (part of) the debt repaid sometime in the future.

A simple test for the presence of debt rollover is obtained by calculating the correlation coefficients between the *change* in short term debt in period $t+1$ and the level of short term debt in period t. These coefficients are reported in Table 5.6. In the presence of debt rollover, we expect the correlation to be positive. Considering the entire time period, the correlation coefficients are negative, suggesting that the initial stock of debt was not excessively problematic, at least not to the point of triggering debt rollover. This is consistent with the evidence presented in Cornelli *et al.* (1998) that firms in Eastern Europe were not overloaded by debt, compared to western economies. Nevertheless, splitting the sample period in two parts, we note that while in the initial period (1989-1993) the coefficients are mainly negative, in the second period (1994-1999) they are all positive. No clear pattern emerges by distinguishing between state and private firms or between large and small firms.

The switch in the correlation coefficients in the second part of the sample calls for a deeper investigation. This finding can in fact be an indication of debt rollover, or simply of the fact that firms that took on debt were increasing their debt exposure. In order to shed light on this issue we will first analyse the distribution of debt and then perform a test of soft budget constraints.

Even if firms were not on average exposed to an excessive debt burden, there can still be a problem if the *distribution* of debt is the source of concern. If debt is in fact concentrated mainly among loss making firms, bankruptcy may really become a serious issue. In order to check for this, we plotted the conditional distribution of debt over after-tax profits of the same year. Looking at Fig. (5.1) we note that the distribution is fairly unimodal, with most of the debt concentrated among profitable firms. This is in line with the findings of Bonin and Schaffer (1995), and in contrasts with those of Gomulka (1994) for Poland, where a bimodal distribution was observed with a large proportion of debt concentrated in loss-making firms. We can therefore conclude that there was not a stock problem with a large amount of bank debt (mainly long term) being concentrated among loss-making firms, and therefore the determinants of debt that will be investigated in the next sections should refer mainly to demand and supply factors.

Next, we follow the analysis of Schaffer (1998), by looking at the relationship between new credit allocation and profitability. New credit is measured by *net bank financing*, i.e. the change in bank debt minus interest payments normalised by total assets.[7] This measure indicates the direction of flows between banks and firms (i.e. *from* banks *to* firms if NBF is positive, *from* firms *to* banks if NBF is negative) and is plotted against firms' profitability. We

[7] The formula used is $NBF_{i,t} = \frac{B_{i,t} - B_{i,t-1} - I_{i,t}}{A_{i,t}} \times 100$, where B= bank debt, I= interest payment and A=total assets (see Schaffer, 1998).

divide the sample between economic viable and non-viable firms.[8] If a firm is economically non viable, it is unable to cover its operating costs and should not receive any injection of new loans from the banking sector.

Figures (5.2b,d and 5.3b,d) show that for the majority of economically non-viable firms NBF is in fact negative, although there are some firms receiving new credit.[9] Figure (5.2a,c and 5.3a,c) shows another interesting fact: the majority of firms are economically viable *and* display positive profits, nevertheless banks are extracting money from them and not providing new funds. Can this be taken as evidence for the presence of credit rationing? The answer is difficult, because liquidity flowing from profitable firms to banks is not *per se* evidence of credit rationing, as the latter arises when firms willing to take on loans are denied credit. In fact in our case profitable firms may be unwilling to borrow because, for instance, of high interest rates, preferring internal finance instead. This interpretation, advanced by Schaffer (1998), is certainly part of the story. Nevertheless, performing the same analysis for each year of the sample, we note that while the cost of borrowing (i.e. the real interest rate on bank loans) between 1989 and 1999 fell, the proportion of economically viable firms with positive profitability and negative NBF increased. This pattern suggests that forms of credit rationing were probably occurring during this period.[10]

Finally, we analyse an issue that has profound implications for the analysis of this chapter: approximately 30% of the firms in our sample do not use bank debt at all as a form of financing. Although this figure is not uncommon (for instance, in several European countries such as Italy the percentage is above 40%), it is important to analyse the features of firms that do not use debt and compare them with other firms.

Looking at the ownership structure of the two groups of firms (Table 5.8), we note that among the firms that use debt there is a higher proportion of state-owned firms relative to firms that do not use debt (21.24 versus 14.02). Moreover, there is a higher proportion of joint venture firms (22.13 versus 19.82) and conversely a lower proportion of private firms (47.49 versus 59.46). If the observation of zero debt is a signal of some sort of credit rationing, this result can suggest that state-owned firms and joint ventures have an easier access to the credit market with respect to private firms.

We can also note that firms that do not use debt are on average smaller than firms which use debt (see Table 5.7). This can also be a signal of forms of credit rationing that are keeping small firms out of the market. However, it

[8] Economic viability is defined as earnings before interest, profit tax, depreciation and extraordinary charges.

[9] For reasons of readability, the figures refer to the balanced sample. The results do not change if we refer to the fixed sample of firms.

[10] The analysis conducted in this section is suggestive but imprecise, since we cannot distinguish between classes of firms nor provide quantitative estimates of these phenomena. The next chapter will fill this gap by providing direct tests of the existence of soft budget constraints.

is also true that firms that do not use bank debt are on average less profitable and can rely on a lower amount of cash flows. This may suggest that the exclusion from the credit market could be due to a correct behaviour by banks rather than to forms of financial market imperfections. Nevertheless, the outcome is a particular distribution of debt across firms that in turn affects the methodology used in the empirical analysis. The next section investigates this issue.

5.4 Methodology

In order to investigate the determinants of capital structure choice we follow the approach of Rajan and Zingales (1995) and Cornelli *et al.* (1998), estimating a reduced form equation with a measure of leverage as the dependent variable. Among the different measures of leverage that can be used (total liabilities, total debt, coverage ratio), we restricted our attention to short term bank debt. The choice is motivated by the fact that most of the time period considered is very close to the pre-transition period where presumably the majority of decisions concerning long-term debt have been taken. Concentrating on short-term debt (defined as debt with less than one year maturity) allows to avoid mixing pre-transition with post-transition decisions about the capital structure. Short term debt is the predominant form of debt for the firms investigated (it accounts for more than 80% of total bank debt); at the same time, short term debt has a time horizon sufficiently limited to capture all the relevant changes we are interested in. In any case, we have also estimated the model using long term debt instead of short term debt without finding any interesting result: it seems that long term debt is not affected by demand or supply side factors. This is consistent with the hypothesis formulated above that long term debt is mainly inherited from the planning period and is not sensitive to economic considerations.

Since only a limited fraction of our firms is quoted, we have book-value measures for the relevant variables. It can be argued that decisions about firms' capital structure are taken by considering market value figures; however, as shown by Bowman (1980), the cross-sectional correlation between book and market value of debt is very high, reducing the potential misspecification problem deriving from the use of book value measures.[11]

The observation that 30% of the firms in our sample do not use debt has important implications for the econometric methodology. The distribution of the dependent variable calls for the use of a censored regression (Tobit) model. Let y^* be the original variable and y a random variable transformed from the original one. The estimated model is:

[11] Virtually all studies on firms' capital structure (as Rajan and Zingales (1995) and Titman and Wessels (1988)) find no differences using market and book value variables.

$$y^*_{i,t} = \beta x'_{i,t} + \epsilon_{i,t} \tag{5.1}$$

where

$$y_{i,t} = y^*_{i,t} \text{ if } y^*_{i,t} > 0$$
$$y_{i,t} = 0 \quad \text{otherwise}$$

The basic problem in applying a censored regression model to panel data is that it is not possible to account for fixed effects using the within transformation. The reason is that, in presence of a censored distribution, the β and the individual effects (μ) are not independent (unless the time horizon is infinite), resulting in an inconsistent estimate of μ_i that results in inconsistent estimates of β_i. We therefore estimated a random effect Tobit model using a ML estimator. In order to control for possible endogeneity, we lagged the explanatory variables by one period. We also controlled for individual-invariant time effects using a two-way error component model.

Equation (5.1) becomes:

$$y^*_{i,t} = \beta x'_{i,t} + \mu_i + \lambda_t + u_{it} \tag{5.2}$$

where μ_i denotes unobservable time invariant, effects, λ_t accounts for individual invariant time effects and $u_{i,t}$ is the idiosyncratic component of the error term, under the assumption that $u_{i,t} \sim IID(0, \sigma_u^2)$. In order to reduce the problem of heteroskedasticity we normalise the relevant variables by total assets.

The distinctions made at the theoretical level (Sec. 5.2) cannot be easily carried over at the empirical level. This problem arises also in the present work, where the estimated reduced form equations do not allow to distinguish demand from supply side effects. The cause of most concern is profitability: we have already stressed that supply side considerations predict a positive relationship between banks' debt and profits. But profits are also a major determinant of cash flows, and demand side considerations predict a negative relationship between debt and cash flows (if debt is more costly than internal finance, firms that have higher internal cash flow will try to substitute debt with it). Therefore, the sign of the coefficient is going to depend on the relative strength of those two effects.

In the case of Eastern Europe, the shock of transition, and the consequent changes that it entailed, caused short term performance to be a very poor indicator of future long term performance, while on the other hand the widespread presence of credit rationing induced firms to rely heavily on internal finance. We therefore expect profits to capture a demand rather than a supply effect and in the regressions we have subsumed profits within cash flows rather than including them as an individual regressor.

5.5 Results

Following the methodology described in the previous section, equation (5.1) becomes:

$$\begin{aligned} sdta^{*}_{i,t+1} =& \beta_1 lsal_{i,t} + \beta_2 cfta_{i,t} + \beta_3 tata_{i,t} + \beta_4 iata_{i,t} + \beta_5 invta_{i,t} \\ &+ \varepsilon_{i,t+1} + \beta_6 dfshr_i + \beta_7 demp_i + \beta_8 down_i \end{aligned} \tag{5.3}$$

where $sdta$= short term debt over total assets, $lsal$= logarithm of net sales, $cfta$= cash flows over total assets, $tata$= tangible assets over total assets, $iata$= interenterprise arrears over total assets, $invta$= investment over total assets, $dfshr$= dummy for foreign ownership (takes value of 1 if foreign share of capital is greater than 15%), $demp$= dummy for employment (takes value of 1 if employment is greater than 100), $down$= dummy for ownership (takes value of 1 if the firm is state-owned), ε is a stochastic disturbance.

Table 5.9 reports the results.[12] Size (approximated by the logarithm of net sales) is positively related to debt, indicating that large firms tend to have easier access to bank credit relative to small firms. The alternative measure of size (the employment dummy) also has a positive relationship with the dependent variable.

Ownership is an aspect that has to be analysed jointly with size. As large firms are mainly state-owned, and could be protected by an implicit bailout clause by the government, large firms may have easier access to credit simply because they are typically state-owned. The dummy capturing ownership is positive and strongly significant, suggesting that large state-owned firms have indeed easier access to bank financing.[13]

Turning to the other variables, tangibility has a positive and significant coefficient. This finding is in line with the results generally obtained for western-type economies (see Rajan and Zingales (1995)) where debt has a strong positive relation with tangible assets. However, it contrasts with the results of Cornelli *et al.* (1998), who find a negative correlation between tangible assets and debt in Poland and Hungary.[14]

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[12] The table does not show a measure for *Pseudo-R^2*. As it is well known, the widely used formula *Pseudo-R^2*=1 − L_1/L_0 (where L_1 and L_0 are respectively the constant-only and full model Log-Likelihoods) works only in the presence of discrete distributions. It breaks down with mixed continuous/discrete distributions like Tobit. For this reason the model's χ^2 is reported instead.

[13] The ownership dummy is constructed so that cooperatives are not considered as state-owned companies. The results do not change if we include cooperatives in the state ownership category.

[14] The results of Cornelli *et al.* (1998) for Hungary are probably due to the different estimation techniques (they estimate a normal OLS regression): in fact if in our sample we run a simple OLS regression, instead of estimating a Tobit model, the positive effect of tangibility disappears.

Apart from the risk of default, banks should also be concerned for firms' future prospects. In our sample, firms that have invested more are taken as firms which have better growth prospects. The signalling effect of past investment does not seem to enable firms to take on more leverage, as the coefficient of investment is negative (albeit marginally significant).[15]

Turning now to the two "financial" variables, cash flow and interenterprise arrears, they seem to indicate the existence of a "pecking-order", with internal funds preferred over bank debt. The availability of internal funds is measured by cash flow, which displays a negative coefficient, suggesting that firms substitute external with internal finance when they have the opportunity to do so (i.e. external finance is more costly than internal finance). The coefficient on interenterprise arrears is also negative, although not statistically significant.

Finally, the foreign ownership dummy is not significant. As we will see, this result is quite robust (we also tried different cut-off values, e.g. 25 and 30%). This finding is puzzling mainly when referred to the initial years, as one would expect that with time and the improvement of efficiency of financial markets the positive signalling role of foreign ownership would diminish. On the other hand, the non-significance of this variable can indicate the inability to distinguish between demand side and supply side effects. From the demand side we expect banks to favour foreign-owned firms but from the supply side foreign-owned firms may have access to cheaper internal finance (i.e. through the foreign owner), reducing in this way the amount of external finance.[16]

This analysis suggests the presence of an underlying problem of asymmetric information in the credit market, reflected in the inability of firms to achieve their optimal capital structure. Evidence for this is provided by the relevance of variables like cash flow that suggests the existence of a "pecking order" in firms' financing choices. Moreover, the positive sign on the coefficients for indicators of size (sales and employment) coupled with the positive coefficient of the ownership dummy, suggest that small private firms tend to be more constrained by financial market imperfections.

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[15] The presence of investment as a regressor may raise doubts about possible multicollinearity with other variables, in particular with cash flows. If a firm invested in the past and the investment turned out to be successful, it will have higher profits in the subsequent period and therefore higher cash flows. In our sample multicollinearity between these two variables does not seem to be a problem. More precisely, the pairwise correlation is always below 30%, and neither the sign of the coefficients nor their significance change when one of the variables is deleted. The investment variable can also create a possible problem of endogeneity, an issue that will be addressed in the next chapter.

[16] Moreover, generally one has to be cautious when assessing the role of foreign ownership in capital structure decisions of Eastern European firms. At least in the initial years of transition foreign ownership in fact could represent either solid Western European or also very risky Eastern European (mainly Russian) capital. In our sample, however, we do not have the opportunity to distinguish foreign ownership by country of origin.

Next, we analyse how reforms in the credit market affected firms' capital structure choices. Since we are interested mainly in the reform of the bankruptcy code and of the banking system, we choose 1993 as the threshold year, considering the period 1989-1993 as pre-reforms and the period 1994-1999 as post-reforms. Tables 5.10-5.11 report the results, revealing some interesting aspects. Both net sales and cash flow are always significant, keeping the same sign in both periods. The coefficient for tangible assets is negative and not significant in the first sub-sample, while it becomes positive and strongly significant in the second sub-sample. This suggests that at the beginning of transition tangible assets could not provide forms of collateral to bank loans, probably because of both the difficulty in defining correct values for those assets and the unwillingness of banks to accept tangible assets as collateral. After the reforms, tangible assets do seem to play a role as collateral, probably because reforms had some success in cleaning firms' and banks' balance sheets, allowing them to correctly price those assets.

Another interesting aspect is represented by interenterprise arrears, which are negatively and significantly related to banks' debt in the pre-reform period, while the significance disappears in the post-reform period. This suggests that in the pre-reform period firms were substituting bank credit with trade credit, while this practice (probably due to the effects of the bankruptcy law) was not followed in the post-reform period. The dummy for employment is positive and significant only in the first sub-sample, while not significant in the second sub-sample.

It seems therefore that reforms have contributed to hardening firms' budget constraints by changing firms' capital structure and banks' behaviour. In fact, tangible assets in the post-reform period play a role in credit allocation, interenterprise arrears do not seem to provide an alternative source of credit, and size measured in terms of employment does not seem to give large firms easier access to bank credit.

Since the panel we consider is unbalanced, it might be argued that the results presented in this chapter are driven by the birth and death of firms rather than by their actual choices and decisions. In order to control for this we run separate regressions also for a balanced sample of firms defined as those companies that kept the same identification number for the entire period (11 years). Tables 5.12-5.14 show the results and confirm that the main findings obtained with the larger unbalanced sample hold also for the smaller balanced sample.[17]

[17] We also ran different regressions with a balanced panel over the period 1989-1993 and over the period 1994-1999, without significant changes in the results.

Table 5.1. Descriptive statistics: unbalanced sample

Var.	Mean	25th	50th	75th	N.Obs.
cfta	−0.32	0.01	0.08	0.18	66221
emp	178.75	19.00	58.00	132.00	66455
iata	0.17	−0.09	0.00	0.06	63845
invta	0.11	0.02	0.05	0.13	44473
lsal	11.85	10.64	11.97	13.26	64995
sdta	0.10	0.00	0.00	0.03	66027
tata	0.38	0.12	0.31	0.51	66347

Table 5.2. Descriptive statistics: balanced sample

Var.	Mean	25th	50th	75th	N.Obs.
cfta	0.09	0.03	0.08	0.15	8230
emp	179.88	48.00	88.00	184.00	8250
iata	−0.02	−0.09	−0.00	0.05	8224
invta	0.08	0.02	0.04	0.09	6235
lsal	12.23	11.28	12.28	13.32	8178
sdta	0.03	0.00	0.00	0.03	8226
tata	0.38	0.23	0.35	0.49	8230

Table 5.3. Averages over time: state-owned firms

Year	Employment	Profit / Tot. Ass.	Investment / Tot. Ass.	Cash Flows / Tot. Ass.	Bank Debt / Tot. Ass.
1989	511.95	0.09	n.a.	0.12	0.05
1990	529.18	0.05	0.04	0.09	0.06
1991	423.17	−0.01	0.04	0.03	0.07
1992	313.98	−0.45	0.09	−0.38	0.06
1993	385.06	−0.34	0.06	−0.26	0.16
1994	379.95	−0.27	0.07	−0.18	0.06
1995	315.69	−0.22	0.07	−0.15	0.06
1996	302.24	−0.18	0.08	−0.11	0.08
1997	280.89	−0.06	0.10	−0.00	0.04
1998	277.45	−0.01	0.08	0.04	0.04
1999	283.88	−0.03	0.10	0.03	0.04

Table 5.4. Averages over time: private firms

Year	Employment	Profit / Tot. Ass.	Investment / Tot. Ass.	Cash Flows / Tot. Ass.	Bank Debt / Tot. Ass.
1989	45.08	0.19	n.a.	0.21	0.03
1990	35.12	0.11	0.09	0.13	0.04
1991	39.54	−0.33	0.08	−0.29	0.06
1992	56.03	−0.57	0.11	−0.50	0.03
1993	111.28	−0.23	0.12	−0.15	0.11
1994	129.02	−0.01	0.10	0.05	0.06
1995	119.97	−0.09	0.11	0.01	0.08
1996	81.56	−0.49	0.13	−0.42	0.07
1997	114.55	−0.43	0.12	−0.36	0.07
1998	117.69	0.60	0.15	0.70	0.07
1999	117.17	−0.05	0.11	0.02	0.07

Table 5.5. Averages over time: foreign firms

Year	Employment	Profit / Tot. Ass.	Investment / Tot. Ass.	Cash Flows / Tot. Ass.	Bank Debt / Tot. Ass.
1989	30.80	0.06	n.a.	0.07	0.03
1990	74.83	0.11	0.11	0.14	0.07
1991	17.65	0.05	0.09	0.09	0.06
1992	116.00	−0.05	0.10	0.01	0.05
1993	196.12	−0.02	0.15	0.04	0.08
1994	235.94	−0.06	0.14	0.00	0.08
1995	202.72	0.00	0.14	0.07	0.10
1996	210.04	0.01	0.14	0.08	0.11
1997	237.71	0.02	0.13	0.09	0.10
1998	256.55	−0.04	0.14	0.03	0.10
1999	264.06	0.06	0.11	0.14	0.10

Table 5.6. Debt rollover

	1989-99	1989-93	1994-99
Overall sample	−0.230	−0.017	0.348
Private	−0.478	0.228	0.361
State	0.819	−0.045	0.043
Small	−0.217	−0.290	0.473
Large	−0.233	0.031	0.196

Correlation coefficients between the *change* in short term debt at $t+1$ and the level of short term debt at t. All coefficients are statistically significant at the 95% confidence level.

Table 5.7. Firms with and without debt: selected indicators (average values)

	Firms without debt			Firms with debt		
	1989-99	1989-93	1994-99	1989-99	1989-93	1994-99
Cash Flows/ Tot. Ass.	−0.12	−0.18	−0.06	0.08	0.05	0.09
Log sales	11.21	10.38	12.07	12.84	12.22	13.21
Employment	90.22	75.85	105.04	323.40	419.26	266.95

Table 5.8. Firms with and without debt: ownership distribution

	Firms without debt			Firms with debt		
	1989-99	1989-93	1994-99	1989-99	1989-93	1994-99
State	14.02	16.19	11.77	21.24	30.84	15.58
Cooperatives	6.70	8.41	4.93	9.14	19.41	3.09
Foreign	19.82	16.41	23.35	22.13	14.93	26.37
Private	59.46	58.99	59.95	47.49	34.82	54.96
Total	100.00	100.00	100.00	100.00	100.00	100.00

Table 5.9. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_1	0.043***	(0.001)
cfta_1	−0.092***	(0.010)
tata_1	0.054***	(0.009)
iata_1	−0.009	(0.010)
invta_1	−0.024*	(0.013)
dfshr	−0.001	(0.004)
demp	0.017***	(0.004)
down	0.009***	(0.003)
Intercept	−0.623***	(0.015)

Dependent variable: short term bank debt over total assets. N=25790, Log-likelihood = -468.825, $\chi^2_{(8)}$ = 1711.738. Significance levels: * : 10% ** : 5% *** : 1%. _1 denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1989-99, unbalanced.

Table 5.10. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_1	0.045***	(0.003)
cfta_1	−0.061***	(0.022)
tata_1	−0.018	(0.021)
iata_1	−0.045**	(0.020)
invta_1	0.172***	(0.035)
dfshr	0.010	(0.009)
demp	0.056***	(0.009)
down	0.015*	(0.008)
Intercept	−0.651***	(0.032)

Dependent variable: short term bank debt over total assets. N = 6781, Log-likelihood = -1157.457, $\chi^2_{(8)}$ = 662.417. Significance levels: * : 10% ** : 5% *** : 1%. _1 denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1989-93, unbalanced.

Table 5.11. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_l	0.040***	(0.001)
cfta_l	−0.106***	(0.011)
tata_l	0.073***	(0.010)
iata_l	−0.005	(0.010)
invta_l	−0.044***	(0.014)
dfshr	0.000	(0.005)
demp	0.006	(0.004)
down	0.008**	(0.003)
Intercept	−0.590***	(0.019)

Dependent variable: short term bank debt over total assets. N=19009, Log-likelihood = 925.685, $\chi^2_{(8)}$ = 938.768. Significance levels: * : 10% ** : 5% *** : 1%. _l denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1994-99, unbalanced.

Table 5.12. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_l	0.045***	(0.002)
cfta_l	−0.042*	(0.024)
tata_l	0.046***	(0.017)
iata_l	−0.045*	(0.024)
invta_l	−0.066**	(0.032)
dfshr	−0.002	(0.010)
demp	0.002	(0.005)
down	0.004	(0.005)
Intercept	−0.609***	(0.033)

Dependent variable: short term bank debt over total assets. N=4252, Log-likelihood = 641.112, $\chi^2_{(8)}$ = 390.228. Significance levels: * : 10% ** : 5% *** : 1%. _l denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1989-99, unbalanced.

Table 5.13. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_l	0.035***	(0.004)
cfta_l	0.004	(0.035)
tata_l	0.007	(0.026)
iata_l	−0.076**	(0.034)
invta_l	0.025	(0.047)
dfshr	0.014	(0.010)
demp	0.028***	(0.009)
down	0.020**	(0.009)
Intercept	−0.499***	(0.051)

Dependent variable: short term bank debt over total assets. N=1558, Log-likelihood = 190.163, $\chi^2_{(8)}$ = 143.089. Significance levels: * : 10% ** : 5% *** : 1%. _l denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1989-93, unbalanced.

Table 5.14. Determinants of capital structure: tobit estimates

Variable	Coefficient	(Std. Err.)
lsal_l	0.039***	(0.004)
cfta_l	−0.057*	(0.030)
tata_l	0.050**	(0.023)
iata_l	−0.100***	(0.031)
invta_l	−0.060	(0.041)
dfshr	0.058***	(0.014)
demp	−0.014**	(0.007)
down	0.002	(0.005)
Intercept	−0.560***	(0.054)

Dependent variable: short term bank debt over total assets. N=2694, Log-likelihood = 566.623, $\chi^2_{(8)}$ = 163.63. Significance levels: * : 10% ** : 5% *** : 1%. _l denotes lagged variables; ta= total assets, sdta= short term debt/ta, lsal= log sales, cfta= cash flow/ta tata= tangible assets/ta iata= interenterprise arrears/ta, invta= investment/ta, dfshr= foreign ownership dummy, demp= employment dummy, down= ownership dummy. Sample: 1994-99, unbalanced.

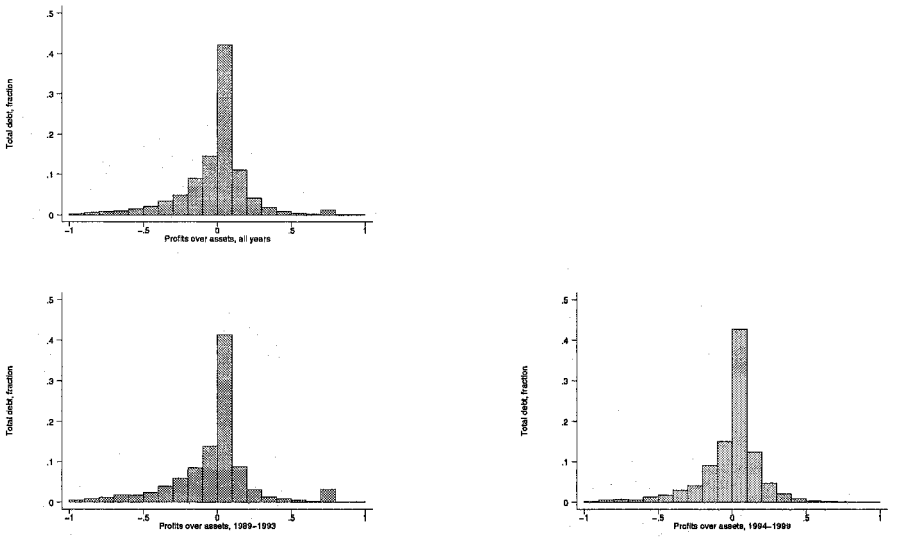

Fig. 5.1. Distribution of bank debt

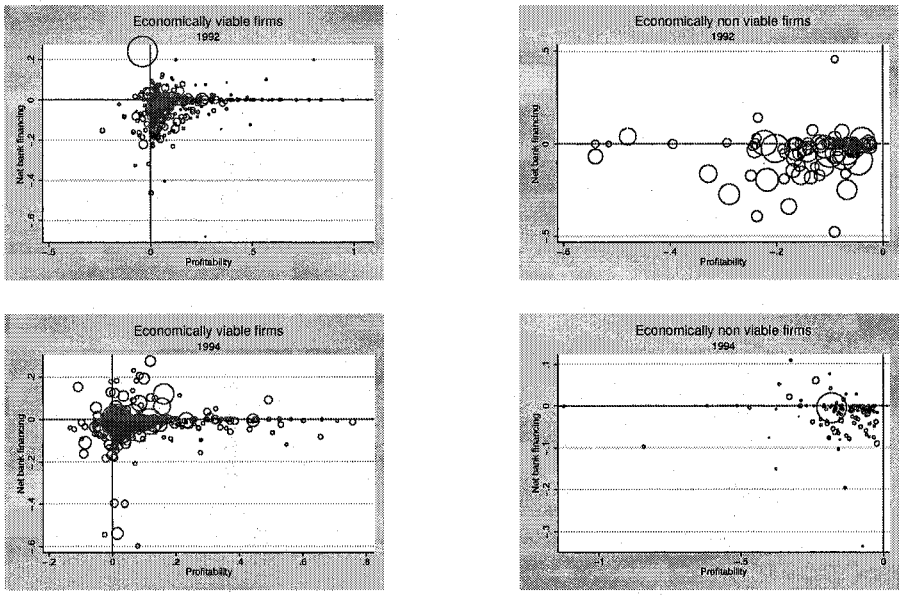

Fig. 5.2. Net bank financing versus profitability (1992-94)

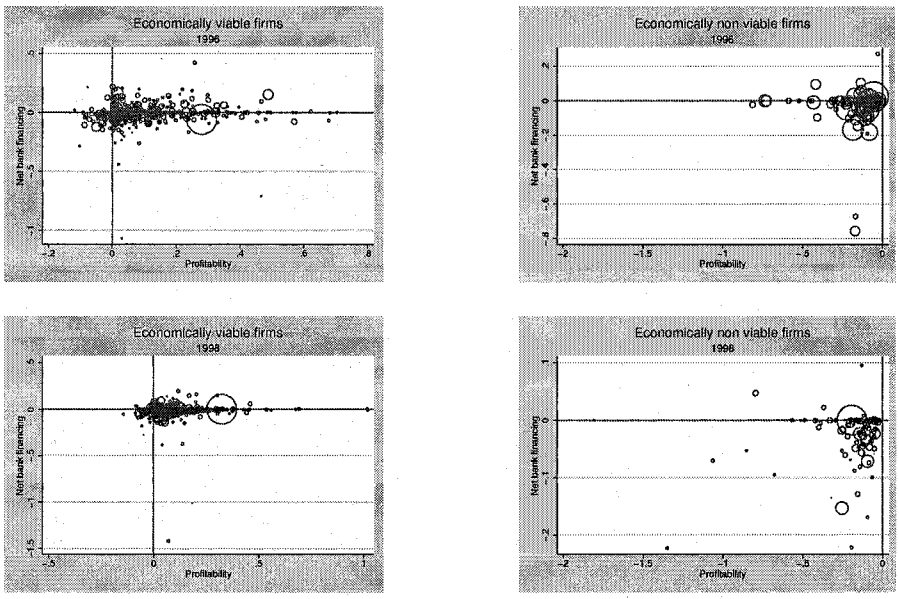

Fig. 5.3. Net bank financing versus profitability (1996-98)

6

Financial constraints and investment decisions

6.1 Introduction

This chapter investigates whether and to what extent reforms to the Hungarian financial system have succeeded in increasing the efficiency of credit allocation to the corporate sector.[1] In particular, we examine the role of financial factors for the investment decisions of a large panel of Hungarian firms in the period 1989 to 1999, focusing on changes in corporate behaviour before and after the introduction of major financial reforms.

The task of establishing an efficient credit allocation system is particulary difficult in transition economies, as it requires to design institutions and rules to impose financial discipline on firms that were often subject to a soft budget constraint. In the past two decades a number of major changes introduced in order to increase the efficiency of the Hungarian financial system, with the banking sector reform and the new bankruptcy law playing a major role (see chapter 3). Institutional reforms, however, are only a necessary condition increasing the efficiency of credit allocation.

A number of recent studies have examined the transition process of formerly centrally planned economies, focusing on the progresses made in establishing a functioning financial system (see e.g. Bonin and Schaffer (1995, 2002), Halpern and Körösi (2000), Colombo and Driffill (2003), Halpern and Wyplosz (1998), Stephan, 1999). In particular, the role of financial constraints for corporate financial decisions has been addressed by several studies for a number of transition economies (see e.g. Schaffer (1998), Lízal and Svejnar (2002), Budina *et al.* (2000), Bratkowski *et al.* (2000), Volchova (2003), Maurel (2001), Sgard, 2001).

The analysis presented in this chapter is the first investigation of the role of financial factors for investment decisions based on a comprehensive firm-level panel data set for the Hungarian economy. In addition, the long time

[1] This chapter draws on Colombo and Stanca (2003)).

period covered by our data set allows us to compare firms' investment behaviour *before* and *after* the introduction of major financial reforms. We can therefore provide evidence not only on the extent to which firms face a soft budget constraint, but also on whether financial system reforms have affected the degree of credit rationing or softness of the budget constraint. We also provide a disaggregate analysis by ownership type, comparing the investment behaviour of state-owned, private domestic and foreign-owned firms.

We find that the role of financial factors for investment decisions has changed significantly after the introduction of financial reforms, and firms were affected differently depending on their ownership type. In the post-reform period, small private firms came to face binding financial constraints, whereas state firms kept facing a soft budget constraint, although the investment decisions of small state firms became more sensitive to financial conditions. Foreign-owned firms were subject to a hard budget constraint in both periods, but became less sensitive to financial conditions after 1993, indicating that reforms have been successful in lowering informational costs.

The chapter is structured as follows. Section 2 reviews the empirical literature on the role of financial factors and informational asymmetries for corporate investment decisions, considering both market and transition economies. Sections 3 and 4 describe the data set and the econometric methodology, respectively. Section 5 presents and discusses the results of the empirical analysis.

6.2 Related literature

In the last decades, the neoclassical view that the investment decisions of firms are independent of financial factors has been gradually challenged by both theoretical and empirical studies. First, a number of authors showed that the costs of internal and external finance may differ under more realistic assumptions about capital market imperfections (see e.g. Stiglitz and Weiss (1981)) and Myers and Majluf, 1984). More recently, it has been shown that, under asymmetric information, the net worth positions of borrowers determine their capacity to obtain external funds and, in turn, their investment and production levels (see e.g. Bernanke and Gertler (1989), Calomiris and Hubbard (1990), Gertler (1992), Greenwald and Stiglitz (1993b), and Kiyotaki and Moore, 1997a).

At the empirical level, following the seminal work by Fazzari *et al.* (1988), the relevance of financial factors for corporate investment decisions has been commonly investigated by adding financial indicators to empirical specifications derived from a real investment model, and testing that financial factors are more important for firms that a-priori can be considered likely to be credit

constrained. Subsequent studies extended the analysis along several dimensions.[2]

It is important to observe that in this literature, in the empirical applications to developed market economies the null hypothesis is perfect capital markets. A positive and significant relationship between investment and financial indicators is taken as evidence that firms are credit constrained, whereas under perfect capital markets internal and external financing would be perfect substitutes.

A similar approach has been followed to investigate the sensitivity of investment decisions to financial positions in transition economies. However, differently from market economies, in transition economies the absence of a positive and significant relationship between investment and financial indicators is not likely to indicate perfect capital markets: it rather suggests that firms are subject to a soft budget constraint, since they have access to external finance irrespective of their profitability. In other words, whereas in estimating cash flow-augmented investment equations for market economies the null hypothesis is perfect capital markets, in the case of formerly planned economies the null hypothesis is the presence of a soft budget constraint.

This approach has been followed in a number of recent papers that investigate investment decisions in transition economies. In particular, Lízal and Svejnar (2002) analyse firms' investment decisions in the Czech Republic between 1992 and 1998, finding that cooperatives and small firms are credit rationed, whereas large state-owned and private firms operate under a soft budget constraint. Budina *et al.* (2000) investigate the role of liquidity constraints for investment decisions of Bulgarian manufacturing firms in the 1993-1995 period, finding that size and financial structure help to determine the extent to which firms are credit constrained and that soft-budget constraints continue to play a major role.

Among related studies, Volchova (2003) estimates an accelerator model for Russian industrial firms in 1996 and 1997, finding that firms in unregistered groups invest a larger proportion of their retained earnings relative to the rest of the economy, while Bratkowski *et al.* (2000) examine survey data for Czech, Hungarian and Polish newly established private firms to assess the presence of credit constraints, concluding that imperfections in capital markets do not seem to restrain the growth of new private firms.

For the Hungarian economy, Maurel (2001) analyses company accounts between 1992 and 1998, and finds that credit rationing applies to all categories of firms (foreign, private and domestically owned). The focus of this study,

[2] Among others, Calomiris and Hubbard (1995) considered different data sets for the United States; Chirinko and Schaller (1995), Devereux and Schiantarelli (1990), Hoshi *et al.* (1991) and Blundell *et al.* (1992) examined countries other than the United States; Whited (1992) and Oliner and Rudebusch (1992) used alternative sample split criteria to identify credit constrained firms; Bond and Meghir (1994) and Hubbard *et al.* (1995) proposed alternative model specifications.

however, is the role of investment in improving the technical efficiency of firms, as measured by total factor productivity. Another work based on a large panel of Hungarian firms presented by Sgard (2001), who add to the large body of literature on foreign direct investment, finding that between 1992 and 1999 foreign equity is associated with higher productivity levels and substantial positive spillover effects on aggregate TFP growth. More recently, Perotti and Vesnaver (2004) investigate the financing of investment in a sample of 56 listed Hungarian firms between 1992 and 1998, finding evidence of significant financial constraints with the exception of foreign-owned firms.

Other important related studies for the Hungarian economy include Bonin and Schaffer (1995), who provide an assessment of the banking and bankruptcy reforms on the basis of a survey of 200 manufacturing firms, and Halpern and Körösi (2000), who estimate frontier production functions to investigate the impact of competition on the efficiency of the corporate sector. More recently, Colombo (2001) and Csermely and Vincze (2003) examine the determinants of the capital structure of Hungarian firms, finding evidence of imperfections that constrain firms in the achievement of their optimal capital structure.

6.3 Data description

The present analysis examines company accounts for about 18,000 Hungarian firms from 1989 to 1999 (see the the data appendix for a detailed description). We selected from the original data set the companies whose main activity was in the manufacturing and construction sectors. The resulting sample represents in 1995 about 80 per cent and 35 per cent of total employment in the manufacturing and construction sectors, respectively.

The main variables used in the econometric analysis are investment (I), capital (K), output (Y), cash flow (CF), leverage ($\frac{D}{A}$) and employment (E). Capital is defined as beginning-of-period net fixed assets, and (gross) investment is the change in net fixed assets plus depreciation. Cash flow is measured by adding depreciation to profits after interest, tax and preference dividends. Net sales are used as a proxy for output, and leverage is measured by the debt-asset ratio (non-equity assets over total assets). Information about the distribution of equity ownership allowed to identify separately state-owned, private domestic and foreign firms.

A number of consistency checks were applied in order to account for possible data anomalies. First, we eliminated companies with illogical figures, such as negative sales, capital or employment. After computing the main variables, we also eliminated companies for which any of the variables of interest fell below the 2.5th percentile or above the 97.5th percentile of its distribution.[3]

[3] This check was necessary to control for the presence of outliers and the occurrence of major mergers or acquisitions.

We then excluded companies with incomplete (discontinuous) time series and required that at least four consecutive annual observations on each of the main variables were available for the firms included in the final sample. These criteria left us with an unbalanced panel of 4,333 firms for a total of about 25,000 observations between 1989 and 1999.

We defined small firms as those whose employment is below the median value of the distribution for the whole sample. Similarly, low/high leverage firms were defined as those whose debt-asset ratio is below/above the median value for the whole sample. Table 6.1 reports average values for the variables used in the investment equations (investment, sales and cash-flow relative to capital, leverage and employment). The results are reported for the overall sample and by grouping firms according to sample period (pre- and post-1993), size, and leverage. For comparative purposes, Tables 6.2-6.4 present the same statistics by ownership type: state-owned, private domestic and foreign-owned companies, representing about 41, 39 and 20 per cent of the whole sample, respectively.

Comparing the overall sample averages by ownership type, investment is lowest in state-owned firms (0.17) and highest in foreign-owned firms (0.29). Cash flow and leverage are similar across ownership types (around 0.37 and 0.48, respectively). The sales-capital ratio is highest for state-owned firms (10.78) and lowest for foreign firms (5.56). Private domestic firms are smaller on average (the sample mean for employment is 126 against 209 for the whole sample). Focusing on sub-periods within groups, we observe that average investment and leverage rise in the 1994-99 sub-period, whereas cash-flow and leverage fall substantially. Small firms are characterised by higher average values for all the indicators, both in the overall sample and by ownership type. The disaggregation by leverage indicates that high-debt firms are characterised by higher investment and sales, whereas cash-flow and employment are higher in firms whose debt ratios are below the median.

A similar pattern is observed for median values, reported in Tables 6.5-6.8. Investment, cash flow and leverage are lowest in state-owned firms and highest in foreign-owned firms. The sales-capital ratio is highest for private domestic firms and lowest for foreign firms. Small firms display higher median values for all the indicators, both in the overall sample and by ownership type. High-debt firms are characterised by higher investment and sales, and lower employment levels.

6.4 Methodology

In the following, we estimate an accelerator model of investment demand (see the appendix for details):

$$\left(\frac{I}{K}\right)_{i,t} = \beta_0 + \beta_1 \left(\frac{I}{K}\right)_{i,t-1} + \beta_2 \left(\frac{Y}{K}\right)_{i,t} + \beta_3 \left(\frac{Y}{K}\right)_{i,t-1} + \varepsilon_{i,t} \qquad (6.1)$$

where I is fixed asset investment, K the beginning of period capital stock, Y net sales and $\varepsilon_{i,t} = \alpha_i + \gamma_t + \eta_{i,t}$, where α_i represents firm-specific effects, γ_t time-specific effects, and $\eta_{i,t}$ is the idiosyncratic component of the error term. Equation (6.1) reflects firms' investment demand and implicitly assumes perfectly elastic credit supply or, in the case of a transition economy, a soft budget constraint. In order to account for the possibility that firms face constraints in obtaining external financing, we augment the basic equation with lagged values of cash flow (see *e.g.* Fazzari *et al.* (1988) and Bond *et al.*, 1997a):

$$\left(\frac{I}{K}\right)_{i,t} = \beta_0 + \beta_1 \left(\frac{I}{K}\right)_{i,t-1} + \beta_2 \left(\frac{Y}{K}\right)_{i,t} + \beta_3 \left(\frac{Y}{K}\right)_{i,t-1} + \beta_4 \left(\frac{CF}{K}\right)_{i,t-1} + \varepsilon_{i,t} \tag{6.2}$$

When equation (6.2) is used to characterise the investment behaviour of a market economy, the estimated coefficients for the financial indicators are interpreted as a measure of the sensitivity of investment to financial constraints. When testing the significance of cash flow for the investment levels of domestic firms in a transition economy, however, the null hypothesis is the presence of a soft budget constraint. The absence of a significant relationship between investment and cash flow is likely to indicate that firms are subject to a soft budget constraint, since they have access to external finance irrespective of their profitability.

In estimating equation (6.2), the presence of the lagged dependent variable, which is correlated with the firm-specific component of the error term, implies that the OLS estimator is inconsistent even if the idiosyncratic component of the error term is serially uncorrelated. The *within* transformation, although eliminating the fixed effects, does not solve the problem, as it introduces correlation between the lagged dependent variable and the time averaged idiosyncratic error term (the same problem would apply to the random effect-GLS estimator). An alternative solution for the correlation with the fixed effects is to first difference the data. The effect of differencing, however, is not only to eliminate the individual effects, but also to produce a first-order moving average error term. This, in turn, introduces correlation between the lagged dependent variable and the differenced error term, thus posing the problem of the selection of the appropriate instruments.

To solve this problem, we follow the approach suggested by Arellano and Bond (1991) in using a Generalised Method of Moments (GMM) estimator. The main advantage of the GMM estimator is that it optimally exploits all the linear moment restrictions specified by the model. In particular, more lagged instruments become available for the differenced equations as we consider later cross-sections of the panel. Note that, given that very remote lags are unlikely to be informative instruments, we did not use all available moment restrictions, but only instruments dated $t-2$ to $t-6$.[4]

[4] All the results reported are qualitatively robust to the choice of the instrument set.

As the number of valid instruments depends on the serial correlation of the idiosyncratic component of the error term, it is essential to verify the assumption of serially uncorrelated errors. To this purpose, we report the m_1 and m_2 statistics, which test for first and second order serial correlation in the residuals. Both statistics are asymptotically distributed as standard normal under the null of no serial correlation. If the assumption of no autocorrelation for the errors in levels is correct, so that second order lags of variables are valid instruments, the null hypothesis should be rejected for m_1 (because of the negative autocorrelation induced by first-differencing) but not for m_2.

We report p-values for the Sargan test of over-identifying restrictions, asymptotically distributed as χ^2 under the null of instrument validity, where k is the number of over-identifying restrictions. We also report the z_1 statistic, a Wald test of joint significance of the reported coefficients (asymptotically distributed as a χ^2_k under the null of no relationship, where k is the number of coefficients tested), and the z_2 and z_3 statistics, performing Wald tests of the joint significance of the coefficients of the time and industry dummies, respectively. Estimation was carried out using the DPD program (Arellano and Bond, 1988) with GAUSSwin version 3.6. We report one-step coefficient estimates, and test statistics based on heteroskedasticity consistent standard errors (Arellano and Bond, 1991).

6.5 Results

Our empirical strategy consists in estimating the cash-flow augmented accelerator model described in the previous section both in the whole sample of firms and in sub-samples defined by ownership type. We start by examining the relationship between cash-flow and investment in the entire 1989-1999 sample period. Next, we focus on how this relationship changes across the pre-reform and post-reform sub-samples, and perform a number of robustness checks. Finally, in order to obtain a sharper interpretation of the results, we explore within sub-periods differences across sub-samples of firms defined according to size and leverage.

Table 6.9 presents estimates of the basic accelerator investment equations for the overall sample (column 2) and by ownership type (columns 3-5). Examining the model specification, the diagnostic statistics are generally supportive of the validity of the instruments. In all equations the m_2 statistic does not reject the hypothesis of no second order serial correlation, while the m_1 statistic indicates significant (negative) first order serial correlation. Both results are to be expected if the errors in levels are serially uncorrelated, which is a necessary condition for $t-2$ lags to be valid instruments. In addition, with the only exception of the equation for the overall sample, the Sargan test does not reject the validity of the instruments used.

In the overall sample, lagged investment is positive and significant, and the coefficients for sales are significant and consistent with accelerator effects.

A similar pattern applies to the estimates for the ownership sub-samples, with the exception of the equation for state firms. It is interesting to observe that foreign firms display the highest investment persistence, with a point estimate for the lagged dependent variable (0.16) that is close to the ones observed for western economies in similar specifications (see e.g. Bond *et al.*, 1997a). Both sets of dummies (industry- and year-specific) are jointly significant in all the equations.

The cash flow coefficient is positive and significant in the overall sample, thus leading to reject the soft budget constraint null hypothesis. In the equations by ownership, it is interesting to observe that the coefficient for cash flow is lowest and not significant for state firms, whereas it is positive and significant for both private and foreign firms. These preliminary findings are therefore consistent with the hypothesis that, in the whole 1989-1999 period, Hungarian state firms faced a soft budget constraint, whereas private and foreign firms were subject to binding financial constraints. This hypothesis, however, deserves further investigation. We therefore move to the analysis of how the investment behaviour of firms has been affected by financial reforms.

We interact the cash-flow variable with a dummy variable (and its complement to 1) that equals 0 up to (and including) 1993 and 1 thereafter, in order to compare the sensitivity of firms' investment behaviour before and after financial markets reforms. The choice of 1993 as the cut-off year for the sample split is based on a number of reasons. First, even though the bankruptcy and banking laws were introduced during 1992, a number of amendments were made during 1993, such as the elimination of the automatic trigger in the bankruptcy law. Second, it is reasonable to assume that the new regime displayed its effects only after some time from the introduction of the new regulations. Third, the loan consolidation programs aimed at dealing with the bad debt problem were implemented throughout 1992 and 1993 (see Bonin and Schaffer, 1995). Finally, at the empirical level, 1993 is preferable to 1992 as it produces sub-samples of similar size (5 and 6 year, respectively).[5]

The results for the pre- and post-reform sub-periods, presented in Table 6.10, are revealing. Looking at the overall sample of firms, the cash flow coefficient is close to zero and not significant in the pre-reform period, whereas it is larger and highly significant in the post-reform period. This finding seems to suggest that financial market reforms have indeed hardened budget constraints. The disaggregation by ownership is also particularly informative. For both state and private firms, the cash flow coefficient is close to zero and not significant before 1993, but it rises substantially after 1993. However, only for private firms the sensitivity of investment to financial conditions becomes significant after 1993, whereas it is smaller and not significant for state firms. For foreign firms the picture is quite different: investment is significantly affected

[5] It should be observed that, as shown below, the results reported are robust to the choice of the cut-off year.

by cash flow both before and after 1993, but the coefficient actually falls in the second period.

On the whole, these results indicate that financial reforms significantly affected the investment behaviour of all firms, but in different ways depending on the ownership type. Private firms come to face binding financial constraints in the post-reform period. State firms appear to keep facing a soft budget constraint, although their investment decisions become more sensitive to financial conditions. Foreign firms are subject to a hard budget constraint in both periods, but become less sensitive to financial conditions, possibly indicating that reforms might have been successful in lowering informational costs. This finding, based on a very representative sample of Hungarian firms (about 80 per cent of total manufacturing employment) confirms and extends the results obtained by Perotti and Vesnaver (2004) for the period from 1992 to 1998.

In order to verify the validity of these results, we perform a number of robustness checks. First, we consider the possibility that the changes in cash flow coefficients across sub-periods might be due to differences in sample size: the number of observations available in the two sub-periods is indeed quite different, if we take into account the fact that two cross-sections are lost at the beginning of the sample (1989-90) due to differencing and taking lags. We therefore consider an alternative definition of pre- and post-reform periods, selecting 1995 as the threshold year. This implies that the effective sub-periods contain 5 and 4 cross-sections, respectively. The results, presented in Table 6.11, confirm and qualify those presented in Table 6.10 for the 1993 sample-split: the cash flow coefficient is not significant throughout the sample period for state firms, it rises significantly after 1995 for private firms and, for foreign firms, it falls over time and is actually significant before 1995 but not significant thereafter.

A further robustness check is necessary in order to consider the possibility that, due to the high turnover of firms in the overall sample, the differences in the estimated cash flow coefficients before and after 1993 might actually reflect the different composition of the sub-samples. We therefore estimate the investment equations on a balanced sample containing only firms that are present throughout the 1989-1999 period. The results, presented in Table 6.12, indicate that the effect of financial liberalisation on investment behaviour is not spurious: cash flow coefficients rise and become statistically significant in the post-reform period, both in the overall sample and in the ownership disaggregation, with the only exception of foreign-owned firms. It should be observed, however, that in the balanced sample the number of observations for state and foreign firms is quite low (117 and 459, respectively), so that the results of the corresponding equations should be interpreted with care.

One potential problem with testing the role of financial constraints using liquidity indicators such as cash flow is that these variables may be capturing the effect of other determinants, such as expectations about the profitability of investment projects, to the extent that they are not already captured by sales. The solution generally adopted in the literature relies on firms' cross-

sectional heterogeneity, exploiting the fact that the sensitivity of investment spending to changes in financial positions should be higher for firms believed to face significant agency costs.[6] Empirical studies of investment behaviour thus typically split the sample into groups according to a number of criteria considered *a-priori* to identify financially constrained firms, including dividend policy, age, size, industrial group, bond rating, stock listing, and ownership structure.

We follow a similar approach in order to control for the possibility that the different sensitivity of investment to cash flow before and after the reforms might be reflecting a change in the unobserved determinants of investment demand, such as expected profitability. We therefore present estimates obtained with a further disaggregation, within the pre- and post-reform sub-samples, according to firm size and solvency, respectively. Similarly to the case of informational problems in market economies, size can be expected to matter for budget constraints in a transition economy, as large firms are more likely to face a soft budget constraint.[7] Leverage, on the other hand, is not expected to be related to the tightness of the budget constraint.[8]

The results for the disaggregation by size, presented in Table 6.13, are quite interesting: in the post-reform period cash flow is positive and significant only for small firms. Looking at the results by ownership type, cash flow is significant for small private firms and (marginally) for small state and foreign firms. This indicates that the hardening of the budget constraint following financial market reforms only affected small private firms and, to a lesser extent, small state firms. Large firms, on the contrary, were largely unaffected irrespective of their ownership type. This result appears to be consistent with the findings of Lízal and Svejnar (2002) for the Czech Republic and Budina *et al.* (2000) for Bulgaria.

The results for the disaggregation by solvency (based on the debt-asset ratio), presented in Table 6.10, indicate that in the post-reform period the sensitivity of investment to financial conditions is higher and significant for low-leverage firms. However, if we consider the equations by ownership, the significance of the estimated relationship is not related to leverage: in the post-

[6] An alternative solution is to assume that investment opportunities are captured by the Q ratio (see e.g. Blundell *et al.* (1992); Hayashi and Inoue (1991); Schaller (1990)). However, apart from the practical consideration that the construction of Tobin's Q ratio is substantially more data demanding, it is difficult to determine the extent to which an average estimate of Q actually reflects expected profitability.

[7] "There is a peculiar disparity in the treatment of large and small state-owned firms. [...] Large firms are much more successful in lobbying for favours, particularly for investment resources. Some of them are in great financial trouble; nevertheless large credits or subsidies are granted to them." (Kornai, 2000, p. 29)

[8] The sample split is obtained by allowing the cash-flow coefficient to take different values in the two sub-samples, by interacting it with the appropriate dummy variable.

reform period cash flow does not affect investment levels of state firms, whereas it does affect those of private and (marginally) foreign firms, irrespective of their debt levels. This result is consistent with the hypothesis that the budget constraints of small private and state-owned firms became more binding after the introduction of financial reforms, given that leverage, differently from size, is not expected *a-priori* to be related to the tightness of the budget constraint.

Summing up, the results indicate that financial reforms have significantly affected the investment behaviour of Hungarian firms, with different effects depending on firms' ownership type. Both state-owned and domestic private firms faced a soft-budget constraint before 1993. In the post-reform period, however, while private firms came to face binding financial constraints, state-owned firms remained subject to a soft budget constraint, although their investment decisions became more sensitive to financial conditions. The response of foreign-owned firms was quite different: they were subject to a hard budget constraint in both periods, but became less sensitive to financial conditions, possibly indicating that reforms might have been successful in lowering informational costs.

These results were found to be robust to a number of consistency checks. Splitting the sample further by size and leverage, we found that in the post-1993 period budget constraints have become binding for small private firms and, to a lesser extent, small state firms. Large firms, on the contrary, continued to face a soft budget constraint irrespective of their ownership type. The fact that the post-1993 relationship between financial conditions and investment for Hungarian domestic firms depends on size but not on leverage can be taken as a further indication that financial reforms displayed their effects through the hardening of the budget constraint for small private and state firms.

Appendix: the accelerator model

In the accelerator model, investment is determined by setting the marginal product of capital equal to marginal cost. For a given technology, the optimal level of the capital stock can be obtained, and investment fills the gap between the optimal and current capital stock. Under a number of simplifying assumptions, the demand for capital can be expressed as a function of the level of output and the user cost of capital. Formally, the model can be derived from firms' maximisation of profit (see e.g. Cho, 1996):

$$V_t = \sum_{i=0}^{\infty} \beta_{t+i} \left[p_{t+i} F\left(K_{t+i}, L_{t+i}\right) - w_{t+i} L_{t+i} - p^I_{t+i} I_{t+i} \right] \tag{A.1}$$

subject to

$$K_{t+i} = (1-\delta) K_{t+i-1} + I_{t+i} \tag{A.2}$$

where β is the discount rate, p the price of output, K the capital stock, L the labour input, w the wage rate, I is gross investment, p^I the price of investment goods, and δ the rate of depreciation. The first order condition for the capital stock implies that

$$\left(\frac{\partial F}{\partial K}\right)_t \simeq \frac{p^I_t}{p_t} \left(r_{t+1} + \delta - \pi^I_{t+1}\right) = J_t \tag{A.3}$$

where J is the *user cost* of capital, r the nominal rate of return and π^I the inflation rate for investment goods. Intuitively, at the optimum capital stock, the marginal product of capital equals the cost of using an additional unit of capital. If the production function has constant elasticity of substitution (CES):

$$Y_t = \left[\alpha K^{\rho} + (1-\alpha) L^{\rho}\right]^{\frac{1}{\rho}} \tag{A.4}$$

then

$$F_K = \alpha Y^{(1-\rho)} K^{(\rho-1)} \tag{A.5}$$

so that the first order condition implies

$$K^*_t = \alpha^{\frac{1}{1-\sigma}} Y_t J_t^{-\sigma} = A Y_t J_t^{-\sigma} \tag{A.6}$$

where σ is the elasticity of substitution between capital and labour. This gives the desired *stock* of capital as a function of sales and the user cost of capital. Investment decisions should be aimed at achieving this optimal level of capital. If the production function is Cobb-Douglas ($\sigma = 1$), we obtain

$$K^*_t = \alpha \left(\frac{Y_t}{J_t}\right) \tag{A.7}$$

Under the further assumption that there is no substitution between capital and labour ($\sigma = 0$), or that J_t is constant, then

$$K_t^* = \alpha Y_t \tag{A.8}$$

Investment is then given by

$$I_t = \alpha Y_t - (1 - \delta) K_{t-1} \tag{A.9}$$

and dividing by K_{t-1} we obtain the simple accelerator investment model, where investment is not affected by the user cost of capital:[9]

$$\left(\frac{I_t}{K_{t-1}}\right) = \beta_0 + \beta_1 \left(\frac{Y_t}{K_{t-1}}\right) \tag{A.10}$$

This equilibrium relationship can be modified to account for gradual adjustment of the actual capital stock to the desired capital stock (changes in output):

$$\left(\frac{I_t}{K_{t-1}}\right) = \beta_0 + \beta_1 \left(\frac{I_{t-1}}{K_{t-2}}\right) + \beta_2 \left(\frac{Y_t}{K_{t-1}}\right) + \beta_3 \left(\frac{Y_{t-1}}{K_{t-2}}\right) \tag{A.11}$$

(see *e.g.* Fazzari *et al.* (1988)). To test for the presence of financial constraints this basic specification can be augmented with lagged cash-flow (as a ratio of the capital stock), or other indicators of firms' financial positions.

[9] Alternatively, it can be assumed that the variation in the user cost of capital is captured by time-specific or firm-specific effects in the error term.

Table 6.1. Sample averages, overall and by subsample

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.22	9.32	0.37	0.48	209.43	25202
1989-93	0.18	11.57	0.43	0.47	202.63	9568
1994-99	0.24	7.94	0.32	0.49	213.59	15634
Small firms	0.26	12.61	0.52	0.52	43.10	12607
Large firms	0.18	6.02	0.22	0.44	375.92	12595
Low leverage	0.16	6.11	0.38	0.27	233.96	12606
High leverage	0.28	12.53	0.35	0.70	184.88	12596

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.2. Sample averages, overall and by subsample: State

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.17	10.78	0.37	0.48	253.90	10331
1989-93	0.15	13.59	0.48	0.49	214.94	6195
1994-99	0.20	6.57	0.20	0.46	312.26	4136
Small firms	0.21	16.02	0.63	0.51	33.06	5177
Large firms	0.13	5.51	0.10	0.44	475.74	5154
Low leverage	0.13	6.77	0.40	0.25	272.33	5166
High leverage	0.21	14.78	0.33	0.70	235.48	5165

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.3. Sample averages, overall and by subsample: Private

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.24	9.66	0.36	0.49	126.01	9949
1989-93	0.20	8.84	0.36	0.42	131.33	2577
1994-99	0.25	9.95	0.36	0.51	124.15	7372
Small firms	0.29	11.58	0.45	0.54	46.91	4985
Large firms	0.18	7.73	0.27	0.44	205.43	4964
Low leverage	0.15	6.24	0.31	0.26	138.49	4980
High leverage	0.32	13.09	0.41	0.71	113.49	4969

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.4. Sample averages, overall and by subsample: Foreign

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.29	5.56	0.37	0.48	284.70	4922
1989-93	0.31	4.74	0.31	0.46	337.64	796
1994-99	0.28	5.72	0.38	0.49	274.49	4126
Small firms	0.30	6.56	0.41	0.51	60.82	2464
Large firms	0.28	4.56	0.32	0.46	509.14	2458
Low leverage	0.26	4.14	0.44	0.31	335.47	2465
High leverage	0.32	7.00	0.29	0.66	233.77	2457

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.5. Median values, overall and by subsample

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.15	4.32	0.20	0.43	79.64	25202
1989-93	0.10	4.34	0.16	0.40	65.50	9568
1994-99	0.18	4.30	0.23	0.44	86.50	15634
Small firms	0.19	5.79	0.27	0.47	44.13	12607
Large firms	0.13	3.50	0.16	0.39	184.57	12595
Low leverage	0.11	3.40	0.20	0.27	91.43	12606
High leverage	0.22	5.76	0.21	0.62	69.59	12596

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.6. Median values, overall and by subsample: State

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.10	4.16	0.15	0.41	80.00	10331
1989-93	0.08	4.83	0.16	0.42	44.50	6195
1994-99	0.13	3.36	0.15	0.40	132.42	4136
Small firms	0.14	6.56	0.25	0.44	30.50	5177
Large firms	0.08	3.13	0.11	0.39	251.00	5154
Low leverage	0.08	3.20	0.16	0.26	92.20	5166
High leverage	0.14	5.68	0.15	0.62	67.40	5165

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.7. Median values, overall and by subsample: Private

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.16	5.23	0.23	0.43	71.09	9949
1989-93	0.10	4.22	0.17	0.33	83.75	2577
1994-99	0.18	5.63	0.26	0.46	66.06	7372
Small firms	0.22	6.39	0.29	0.50	46.63	4985
Large firms	0.11	4.47	0.19	0.36	123.88	4964
Low leverage	0.09	4.03	0.20	0.26	84.73	4980
High leverage	0.27	7.07	0.27	0.64	60.67	4969

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.8. Median values, overall and by subsample: Foreign

Sample	$\frac{I}{K}$	$\frac{Y}{K}$	$\frac{CF}{K}$	$\frac{D}{A}$	E	N. Obs.
Overall	0.24	3.20	0.25	0.46	109.14	4922
1989-93	0.25	2.67	0.17	0.43	112.20	796
1994-99	0.24	3.29	0.27	0.46	108.14	4126
Small firms	0.25	3.33	0.27	0.47	58.50	2464
Large firms	0.24	3.09	0.24	0.45	261.50	2458
Low leverage	0.21	2.76	0.29	0.33	111.25	2465
High leverage	0.27	3.91	0.21	0.61	102.38	2457

I = Investment, K = Capital, Y = Total Sales; CF = Cash-flow D = Total debt, A = Total assets, E = Employment.

Table 6.9. Investment equations: overall

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.10	−0.01	0.13	0.16
	(7.74)	(−0.52)	(9.00)	(7.37)
$\left(\frac{Y}{K}\right)_{i,t}$	−0.01	−0.01	−0.01	−0.01
	(−4.21)	(−3.19)	(−3.18)	(−1.80)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.01	0.00	0.01	0.02
	(6.03)	(2.86)	(8.85)	(3.41)
$\left(\frac{CF}{K}\right)_{i,t-1}$	0.03	0.00	0.04	0.04
	(3.41)	(0.24)	(4.16)	(2.78)
m_1 (1st order autoc.)	0.00	0.00	0.00	0.00
m_2 (2nd order autoc.)	0.68	0.87	0.81	0.82
Sargan test	0.00	0.38	0.12	1.00
z_1 (overall)	0.00	0.00	0.00	0.00
z_2 (time dummies)	0.00	0.00	0.00	0.00
z_3 (ind. dummies)	0.00	0.00	0.03	0.00
N. obs.	16536	5893	7167	3476

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 4333.

Table 6.10. Investment equations: pre-post 1993

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.09	−0.02	0.12	0.16
	(7.11)	(−0.61)	(8.24)	(7.32)
$\left(\frac{Y}{K}\right)_{i,t}$	−0.01	−0.01	0.00	−0.01
	(−4.15)	(−3.14)	(−2.78)	(−1.85)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.01	0.00	0.01	0.01
	(6.09)	(2.86)	(8.26)	(3.38)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-93	0.00	0.00	0.01	0.06
	(0.21)	(−0.31)	(0.32)	(2.17)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-93	0.06	0.04	0.06	0.04
	(6.61)	(1.94)	(4.94)	(2.53)
m_1 (1st order autoc.)	0.00	0.00	0.00	0.00
m_2 (2nd order autoc.)	0.59	0.84	0.69	0.81
Sargan test	0.00	0.42	0.24	1.00
z_1 (overall)	0.00	0.01	0.00	0.00
z_2 (time dummies)	0.00	0.00	0.00	0.00
z_3 (ind. dummies)	0.00	0.00	0.02	0.00
N. obs.	16536	5893	7167	3476

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments; where the latter is also interacted with the relevant dummy variables. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 4333.

Table 6.11. Investment equations: pre-post 1995

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.10	−0.01	0.13	0.16
	(7.58)	(−0.53)	(8.88)	(7.27)
$\left(\frac{Y}{K}\right)_{i,t}$	−0.01	−0.01	−0.01	−0.01
	(−4.18)	(−3.15)	(−2.94)	(−1.91)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.01	0.00	0.01	0.01
	(6.05)	(2.82)	(8.67)	(3.38)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-95	0.01	0.00	0.03	0.07
	(1.53)	(−0.07)	(2.14)	(3.67)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-95	0.05	0.03	0.06	0.03
	(5.04)	(1.29)	(4.22)	(1.71)
m_1 (1st order autoc.)	0.00	0.00	0.00	0.00
m_2 (2nd order autoc.)	0.73	0.85	0.84	0.71
Sargan test	0.00	0.39	0.15	1.00
z_1 (overall)	0.00	0.01	0.00	0.00
z_2 (time dummies)	0.00	0.00	0.00	0.00
z_3 (ind. dummies)	0.00	0.00	0.03	0.00
N. obs.	16536	5893	7167	3476

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments; where the latter is also interacted with the relevant dummy variables. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 4333.

Table 6.12. Investment equations: pre-post reforms (balanced sample)

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.03	−0.23	0.00	0.16
	(1.24)	(−1.39)	(−0.01)	(2.62)
$\left(\frac{Y}{K}\right)_{i,t}$	0.00	0.00	−0.01	−0.01
	(−0.04)	(−3.76)	(−4.65)	(−1.37)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.00	0.00	0.01	0.02
	(0.40)	(−0.25)	(2.75)	(2.78)
$\left(\frac{CF}{K}\right)_{i,t-1}$ low pre-93	0.05	0.03	0.06	0.01
	(1.63)	(0.90)	(1.86)	(0.10)
$\left(\frac{CF}{K}\right)_{i,t-1}$ high post-93	0.11	0.11	0.09	0.05
	(5.24)	(3.39)	(3.87)	(1.47)
m_1 (1st order autoc.)	0.00	0.01	0.00	0.00
m_2 (2nd order autoc.)	0.16	0.19	0.42	0.76
Sargan test	0.64	0.94	0.45	1.00
z_1 (overall)	0.00	0.00	0.00	0.00
z_2 (time dummies)	0.00	0.03	0.00	0.11
z_3 (ind. dummies)	0.00	0.00	0.00	0.00
N. obs.	2403	117	1827	459

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments; where the latter is also interacted with the relevant dummy variables. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 267.

Table 6.13. Investment equations: large-small

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.04	−0.03	0.09	0.16
	(2.35)	(−1.07)	(5.32)	(7.03)
$\left(\frac{Y}{K}\right)_{i,t}$	−0.01	−0.01	0.00	−0.01
	(−4.58)	(−3.05)	(−2.88)	(−1.92)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.01	0.00	0.01	0.01
	(4.65)	(2.73)	(7.08)	(3.48)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-93 large	−0.11	−0.28	−0.06	0.12
	(−0.62)	(−1.64)	(−1.10)	(1.84)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-93 small	0.01	0.01	0.02	0.03
	(0.42)	(0.45)	(0.58)	(0.82)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-93 large	0.03	−0.02	0.03	−0.01
	(0.70)	(−0.38)	(0.75)	(−0.12)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-93 small	0.05	0.07	0.06	0.05
	(2.09)	(1.82)	(3.24)	(1.77)
m_1 (1st order autoc.)	0.00	0.00	0.00	0.00
m_2 (2nd order autoc.)	0.01	0.25	0.68	0.80
Sargan test	0.02	0.85	0.43	1.00
z_1 (overall)	0.00	0.00	0.00	0.00
z_2 (time dummies)	0.00	0.00	0.00	0.01
z_3 (ind. dummies)	0.00	0.01	0.02	0.01
N. obs.	16536	5893	7167	3476

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments; where the latter is also interacted with the relevant dummy variables. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 4333.

Table 6.14. Investment equations: low-high debt

Regressors	Overall	State	Private	Foreign
$\left(\frac{I}{K}\right)_{i,t-1}$	0.04	−0.03	0.09	0.14
	(2.52)	(−0.98)	(4.81)	(6.28)
$\left(\frac{Y}{K}\right)_{i,t}$	−0.01	−0.01	−0.01	−0.01
	(−4.95)	(−3.52)	(−3.81)	(−1.79)
$\left(\frac{Y}{K}\right)_{i,t-1}$	0.01	0.00	0.01	0.01
	(4.41)	(2.13)	(7.35)	(3.49)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-93 low debt	0.05	−0.11	0.03	0.03
	(0.61)	(−0.77)	(0.39)	(0.48)
$\left(\frac{CF}{K}\right)_{i,t-1}$ pre-93 high debt	−0.02	0.05	0.00	0.09
	(−0.38)	(0.87)	(−0.02)	(1.12)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-93 low debt	0.21	0.15	0.11	0.07
	(2.99)	(1.36)	(2.35)	(2.58)
$\left(\frac{CF}{K}\right)_{i,t-1}$ post-93 high debt	0.03	0.03	0.05	0.04
	(1.34)	(0.99)	(2.48)	(1.87)
m_1 (1st order autoc.)	0.00	0.00	0.00	0.00
m_2 (2nd order autoc.)	0.47	0.58	0.34	0.83
Sargan test	0.00	0.79	0.30	1.00
z_1 (overall)	0.00	0.00	0.00	0.00
z_2 (time dummies)	0.00	0.00	0.00	0.01
z_3 (ind. dummies)	0.00	0.12	0.05	0.00
N. obs.	16536	5893	7167	3476

Note: Dependent variable: $\frac{I}{K}$. GMM one-step estimates in first differences, using $(t-2, t-6)$ lags of $\frac{I}{K}$, $\frac{Y}{K}$, and $\frac{CF}{K}$ as instruments; where the latter is also interacted with the relevant dummy variables. Year and industry dummies included in all equations. t-statistics in round brackets (heteroskedasticity consistent standard errors). In the bottom part of the table p-values reported for the test statistics. Sample period: 1991 to 1999. Overall number of firms: 4333.

7

Conclusions

In the past two decades the Hungarian financial system has undergone a number of major changes in order to increase its efficiency. In particular, the banking sector reform was aimed at the separation of central banking and commercial banking functions, the restructuring of commercial banks and the definition of an appropriate regulatory framework. At the same time, the introduction of a new bankruptcy law was intended to enhance allocative efficiency and to provide agents with the appropriate incentives.

Institutional reforms *per se*, however, are not a sufficient condition for the achievement of an efficient credit allocation system. Once the new rules are created, agents have to learn to play by the rules. In particular, in transition economies, lenders have to develop project appraisal and monitoring skills, while borrowers must learn to respond appropriately to the new system of incentives. Whether the reform process in transition economies has succeeded in establishing an efficient incentive-based economic system is an open and much-debated issue.

In order to shed light on these issues, this book presented the results of an empirical investigation of the behaviour of Hungarian firms during the transition process, focusing in particular on the role of financial market imperfections for firms' capital structure and investment decisions. Following a survey of the theoretical and empirical literature, we started our analysis of the Hungarian experience by describing the evolution of the Hungarian economy since the beginning of transition, analysing in particular the role of financial markets and their transformation throughout this period.

We then moved to the microeconomic level, providing a descriptive analysis of corporate financial positions in Hungary between 1989 and 1999, focusing on indicators of leverage, liquidity, profitability and efficiency, and providing a characterisation of the static and dynamic features of the distribution of firms' financial positions. We found that Hungarian firms made relatively little use of external debt, and that a large fraction of firms did not use bank credit, while making extensive use of commercial credit. The debt structure ratio was remarkably high, both in absolute terms and when compared with other

countries, indicating that Hungarian firms made little use of long-term debt to finance their assets and, as a consequence, were highly vulnerable to shocks to their financial position. The current ratio indicates that this peculiar debt structure, based on a prominent role of short-term liabilities, is matched by a similar asset structure. Profitability indicators are quite low in international comparison, reflecting on the one hand the severe impact of the recession of the early nineties, and on the other hand the overall impact of firms' restructuring in the transition process.

These results for the overall sample were found to be largely robust to the disaggregation into sub-samples defined according to ownership (state-owned, private domestic, foreign), size (small, medium, large) and industry (Agriculture, Construction, Manufacturing, Utilities, Trade). State-owned firms have lower leverage than private firms and, within the latter group, foreign firms are significantly more leveraged than private domestic firms. State-owned firms display higher financial debt ratios than domestic private firms, and are the ones characterised by the highest pressure of interest expenses. As for liquidity, the debt structure is similar across ownership types. Profitability is lowest for state-owned firms, in terms of both return on assets and return on equity, reflecting low efficiency as measured by asset turnover and gross margin. Large firms have lower mean and median debt-asset ratios than small and medium firms, and are characterised by a higher bank debt and coverage ratio. Small firms tend to have a higher fraction of short term debt. Profitability is negatively related to size, largely reflecting a higher asset turnover ratio for small firms.

As for the evolution over time of the distribution of financial positions, the average debt-asset ratio rises between 1989 and 1992, to remain virtually stable thereafter. The average debt structure declines gradually throughout the sample period. The high percentage of short term debt appears to be mainly inherited from the past, rather than the outcome of the transition period. Profitability indicators display a procyclical behaviour, following closely the dynamics of the aggregate cycle. Intra-distribution mobility is quite low for all the financial ratios considered, with the only exception of profitability indicators.

Next, the analysis focused on the determinants of the capital structure of Hungarian firms in the 1990s. The aim was to investigate the presence of constraints for firms in achieving their optimal capital structure and, more generally, the efficiency of the banking sector in providing credit. The results indicate, on the one hand, a pecking order in firms' financing choices, suggesting the presence of forms of financial market imperfections that constrain firms in the achievement of their optimal capital structure. On the other hand, reforms seem to have hardened firms' budget constraints and rendered the credit allocation process more efficient and market oriented.

Finally, we examined the role of financial factors for corporate investment decisions, exploring differences before and after the introduction of major financial reforms, across sub-samples of firms defined according to size and

leverage. The results indicate that financial reforms have significantly affected the investment behaviour of Hungarian firms. The effects were different depending on firms' ownership type. Both state-owned and domestic private firms faced a soft-budget constraint before 1993. In the post-reform period, however, while private firms came to face binding financial constraints, state-owned firms remained subject to a soft budget constraint, although their investment decisions became more sensitive to financial conditions. The response of foreign-owned firms was quite different: they were subject to a hard budget constraint in both periods, but became less sensitive to financial conditions, possibly indicating that reforms might have been successful in lowering informational costs. These results were found to be robust to a number of consistency checks.

Splitting the sample further by size and leverage, we found that in the post-1993 period budget constraints became binding for small private firms and, to a lesser extent, small state firms. Large firms, on the contrary, continued to face a soft budget constraint irrespective of their ownership type. The fact that the post-1993 relationship between financial conditions and investment for Hungarian domestic firms depends on size but not on leverage can be taken as a further indication that financial reforms displayed their effects through the hardening of the budget constraint for small private and state firms.

These results extend and qualify those obtained by previous studies for Hungary and other transition economies. On the one hand, the persistent absence of liquidity constraints suggests that, despite the introduction of major financial reforms, state-owned firms operated under a soft budget constraint throughout the nineties. On the other hand, financial reforms seem to have significantly improved the efficiency of credit allocation to the private sector, in two respects: budget constraints became binding for private domestic firms, particularly small ones, and informational costs became less relevant for foreign-owned firms.

It is commonly agreed that Hungary represents one of the most successful examples of economic transformation among Eastern European economies. Relative to other transition economies, Hungary had a very strong macroeconomic performance since 1994, indicating that the gradual approach to economic transformation adopted by the Hungarian authorities was successful, at least compared to other advanced transitional economies.

The results of our firm-level empirical analysis provide an indication that the progressive liberalisation and development of financial markets, accompanied by a strong institutional and regulatory reform, was among the key factors explaining the Hungarian success. Financial market reforms seem to have succeeded, albeit partially, in hardening firms' budget constraints and improving the efficiency of the credit allocation process. In particular, following the introduction of the banking sector reform and of the new bankruptcy law, budget constraints became binding for small private firms, while informational costs became less relevant for foreign-owned firms.

Future research will determine whether the further evolution of the Hungarian financial system and the accession to the European Union will allow to impose financial discipline on all firms, irrespective of their size and ownership type, increasing further the efficiency of credit allocation and providing additional support to the macroeconomic performance of the Hungarian economy.

Data appendix

7.1 Data description

The data set used in this work is quite unique for Eastern European standards as it covers company account data for a large cross-section of Hungarian firms observed from 1989 to 1999. The sample of firms analysed is based on two main sources: a data set collected by the Hungarian Ministry of Finance that contains information on all firms that paid corporate or profit taxes from 1989 to 1996, covering the majority of Hungarian firms; and a second data set from the Hungarian Central Statistical Office that contains end of year financial statements of medium-large firms, from 1992 to 1999.[1] Merging the information from the two sources we obtained firm-level annual time series between 1989 and 1999 for balance sheet and income statement variables, plus information on ownership, employment, export, regional location and industry identification at the four digit level. Information about the legal status and the distribution of equities among shareholders allowed us to identify and quantify the presence of foreign ownership.[2] Tables 7.1-7.3 report the number of observations available for each variable by year. Tables 7.4-7.5 present the corresponding average values by variable and year. Table 7.6 reports average values for balance sheet items as a fraction of the book value of total assets.

It should be observed that the data set suffers from some limitations: first, it is an unbalanced panel with a high turnover of firms due to a large number

[1] The data sets were provided by the Kopint-Datorg Budapest in a non identifiable form.

[2] Firms were identified on the basis of their identification numbers. It should be observed that when a firm is split, due to restructuring or privatisation, a branch or a part of it normally keeps the same identification number of the original firm, while a different identification number is assigned to the other parts or branches. While the original firm and the branch that keeps the same identification number are *de facto* different firms, in the sample they are recorded as the same firm.

of entries and exits.[3] This follows a sort of "natural" evolution in Eastern European countries where the development of the transition process brings along the growth of the new private sector with the birth of new firms. Nevertheless, this process poses some problems for the statistical and econometric analysis since both the birth of new firms and the death of old ones makes it very difficult to track down the evolution of the sample of firms over time. For this reason, whenever possible, results were reported for two samples of firms: an unbalanced (floating) sample and a balanced (fixed) sample, the latter being the sample of firms for which we have continuous consecutive observations from 1989 to 1999.

The second problem is that some variables were missing from the data set in some years, particularly in 1989-91 and in 1996. The variable that causes most concerns is interest expenses, since it is a key variable in the definition of some measures of liquidity. In order to overcome this problem we reconstructed the variable, using a measure of total debt (available for all years in the sample), and the series of interest rates charged by commercial banks to firms from 1988 to 1999 (the source is the National Bank of Hungary), with the indication of the range (minimum-maximum) applied in each year. We obtained a measure of the implicit interest rate payed by the firms in the years in which information on interest expenses is available, by dividing interest payment over total debt. We then ranked firms by interest rates paid, thus obtaining an implicit measure of their "merit class" in the credit market. We applied the distribution of merit classes to the official interest rates ranges, obtaining an estimate of the interest rate that each merit class was charged by the market. Using again the information on total debt we calculated an estimate of interest rate expenses for the years when information on interest expenses was missing.

Third, we used book-value indicators. Due to the volatility of inflation in the sample period, market values have fluctuated much more than book values. To overcome this problem, we used indicators (financial ratios) defined in such a way to at least partially take into account this problem.

Despite these limitations, the data set is particularly interesting, as it is highly representative of the overall Hungarian economy. Table 7.7 provides some information on the sample coverage, by reporting total employment and value added in the sample as a percentage of the whole economy. The firms contained in the sample account for over 70% and 80%, respectively, of total employment and value added in the manufacturing sector. In other sectors, such as agriculture and services, the degree of representativeness is lower, reflecting the higher number of small firms.

[3] Sgard (2001) observes that before 1995 the high turnover of firms can be largely attributed to existing firms receiving a new identification number when undergoing a transformation of legal status (privatisation, merger, etc.), whereas after 1995 exits are more likely to reflect effective exit out of the market.

If we consider size representativeness, medium and large firms are over-represented in the data set compared to the overall economy. As shown in Table 7.8, firms in the smallest size class (0-10 employees) account for over two thirds of the total number of firms in the Hungarian economy, while in our data set they account for only 13.6 per cent of the total. Table 7.10 displays the evolution of firms' employment distribution over the years considered. Looking at the sectorial distribution of firms in the sample, Table 7.9 shows that the manufacturing sector is over-represented (43 per cent, against 23.1 in the whole economy).

Finally, Table 7.11 describes the evolution of the ownership distribution of firms. It is clear that the ownership structure of firms in the sample changed considerably during the period investigated. As the table confirms, the share of state owned firms dropped from over 20% in 1989 to 11% in 1999, while the share of private firms rose from 49% in 1989 to almost 60% in 1999.[4] This pattern of ownership is quite common in transitional economies, although Hungary is characterised by two peculiar features: first, even at the beginning of transition the share of private firms was already high, compared to other formerly planned economies; second, the share of foreign owned firms increased steadily throughout the period, and in the second part of the period it appears to be the driving force of the change in ownership structure (as its rise is matched by a contemporaneous decrease in the share of private and state owned firms).

[4] The large fall in the share of cooperatives in 1994 is due to a change in the definition of cooperatives implemented by the Central Statistical Office at the end of 1993.

Table 7.1. Number of observations by variable and year: Classification

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Firm code	7689	7689	7689	11705	8251	8352	8453	8366	7182	7091	6797
Location	7689	7689	7689	11705	8251	8352	8453	8228	7182	7091	6797
Industry 2d	7689	7689	7689	11705	8251	8352	8453	8228	7182	7091	6797
Industry 3d	7689	7689	7689	11705	8251	8352	8453	8228	7182	7091	6797
Industry 4d	7689	7689	7689	11705	8251	8352	8453	8228	7182	7091	6797
Ownership	7689	7689	7689	11654	8240	8324	8428	8179	7160	7055	6760
State	7640	7636	7636	11687	8219	8321	8419	8175	7173	7081	6792
Cooperative	7631	7625	7625	11540	8216	8323	8416	8174	7173	7081	6792
Foreign	7641	7636	7636	11692	8228	8325	8417	8174	7173	7081	6792
Private	7641	7636	7631	11581	8172	8300	8403	8168	7173	7081	6792
Export share	7280	7662	7644	11310	8098	8191	8283	8038	7008	6947	6688
Employment	7689	7689	7689	11705	8251	8352	8453	8204	7182	7091	6797

Note: Hungarian company account data, 1989-1999.

Table 7.2. Number of observations by variable and year: Income Statement

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Gross Output	7650	7684	7677	11565	8191	8298	8387	7155	7138	7038	6752
Value Added	7689	7689	7689	11705	8251	8352	8453	7208	7182	7091	6797
Net Sales	7688	7689	7688	11705	8250	8351	8453	8366	7182	7091	6797
Profit before Tax	7689	7689	7689	11705	8251	8352	8453	8320	7182	7091	6797
Profit after Tax	7689	7689	7689	11705	8251	8352	8453	8320	7182	7091	6797
Material Costs	7681	7676	7675	11705	8249	8352	8453	7208	7182	7091	6797
Labour Costs	7689	7689	7689	11705	8251	8352	8453	7208	7182	7091	6797
Social Security	7689	7688	7689	11705	8251	8352	8453	7208	7182	7091	6797
Depreciation	7684	7685	7683	11705	8250	8352	8453	8366	7182	7091	6797
Interest Expenses	7629	7628	7627	11705	8250	8352	8453	8224	7182	7091	6797
Tax paid	7626	7467	7408	11705	8245	8352	8453	7208	7182	7091	6797

Note: Hungarian company account data, 1989-1999.

Table 7.3. Number of observations by variable and year: Balance Sheet

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Cash	7675	7659	7663	11676	8226	8331	8432	8351	7182	7091	6797
Accounts Receivable	7689	7689	7689	11705	3281	3307	8448	7205	7182	7091	6797
Inventories	7688	7689	7688	11705	8251	8352	8451	7206	7182	7091	6797
Other Current Assets	7635	7635	7610	11653	3281	8340	8392	7131	7182	7091	6797
Total Current Assets	7688	7688	7687	11705	8248	8347	8450	8364	7182	7091	6797
Financial Investment	7688	7688	7687	11705	8251	8352	8453	8366	7182	7091	6797
Net Fixed Assets	7689	7689	7689	11705	8251	8352	8453	8366	7182	7091	6797
Other Assets	7687	7688	7686	11705	3281	3307	8129	6875	7182	7091	6797
Total Assets	7689	7689	7689	11705	8251	8351	8451	8366	7182	7091	6797
Short Term Debt	7687	7688	7686	11705	8043	8173	8453	8366	7182	7091	6797
Accounts Payable	7689	7689	7689	11705	3281	3307	8445	7208	7182	7091	6797
Other Current Liab.	7517	7552	7561	11705	3281	3307	8449	7208	6927	6803	6508
Total Current Liab.	7650	7662	7656	11705	8243	8352	8453	8366	7182	7091	6797
Long Term Debt	7689	7689	7689	11705	8250	8352	8453	8366	7182	7091	6797
Other Long Term Liab.	7689	7689	7689	11705	8250	8352	8453	8366	7182	7091	6797
Total Long Term Liab.	7689	7689	7689	11705	8249	8352	8453	8366	7182	7091	6797
Shares	7686	7688	7688	11705	8248	8352	8453	8366	7182	7091	6797
Retained Earnings	7689	7689	7689	11705	3281	8352	8453	8366	7182	7091	6797
Reserves	7689	7689	7689	11366	3203	8095	8184	8124	7107	7091	6797
Other Equity	7689	7689	7689	11705	8251	8352	8453	8366	7182	7091	6797
Total Equity	7689	7689	7689	11705	8251	8352	8453	8366	7182	7091	6797
Other Liabilities	7253	7276	7331	11705	8011	8352	8448	7208	7182	7091	6797

Note: Hungarian company account data, 1989-1999.

Table 7.4. Averages by variable and year: Income Statement

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Gross Output	166512	191841	186018	232366	403780	491224	623453	830662	1098959	1365134	1637152
Value Added	52410	79586	77232	90120	153137	218875	228641	302114	393043	470891	545187
Net Sales	293186	313783	287246	355175	613099	745527	937621	1193598	1642521	2064426	2472642
Profit before Tax	14039	9302	-254	-16134	-6275	4866	12157	25095	76438	106896	126657
Profit after Tax	7195	8530	945	-18791	-10422	-485	6922	18565	67527	95085	110984
Material Costs	80436	83388	78299	98825	172420	206467	271970	361639	494041	620698	755831
Labour Costs	26332	29609	29977	35184	63535	74830	83757	104899	126375	154357	184234
Social Security	11617	13106	13211	15834	28621	33867	37973	45896	54734	66795	70007
Depreciation	6887	7233	7666	16608	28127	33338	38657	50157	63850	81374	99721
Interest Expenses	4162	7604	9398	13722	16515	11243	27059	27496	31253	36836	36924
Tax paid	4618	3376	2120	2657	5193	5352	5235	6717	8912	11811	15673
Employment	201	201	165	153	212	200	171	178	174	180	183

Note: Hungarian company account data, 1989-1999.

Table 7.5. Averages by variable/year: Balance Sheet

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Cash	11540	15679	12457	25701	45494	49391	51260	57943	75096	85370	99575
Accounts Receivable	35242	39684	42482	47070	149709	155201	102707	132177	164396	205064	260082
Inventories	57793	57548	54317	52411	88704	96387	115620	138188	169414	206555	243371
Other Current Assets	7852	10654	9635	32133	102713	87866	79606	107777	136261	162331	206952
Total Current Assets	112108	123264	118328	157065	272264	294965	348371	426356	545169	659321	809981
Financial Investment	13307	19540	27512	54490	82001	80658	76026	78781	100333	116648	142503
Net Fixed Assets	116679	119204	121087	211262	492784	480874	513410	582452	700836	827165	968192
Other Assets	15472	15948	16954	13981	25507	31383	23426	37664	39830	51441	77186
Total Assets	257252	277905	283831	430255	864621	874141	959453	1118425	1386169	1654577	1997862
Short Term Debt	12484	16533	18635	31445	56166	59446	70698	93336	110359	118859	133614
Accounts Payable	28253	29052	31047	35261	112852	123334	91179	115504	136244	175083	236502
Other Current Liab.	28797	34876	35081	54504	160280	166376	109767	136248	184335	216538	276969
Total Current Liab.	69205	80068	84473	121211	213887	229895	271505	335610	420790	496340	626859
Long Term Debt	8004	11087	11674	14721	27124	32110	36487	52956	75487	96589	117197
Other Long Term Liab.	2607	2449	2881	9627	27181	34756	50009	60062	69944	101357	111625
Total Long Term Liab.	10611	13536	14556	24348	54312	66866	86497	113018	145431	197946	228822
Shares	108568	115677	121577	227146	433667	425779	433287	466792	534982	566588	596770
Retained Earnings	50173	52091	56249	23102	48771	22887	29101	47353	-3242	43493	128683
Reserves	1469	2382	3637	53088	290911	146705	154135	170640	191376	202569	216016
Other Equity	5456	2948	-6616	-26798	-23414	-37705	-37104	-53956	45586	68067	94350
Total Equity	165623	173084	174832	274815	574648	551894	574503	632851	766599	880719	1035821
Other Liabilities	12943	12241	10888	9879	23765	25051	28496	38282	53333	79567	106256

Note: Hungarian company account data, 1989-1999.

Table 7.6. Balance Sheet (percentages)

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
ASSETS											
Cash	0.04	0.06	0.04	0.06	0.05	0.06	0.05	0.05	0.05	0.05	0.05
Debtors	0.14	0.14	0.15	0.11	0.17	0.18	0.11	0.12	0.12	0.12	0.13
Inventories	0.22	0.21	0.19	0.12	0.10	0.11	0.12	0.12	0.12	0.12	0.12
Other Current Assets	0.03	0.04	0.03	0.07	0.12	0.10	0.08	0.10	0.10	0.10	0.10
Total Current Assets	0.44	0.44	0.42	0.37	0.31	0.34	0.36	0.38	0.39	0.40	0.41
Financial Investment	0.05	0.07	0.10	0.13	0.09	0.09	0.08	0.07	0.07	0.07	0.07
Fixed Assets	0.45	0.43	0.43	0.49	0.57	0.55	0.54	0.52	0.51	0.50	0.48
Other Assets	0.06	0.06	0.06	0.03	0.03	0.04	0.02	0.03	0.03	0.03	0.04
Total Assets	1.00	1.00	1.00	1.02	1.01	1.02	1.00	1.01	1.00	1.00	1.00
LIABILITIES											
Short Term Debt	0.05	0.06	0.07	0.07	0.06	0.07	0.07	0.08	0.08	0.07	0.07
Creditors	0.11	0.10	0.11	0.08	0.13	0.14	0.10	0.10	0.10	0.11	0.12
Other Current Liabilities	0.11	0.13	0.12	0.13	0.19	0.19	0.11	0.12	0.13	0.13	0.14
Total Current Liabilities	0.27	0.29	0.30	0.28	0.25	0.26	0.28	0.30	0.30	0.30	0.31
Long Term Debt	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06
Other Long Term Liabilities	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.05	0.05	0.06	0.06
Total Long Term Liabilities	0.04	0.05	0.05	0.06	0.06	0.08	0.09	0.10	0.10	0.12	0.11
Shares	0.42	0.42	0.43	0.53	0.50	0.49	0.45	0.42	0.39	0.34	0.30
Retained Earnings	0.20	0.19	0.20	0.05	0.06	0.03	0.03	0.04	0.00	0.03	0.06
Reserves	0.01	0.01	0.01	0.12	0.34	0.17	0.16	0.15	0.14	0.12	0.11
Other Equity	0.02	0.01	-0.02	-0.06	-0.03	-0.04	-0.04	-0.05	0.03	0.04	0.05
Total Equity	0.64	0.62	0.62	0.64	0.66	0.63	0.60	0.57	0.55	0.53	0.52
Other Liabilities	0.05	0.04	0.04	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.05
Total Liabilities	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Note: Hungarian company account data, 1989-1999.

Table 7.7. Sample coverage

Sector	Employment	Value Added
Agriculture	37.2	27.3
Mining	41.0	82.7
Manufacturing	78.0	81.2
Electricity, Gas, Water	93.8	97.0
Construction	36.1	34.3
Trade, Tourism	35.8	40.3
Transport	72.1	58.9
Finance	29.8	9.4
Public Administration	4.3	4.7

Note: Total employment and value added in the sample as a percentage of the Hungarian economy (1995).

Table 7.8. Sample representativeness by size

Size class	Data set	Whole economy
0-10	13.6	75.5
11-20	5.0	12.0
21-50	21.2	7.0
51-300	49.4	4.5
300-	10.8	1.0

Note: Distribution of employment by employment size class (1995).

Table 7.9. Sample representativeness by sector

Sector	Data set	Whole economy
Agriculture	7.6	8.0
Mining	1.0	0.9
Manufacturing	43.0	23.1
Electricity, Gas, Water	6.3	2.6
Construction	5.4	5.9
Trade, Tourism	14.2	15.6
Transport	15.9	8.7
Finance	4.4	6.0
Public Administration	2.2	29.2

Note: Distribution of employment by sector (1995).

Table 7.10. Distribution of firms by employment classes

Year	$0-9$	$10-19$	$20-49$	$49-249$	>250
1989	31.59	12.78	16.74	23.49	15.40
1990	31.59	12.78	16.74	23.49	15.40
1991	30.97	14.83	17.97	24.02	12.20
1992	29.79	10.51	15.79	31.65	12.26
1993	12.21	4.51	17.23	49.22	16.83
1994	11.23	4.78	20.31	48.76	14.92
1995	12.12	4.76	22.22	47.52	13.37
1996	11.71	4.69	22.50	47.60	13.50
1997	9.28	4.10	21.20	51.74	13.69
1998	8.43	3.96	18.17	55.87	13.58
1999	8.44	4.01	13.89	59.69	13.96

Table 7.11. Firms' ownership distribution by year

Year	State	Cooperatives	Joint Ventures	Private	Total
1989	20.47	21.23	9.21	49.10	100
1990	19.40	21.50	12.11	46.99	100
1991	21.19	21.55	11.67	45.60	100
1992	23.59	16.03	15.33	45.06	100
1993	20.59	15.17	19.58	44.66	100
1994	14.33	3.86	21.08	60.73	100
1995	10.96	3.46	22.43	63.15	100
1996	11.20	3.87	23.26	61.67	100
1997	12.42	4.19	24.44	58.95	100
1998	11.51	3.97	24.96	59.56	100
1999	11.43	4.13	25.24	59.20	100

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