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Firms' investment under financing constraints

A euro area investigation

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Firms' investment under financing constraints
A euro area investigation [1]

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Abstract

In this paper we describe a theoretical model of optimal investment of various types of financially constrained firms. We show that the resulting relationship between internal funds and investment is non-monotonic. In particular, the magnitude of the cash flow sensitivity of the investment is lower for firms with credit rationing compared to firms that are able to obtain short-term external financing. The inverse relationship is driven by the leverage multiplier effect. A positive cash flow shock increases the short-term borrowing capacity of the firm, which in turn has a positive effect on investment and firm's growth. Moreover, the leverage multiplier effect is the highest for firms relying on short-term credits and it is lower for firms that are able to obtain long-term financing. Analysing a large euro area data set we find strong empirical support for our theoretical predictions. The results also help to explain some contradictory findings in the financing constraints literature.

JEL classification: D92, G3, G32

Keywords:

Financing constraints, growth, investment, cash flow sensitivity

Az eurozóna vállalati beruházásai finanszírozási korlátok mellett

Pál Rozália — Roman Kozhan

Összefoglaló

A dolgozatban eltérő finanszírozási korlátú vállalatok optimális beruházásának elméleti modelljét mutatjuk be. Megmutatjuk, hogy a belső pénzügyi források és beruházás kapcsolatára adódó összefüggés nem monoton. A hitel-korlátos vállalatoknál a beruházások kevésbé érzékenyek a pénzforgalomra, mint azoknál a cégeknél, amelyek hozzáférnek rövid-távú külső finanszírozáshoz. Az inverz összefüggést a tőkeáttételi multiplikátor hatás határozza meg. Egy pozitív pénzforgalmi sokk növeli a cég rövid-távú hitelfelvételi korlátját, ami pozitívan hat a vállalat növekedésére. Továbbá a tőkeáttételi multiplikátor hatás a rövid-távú hitelekre szoruló cégeknél a legmagasabb, és alacsonyabb azoknál, amelyek képesek hosszú-távú hitelhez jutni. Egy az eurozóna vállalatait lefedő nagyméretű adatbázist felhasználó empirikus elemzés eredményei nagyon pontosan egybeesnek az elméleti következtetésekkel. Ezek az eredmények hozzájárulnak a finanszírozási korlátok irodalma ellentmondásos következtetéseinek jobb értelmezéséhez.

Tárgyszavak:

Finanszírozási korlátok, növekedés, beruházás, pénzforgalom érzékenység.

INTRODUCTION

Understanding the firms' investment decisions under imperfect market conditions is one of the central issues of the financial economics. Studying firm's investment in such environment can provide insight into the dynamics of its growth as a function of internal and external financial sources. Fazzari et al. (1988) argue that in the presence of financing constraints the firms' investment varies not only with the availability of the profitable investment projects, but also with the internal funds. Consequently, the severity of the financing constraints is proposed to be measured by the magnitude of the cash flow sensitivity of investment.

However, there is debate on the interpretation of the sensitivity in the light of the financing constraints. Different conclusions are drawn mostly because of the different ways of a-priori classification in financially constrained and unconstrained groups. Fazzari et al. (1988) consider firms a-priori as constrained if they pay low dividend payout ratio, and they interpret the estimated significant cash flow sensitivity of this group of firms as an evidence of financing constraints. The lower sensitivity is taken as an evidence of the less severe financing conditions.1 Kaplan and Zingales (1997) define as financially constrained those firms that are in violation of debt convenants, have been cut out of their usual source of credit, are negotiating debt payments, or declare that they are forced to reduce investments because of liquidity problems. Their classification is based on the managers' report on operations, capital resources and liquidity (qualitative information) and financial statements and notes (quantitative information). Contrary to previous results, they document the highest sensitivity for least constrained firms. In a recent study, Moyen (2004) shows, that both results can be replicated with the help of a simulated sample just by changing the a-priori classification, however not all of these a-priori classifications is able to group firms based on their true financing conditions.

In this paper we propose an alternative perspective to investigate the relationship between financing conditions and the sensitivity measure. First, we argue that in the real world it is hard to identify a group of firms in the absence of the financing constraints. Just considering the external relative to the internal costs of financing, we could hardly find any unconstrained firm (Kaplan and Zingales (1997)). Consequently, we focus on the severity of the constraints instead of its absence or presence. We model the firms' cash flow sensitivity of total investment with respect to the reliance on the external financial market. Further on,

[1] Supporting results with alternative classifications are summarised in the literature overview presented by Schiantarelli (1995) and Hubbard (1998).

we differentiate firms relying mostly on short-term credits from those that are able to access external long-term sources assuming that long-term debt is more preferable for investments.

Some firms forgo investment rather than access capital markets. Consequently the firm will under-invest relative to its first best level. The reason behind can be diverse, i.e. the firm decides not to take the credit because of the high cost, managerial agency problem, or not wishing to provide private information on their projects to the financing institutions. Firm's can face the credit rationing resulting from asymmetric information, moral hazard, adverse selection, costly state verification or low level of tangible assets[2]. Consequently, we provide a special attention to such group of firms that rely exclusively on their internal sources, considering them under the worst financing conditions.

Firms with a financing need (lower cash flow than investment value) access external financing sources whenever it is possible in order to precede their investment projects. However the variability in internal sources, especially a negative shock, increases not only the likelihood that a firm will need external sources but its cost as well and at the same time it also decreases the likelihood to obtain it (see Minton and Schrand (1999)). In such case both borrowing and investment became endogenous. An increase in cash flow results in a higher borrowing capacity, which in turn allows for higher investment and growth (see also Carpenter and Petersen (2002) and Almeida and Campello (2006)). Consequently, we expect a higher sensitivity of levered firms compared to those relying exclusively on internal sources. Moreover, we argue that the leverage multiplier effect associated with the endogenous change in external credit capacity following a cash flow shock is the highest for those constrained firms which need to negotiate each year their external sources. We assume that firms that are able to obtain longer term borrowings are the least constrained or unconstrained firms (despite of some market imperfections all of their positive net value projects can be financed) and a lower cash flow sensitivity is expected compared to those that are financed by short-term borrowings. Their borrowing capacity is assumed to be determined by factors less related to the current liquidity, such as longer-term credit history, stock market performance, bank-firm relationship, size, etc. In such case the multiplier effect is reduced or completely disappears. Still, the external funds could be insufficient for all of their positive net value projects and each additional cash flow would have a positive direct effect on the investment and growth. In the optimal case, when internal and external funds are sufficient for all of their investment projects, investment should not vary with the

[2] For theoretical discussion see Stiglitz and Weiss (1981), Williamson (1986), Bester (1985), Jaffee and Russell (1976), Sharpe (1990).

internal funds. Taking into consideration both direct and indirect effects, the sensitivity is expected to be the lowest for this group of firms.

We test the predictions of the theoretical model using a euro-area sample. Borrowings from financial institutions play a special role in the European financial system. First, contrary to the American system, the European financial system is more bank than market oriented3. Private firms do not have the option to increase their capital through new issue of shares (around 70% of our sample) and those listed on the market rely also on the credits obtained from financial institutions as the priori source4. Second, in line with the pecking order theory of Myers (1984) and Myers and Majful (1984), only firms, that are not able to increase their leverage, issue shares. Our firm classification relies on quantitative information taken from balance sheets and profits and loss statements, allowing the reclassification of firms' financial status each period. However the final analysis is in a dynamic framework and the firms' status in the whole period is determined conditional on its yearly changes. We use an error correction model with system GMM estimations (Arellano and Bond (1991), Blundell and Bond (1998)).

We find strong empirical support for our predictions. For firms with no access to external financing sources an additional euro of internal finance results in less than a euro total investment in fixed and non-cash current assets. For partially constrained firms, that have access to external financial market but with certain binding conditions in the sense that they are able to obtain only short-term credit, an additional euro generates slightly more than an additional one euro caused by the leverage multiplier effect. And finally, firms with available long-term borrowings face lower investment sensitivity on internal financing.

Considering the classifications of the previous literature, our first group of firms that relies exclusively on internal finance have similar characteristics to those defined as constrained by the KZ index, Moyen's constrained model and Cleary's index (see Kaplan and Zingales (1997), Moyen (2003) and Cleary (1999)). Our results are similar to the findings of these studies, i.e. firms relying on internal sources (identified as constrained) face a lower sensitivity than those that are able to borrow. The lower sensitivity of long-term borrowing firms compared to the short-term borrowing firms is more in line with the Fazzari et al. (1988) findings, i.e firms facing higher asymmetric information problems and consequently not able to satisfy the conditions for long-term borrowing, have higher cash flow sensitivity. Hence, we present evidence for the two contradictory predictions of the literature, showing that they are more complementary.

[3] In 2004, bank loans represented around 90% of the total debt flows to non-financial corporations in the euro area. The stock market capitalization at the end of 2003 in Euro Area was 73.4%, which is significantly lower than the US capitalization of 129.6% of GDP (source: World Federation of Exchanges).

[4] For a more detailed description of the European financial system see Ehrmann et al (2001) and Hartmann et al. (2003).

The paper is organized as follows. The next section presents the related literature of non-monotonic behaviour of investment-cash flow sensitivity. In Section 3 the theoretical model is presented. Section 4 describes the data and sample selection. In Section 5 the empirical test of the theoretical model's predictions is described. Main conclusions are summarised in the final section.

1. Related literature

On the theoretical basis there is no sufficient condition for monotonicity in the cash flow sensitivity with respect to firms financing conditions. A higher sensitivity of corporate investment to cash flow is not sufficient evidence for more severe financing constraints (see Kaplan and Zingales (1997, 2000)). Couple of recent papers present theoretical models supporting the non-monotonous sensitivity, however there is less clear way about its pattern, especially on the empirical level.

Cleary, Povel and Raith (2003) present a non-monotonic relationship between investment and cash flow. They show that firms with negative cash flow or zero dividends have the lowest sensitivity and it is the highest for firms with moderate cash flow or dividend. For the firms with the highest cash flow or dividend, which they considered as unconstrained, a lower sensitivity is estimated. Boyle and Guthrie (2003) present a dynamic model of investment distorted by costly external financing. They look at the relationship of investment timing and financing constraints showing that financing constraints can not only discourage investment, but also accelerate it, resulting in sub-optimal early investments. More importantly, an increase in cash has a smaller positive effect on the investment for constrained firms with low-cash than it does for constrained firms with high-cash. Dasgupta and Sengupta (2002) investigate with the help of a multi-period version of a standard moral hazard model the case when the firms have the option to allocate their liquidity inter-temporally. Their results differ from the previous two studies. They argue that the responsiveness of investment to changes in liquidity is the highest for low liquidity firms, the least for intermediate liquidity firms and intermediate for the high liquidity firms. However, Moyen (2003) shows that the value of cash flow, just as the dividend payout ratio used for a-priori classification is not appropriate to distinguish firms facing different financing conditions.

Moyen (2003) compares the dynamic model of unconstrained relative to constrained firm. The categories of constrained-unconstrained firms are defined based on their access to external financial markets where only unconstrained firms can issue debt. They predict a higher investment cash-flow sensitivity of unconstrained firm. They explain the higher sensitivity by the effect of debt financing on investment that is not taken into account by the

regression specification. Carpenter and Petersen (2002) provide also a theoretical model for the leverage multiplier effect. They show that the leverage effect occurs when firms' access to debt depends on the collateral and each additional dollar of internal finance should generate slightly more than one additional dollar of growth. Similar to this explanation, Almeida and Campello (2006) develop a theory explaining that sensitivities will decrease with financial constraints, so long as firms are not entirely unconstrained. They explain the decreasing sensitivity by the cash flow borrowing capacity. They show that investment-cash flow sensitivities are increasing in the degree of tangibility of constrained firms' assets and for entirely unconstrained firms the investment-cash flow sensitivities drop to zero. This implies that the relationship between capital spending and cash flows is non-monotonic.

Our results are in line with the Carpenter and Petersen (2002) and Almeida and Campello (2006) theoretical model predictions. Since Almeida and Campello (2006) show that the multiplier effect is increasing with project's tangibility, we show that such multiplier effect depends on the type of borrowing. We contribute to the literature of non-monotonic sensitivity, by differentiating the short versus long-term borrowing firms. The endogenous multiplier effect increases the sensitivity of short-term borrowing firms relative to those that rely exclusively on internal financial sources. However, for those firms that are able to get long-term financing, the borrowing capacity is less dependent on the current cash flow shocks, but rather on the "long-term" firm characteristics, like credit history, size, bank-firm relationships, etc. In this case the indirect effect of cash flow on investments is less significant or even disappears. In addition, the direct effect of cash flow is expected to be less significant, since firms are able to make the long-term investment plans relying on long-term borrowings, weakening the reliance of investment and growth on internal financing. The non-monotonic relationship of the theoretical literature relies partially on the existence of the totally unconstrained firms. Contrary to simulated sample, where unconstrained firms by definition have zero sensitivity, in real world none of the firms operate in perfect market conditions. The non-monotonic relationship derived in this paper is independent of the presence of the totally unconstrained firms.

THEORETICAL MODEL

In order to discuss the investment-cash flow sensitivity in the light of financial constraints let us define several tipes of constrained firms. As it was already mentioned before, it is quite difficult to find in the real world a group of totally unconstrained firms. It looks more reliable to determine the degree of the financing constraints based on the accessibility to different types of external financial sources. A firm is assumed to be absolutely constrained if it cannot

issue any debts and its internal sources are not enough to cover the optimal investment value (a firm with higher sources than the optimal investment is unconstrained). We consider a firm to be partially constrained if it has no possibility to issue long-term debts but can rely on the short-term credits. And least constrained firms are those able to issue debts with long-term maturity. The long-term borrowings is always preferable relative to short-term borrowings for the financing a long term projects.

We consider the model with a firm which is going to finance a long-term project (two periods in this context). The project's investment starts at time o and at the end the second period the firm collects the revenues $F(I_0)$, where the production function $F: R^+ \to R^+$ is twice differentiable strictly concave (i.e. $F'' < 0$) and increasing ($F' > 0$).There are two alternative sources of financing: internally, using the cash flow (CF) and externally, borrowing funds (D) from creditors. We also assume that the firm cannot invest into the project the whole amount of the cash flow. For liquidity reasons it saves αCF, where $\alpha < 1$, under the form of cash or highly liquid assets.

Let us consider now the investment policies of the unconstrained and our three types of constrained firms.

Unconstrained firms with sufficient internal sources: The optimal investment can be calculated as the solution of the profit maximization problem.

$F(I_0) - I_0 \to \max,\ I_0 \le (1-\alpha)CF$.

This implies that the optimal investment of the firm is $I_0^l = I^*$ if $CF \ge \frac{I^*}{1-\alpha}$, where $I^* = (F')^{-1}(1)$ is the first-best investment – the solution of the unconstrained maximization problem $F(I_0) - I_0 \to \max$. In this case we implicitly suppose that the firm can issue debts but it does not do so because it has enough internal sources to finance its project. The cash flow sensitivity of the investment under no financing constraints is:

$$Sens_u = \frac{\partial I_0^u}{\partial CF} = 0$$

I. Absolutely constrained firms: Internal sources are not sufficient, i.e. its cash flow available for investment is less than the first best investment, $(1-\alpha)CF < I^*$. This group of firms cannot issue any debts. The profit function $F(I_0) - I_0$ is increasing on the interval $(0, I^*)$ (see Figure 1) and the maximization problem of this type of firm can be written as:

$F(I_0) - I_0 \to \max,$
$I_0 \le (1-\alpha)CF$

Its solution for the amount of investment is: $I_0^a = (1-\alpha)CF$, and the investment-cash flow sensitivity is:

$$Sens_a = \frac{\partial I_0^a}{\partial CF} = 1-\alpha < 1.$$

II. Partially constrained firms: The insufficient internal sources, $CF < \frac{I^*}{1-\alpha}$, can be compensated by the issue of short-term debts. Firms financed by short-term debts need to renegotiate its credit contracts at time 1 or to find another credit in order to pay the financial obligations. We assume that the negotiation costs are fixed and smaller than the saved amount of cash, αCF, so these reserves can be used at time 1 for contract renegotiation.

We assume that borrowing capacity is a function of the project tangibility (see also Carpenter and Petersen (2002) and Almeida and Campalo (2006)). The project can be liquidated at time 1 and its liquidation value is equal to qI_0, with $q < 1$. Due to the risk of the project's default the bank is not going to lend more than the liquidation value of the project plus the cash savings of the firm. In this case the firm is faced with a debt constraint of the form: $D \le \alpha CF + qI_0$. We assume that the maximum total financing of the short-term firm $(1-\alpha)CF + D_{\max} < I^*$ and the profit function $F(I_0) - I_0$ is increasing on the interval $(0, I^*)$. When $I = I^*$, the firm is assumed to have an infinitely elastic borrowing and consequently enter the category of least constrained firms (III). The maximization problem of the partially constrained firms is:

$$\begin{aligned} &F(I_0) - I_0 \to \max, \\ &I_0 \le (1-\alpha)CF + D, \\ &D \le \alpha CF + qI_0 \end{aligned}$$

We conclude that the optimal investment for the partially constrained firms is $I_0^p = \frac{CF}{1-q}$ and the investment-cash flow sensitivity of this type of firm equals:

$$Sens_p = \frac{\partial I_0^p}{\partial CF} = \frac{1}{1-q} > 1.$$

III. Least constrained firms: Firms with available long-term debts do not face the problem of renegotiation risk and do not pay the fixed costs of the credit contract at time 1. For this type of firms the borrowing capacity is assumed to be less dependent on the project tangibility, but rather on other characteristics, like size, firms' tangibility, credit history,

quotation on the stock market or bank-firm relationships. Technically, we assume that: $\frac{\partial B(CF)}{\partial CF} = q' < q$.

Thus, the least constrained firm solves the maximization problem:

$$F(I_0) - I_0 \rightarrow \max,$$
$$I_0 \leq (1-\alpha)CF + D,$$
$$D \leq B(CF).$$

The optimal investment $I_0^l = I^*$ if $(1-\alpha)CF + B(CF) \geq I^*$ (the global maximum I^* of the function $F(I_0) - I_0$ lies within the constraint interval $(0,(1-\alpha)CF + B(CF))$ and $I_0^l = (1-\alpha)CF + B(CF)$ if $(1-\alpha)CF + B(CF) < I^*$. Hence, the optimal investment-cash flow sensitivity of the least constrained firms firm can be described as:

$$Sens_l = \frac{\partial I_0^l}{\partial CF} = \begin{cases} 0, & (1-\alpha)CF + B(CF) \geq I^*, \\ 1-\alpha+q', & otherwise. \end{cases}$$

In summary we can conclude that $Sens_{absolutely\ c.} < Sens_{partially\ c.} > Sens_{least\ c.}$, i.e. the partially constrained firms are expected to have always the highest sensitivity. Firms relying on the long-term debts are expected to have the lowest sensitivity, however it depends on the percentage of firms that are able to finance all of their positive net value projects with the help of external financing. Our model shows a non-monotonic investment-cash flow sensitivity with respect to financing constraints even in the case when all firms faces some under-financing problem (the direct effect of cash flow on investment is always present for the companies with underfinanced projects).

DATA

SAMPLE CONSTRUCTION

We use a comprehensive database of euro area firms collected from the AMADEUS database of Bureau van Dijk. Amadeus contains financial information on about 2.6 millions private and publicly owned firms across euro area countries. Data is created by collecting standardised data received from vendors of each European country. In addition to financial

information, the 4-digit NACE code, which is the European standard of industry classification, is also given. We select for our study only those firms that provide the consolidated balance sheets resulting in a sample of about 26,000 firms. The consolidated annual accounts are selected because these are considered to be the most suitable format for providing information about the financial situation of the parent company since the true financial boundaries of firms are at group level and not at individual plants. It takes in consideration the financial interest and the net assets owned by the parent in subsidiaries that will contribute to future earnings and dividends. Additionally, the consolidated accounts make our study more comparable across the results of the previous literature.

The time period covered is 1990-2004, however we exclude the first four years because of the poor coverage and an additional year is lost by constructing the variables of interest as the first difference of the balance sheet items. We exclude firms operating in financial services industries (Nace code 65 and 66) because their financial ratios are not comparable to those of non-financial companies. In addition, we drop several country-specific industries, like the Agriculture (Nace code 1), Forestry (Nace code 2), Fishing (Nace code 5) and Mining (Nace code 10-14) industry sectors. Finally, we drop the government/public sector, Education, Health and social sector, Activities of organizations, private households and extra-territorial organizations, and firms that cannot be classified (NACE codes 75, 80, 85, 91, 92, 95 and 99). The selected sample consists of 15,145 firms with 69,136 observations.

We apply several quality checks on the data. Only those firms are selected that provide information on the total assets and sales. The sample size is further reduced after checking the reported balance-sheet items of selected firms to be positive and that the sum of the subcategories of a balance-sheet item not to differ more than 5% from the reported value of the item. Finally, we exclude firms that are inactive. We apply a 1% trimming of the variables of main interest: logarithm of total assets, total assets growth, sales growth, total investment, cash flow to beginning of period total assets and short/long term borrowings to the beginning of year total assets. We retain only those firms that report data for, at least, three consecutive years. The main sample consists of 5,131 firms with 31,499 observations (for a detailed sample selection see the appendix).

Amadeus is especially useful because of its large coverage of both public and private firms (80% of total sample), however it faces some limitations. The coverage varies across euro area countries reflecting the peculiarities of European accounting legislation and its heterogeneity across countries. For example, Greece firms do not provide consolidated items and data on Irish firms were filtered out by the quality controls due to the low coverage. Austrian and Luxembourgian firms have a very low coverage. The Netherlands and Finland are over-represented due to statutory reporting requirements of the consolidated statements.

Countries such as France, Italy and Spain are well covered by the sample (for a detailed cross-country coverage of the sample see the appendix).

FIRMS' CLASSIFICATION

While there is a consensus to consider financially constrained firms those that face difficulties in obtaining external finance, there is no clear way how to identify these firms a-priori and the posterior sensitivity measures are influenced by the alternative a-priori classification. Just as Kaplan and Zingales (1997) argue, the definition of financial constraints is based on the cost of internal and external financing is the most precise one but also the broadest as well. Based on this definition almost all firms can be classified as constrained, just considering the transaction costs of external finance. However there is a significant difference among firms with respect to their accessibility to external financing, which in turn affects their corporate investment policy and growth. Our classification does not measure the internal relative to external costs but it captures cross-sectional differences in financing conditions defined as the availability of the external financial sources. Since all firms face the imperfect market conditions on some degree we propose a new classification instead of the traditional constrained-unconstrained classification. We identify three different types of firms: I.) firms relying mostly on internal financial sources noted as absolutely constrained firms, II.) firms relying on short-term external sources with maturity less than one year, noted as partially constrained, and III.) firms relying on external financial sources in form of long-term borrowings with maturity above one year, considered as the least constrained firms. We classify firm-years in the first category, only when there is a sign of constraints, i.e. despite of the financing needs (higher investment value than current cash flow) firms cannot get external sources and they need to use the cash savings from the previous periods or to liquidate its assets. We assume that firms with long-term projects would always prefer long-term instead of short-term borrowings because of the additional renegotiation costs and renegotiation risk of the short-term financing. Moreover, firms with higher borrowing costs tend to use less external finance than firms under favourable condition. The long-term borrowing firms obtain the credits under better conditions, just if we consider the fixed cost of credit renegotiation. We are not able to determine, whether firms with long-term borrowings are able to finance all of their positive net value projects but we can expect to be closer to the optimal investments than firms belonging to the other two groups and we can consider them the least constrained firms. Table 1 summarizes the criteria used in the classification and the cross-groups firm-years distribution.

[Insert Table 1 here]

After having classified each observation we apply a dynamic view of constraints. For this, we look at the characteristics to be present for minimum of three consecutive years and in the most of the available years of the given company (total number of years divided by two plus one). In order to classify a firm as absolutely constrained, minimum of three consecutive years should use only internal financial sources despite of the financing need or they liquidate their assets. Our sample is an unbalanced sample of firms and since 3 years of constrained years could be followed by 7 years of unconstrained years, for the firm classification we give the additional condition that the majority of its firm-years should be absolutely constrained. This means that the number of constrained years should be more than the total number of available years of the given firm divided by two (in case of maximum available of 10 years, in a minimum of 6 years the firm should be absolutely constrained). The firm is considered as partially constrained, if minimum of three consecutive years and in majority of its available years was categorised as partially or absolutely constrained. The least constrained firms are those that are not included in the previous two categories and consequently for such firms the financial constraints do not persist for more than half of the available years and less than 3 consecutive years. The final outcome of the classification is presented in Table 2 and the regression analyses are based on this dynamic firm classification.

[Insert Table 2 here]

EMPIRICAL TEST

To gain some first insight into the firms' characteristics and their financing condition, key characteristics of firms of the three groups are reported in Table 3. Differences in mean values of the variables among the firm-groups are tested based on the t statistic.

[Insert Table 3 here]

The first variable presented in Table 3 indicates that firms that rely more intensively on external financial sources are in general larger. The growth of total assets (2nd variable) is significantly higher for the firms with financial debt. Less risky firms get better financing,

thus have less impediment in their growth. This relationship is important with respect to one of the main critics addressed to the sensitivity measure. Previous studies emphasize that the magnitude of the sensitivities, which should measure the presence of financing constrained is actually reflecting future investment opportunities and it is higher for growing firms (see Ericson and Whited (2000), Alti (2003), Bond et al. (2004)). Thus the cash flow sensitivity could reflect the future investment opportunity, not efficiently captured by other proxies like Tobins' Q or sales growth. If the hidden investment opportunities would rule the investment-cash flow sensitivity of our sample, we should estimate a monotonic increase in sensitivity from absolutely to least constrained firms. If there is any distortion caused by future investment opportunity, this would result in a higher increase of sensitivity of least constrained firms. A higher growth of less constrained firms is documented also by Cleary (1999) and Whited and Wu (2004). They classify firms based on the dividend cuts and an index measuring the shadow cost associated with raising new equity (the cost of external finance relative to internal finance), respectively.

The significantly higher sales growth (3rt variable) of less constrained firms could be specific for the euro area firms. The euro area of the given period is characterised by a progress towards integration of financial system, not only in the area of money markets but also in bond markets, equity markets and banking. Related policy initiatives provide the opportunity for both new- and well-established firms to new directions of development.[5] This means that possible investment projects are above the internal financial sources and any additional external financing is able to increase their productivity and sales. Mizen and Vermeulen (2005) suggest using sales growth as a-priori classification criteria for some European firms, since the high sales' growth could be an indicator of financial health and future profitability that opens up access to external finance.

The lower cash flows (4th variable) of absolutely constrained firms confirm our assumption that the negative or zero borrowings are caused by the difficulties in obtaining external sources and not the excess cash flow. The yearly changes in the amount of short- and long-term credits (5th and 6th variables) are the proxies of the new external sources used as a classification criteria and the mean values reflect the outcome of the firms' classification. More importantly, the leverage (7th variable) is higher for less constrained firms, indicating that firms do not rely on external financial sources in general, and not only in the analysed sample period. The lower leverage of the more constrained firms is in line with the findings of Faulkender and Petersen (2003). They argue that the availability of incremental capital depends on the risk of the firm's cash flows and characteristics of the firm. Consequently,

[5] For a more detailed description of the euro area financial structure integration see Hartmann, Maddaloni and Manganelli (2003).

firms with barriers to some external sources are under-levered. The unconstrained firms simulated by Moyen (2004) take on also more debt than constrained firms since they can respond to income shocks by varying their debt level.

Based on the leverage (7th variable) and the proxy for the cost of credits (8th variable) we find that less constrained firms despite of the higher leverage face lower financing costs. The bankruptcy cost of leverage suggests a positive relationship, in the sense that higher leverage increases the bankruptcy risk and the higher risk should be compensated by higher interest. However, reliable, less risky firms should be able to increase their leverage with lower costs. Our data suggest that on the one hand, firms with long-term borrowing are less risky firms and consequently they are able to increase their leverage with lower cost. On the other hand, firms with short-term borrowings and relying mostly on their internal sources (absolutely constrained) are under-levered. Absolutely constrained firms pay the highest cost for the credit obtained prior the period under consideration and this could likely be the reason why they do not take any further credit obligations.

The principal specification that we use to test the prediction of the investment-cash flow sensitivity of the selected three types of firms is an error correction model and it is as follows:

$$\frac{Inv_{i,t}}{TA_{i,t-1}} = \delta_0 + \delta_1 \frac{Inv_{i,t-1}}{TA_{it-2}} + \delta_2 \frac{CF_{i,t}}{TA_{i,t-1}} + \delta_3 \Delta \log S_{i,t} + \delta_4 \left[(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right] + \sum \delta_j D_{year} + \sum \delta_k D_{industry} + \sum \delta_l D_{country} + \varepsilon_{it} \quad (1),$$

where the dependent variable is the total investment of the firm i at time t, measured as the change in fixed and non-cash current assets plus depreciation divided by the beginning of period total assets. Total investment includes besides the fixed investments the investment in current assets. Hence, the sensitivity is not affected by the temporary fluctuations of the investments through the draw down of working capital (see Carpenter and Petersen (2002)). $CF_{i,t}$ denotes the current cash flow calculated as the profit for the period (profit after tax plus extraordinary profit) plus depreciation and $\Delta \log Sales_{i,t}$ is the first difference of the logarithm of sales, the proxy for firms' investment opportunities. The regression is controlled for time-, industry- and country- effects by inclusion of the corresponding dummy variables, D_{year}, $D_{industry}$, and $D_{country}$ respectively and $\varepsilon_{i,t}$ is a random disturbance. Since we focus on both public and private firms (for which the market value is not available), the expected profitability is controlled, instead of the Tobin's Q, by current sales growth, specific to the error correction models used by previous literature (see for instance Bond et al. (2004), Fuss and Vermuelen (2004)). The sales growth, just as the cash

flow - relative to the Tobin's Q - can capture relatively more new information obtained within the year about the running projects of the firm based on which the manager decides about the new investment and revise the target capital stock accordingly (for theoretical model see Alti (2003)). Estimating the dynamic structure of the growth, the lag value of the dependent variable is also used as an explanatory variable. In addition, the model includes the error correction term, based on the estimated long-term relationship among sales and non-cash total assets.

Table 4 presents the mean, median, standard deviation, minimum and maximum values of the variables used for the regression. The median firm has a yearly investment representing 10% of the beginning of year total assets, which drops to 5% for absolutely constrained firms. The median firm has a cash flow of 9% of the beginning of period total assets and a sales growth of 6%. The annual growth of net working capital counts on average 1.2% of the total assets. Mean and median values do not differ significantly and the minimum and maximum values suggest that none of the coefficient estimates of the regressions can be influenced by the presence of outliers.

[Insert Table 4 here]

Based on the theoretical model, the quantitative predictions of the cash flow sensitivity of absolutely constrained firms is less than one. The only source of financing is represented by cash flow; however a part of it is reoriented to precautionary cash savings or credit repayments. For partially constrained firms the sensitivity is expected to be slightly higher than one resulting from the leverage multiplier effect. And finally, for the least constrained firms a lower cash flow coefficient is expected, caused by the favourable financing contract less dependent on current cash flow shocks (indirect effect) and by the possibility that all long-term investment projects of the firm are covered by the available financial sources (direct effect).

In Table 5 the regression results of the two-step system GMM estimates are presented. The t-statistics are reported in parenthesis. Firm-specific effects are first removed by calculating the first differences specific to the GMM estimation. The third lagged values of endogenous variables are valid instruments since there is no serial correlation in the time-varying component of the error terms of the equation. This condition is met, since the test for serial correlation in the first difference residuals is rejected based on the test for second-order autocorrelation (the first-order autocorrelation is expected due to model specification).

The validity of the used instruments is also accepted based on the Hansen test of over-identifying restrictions.

[Insert Table 5 here]

In each of the three samples the cash flow coefficient is statistically significant and it strongly supports the quantitative predictions of the model. The point estimate for cash flow in the case of absolutely constrained firms is 0.96. For the partially constrained firms the cash flow coefficients of 1.15 is consistent with the presence of the leverage multiplier effect. And for the least constrained firms the cash flow coefficient is again lower, with the point estimates of 0.79.[6] This lower coefficient is consistent with the models' prediction that the better credit contracts should reduce the investment dependence on internal finance.

The coefficient of the sales growth is highly significant for least constrained firms and significant under 5% confidence level for the partially and absolutely constrained firms. The negative coefficient of the lagged dependent variable, however not statistically significant, suggests a mean-reversion of the investment rate. The error correction terms are negative as expected, however not statistically significant.

As a robustness test we use an alternative specification for the error correction term and re-estimate the equation 1. The error correction term ($Er.Correction\_term$) is the first lagged estimated residuals of the equation:

$$\log TA_{i,t} = \alpha + \beta \log Sales_{i,t} + \gamma_i + \varepsilon_{i,t} \qquad (2),$$

where $\log TA_{i,t}$ and $\log Sales_{i,t}$ refer to the logarithm of total assets and sales. γ_i and $\varepsilon_{i,t}$ represent the firm fixed effects and a random disturbance, respectively. Results are presented in Table 6. The cash flow sensitivity of investment has the same pattern as in the case of previous estimation, with higher coefficient for partially constrained firms of 1.34. The coefficient of absolutely and least constrained firms is about 0.95. The coefficients of the error correction terms is higher, given that the value of the estimated residual is lower than the assets-sales difference, however statistically still not significant. We can conclude that using alternative error correction specification our main results of the cash flow sensitivity is not affected.

[6] The magnitude of the sensitivity is higher than those presented in most of the financing constraints literature. This is simply caused by the fact that our dependent variable is the investment in total assets instead of the investment in fixed assets. The magnitude of the coefficient is more comparable with the results presented by Carpenter and Petersen (2002), using the firm's growth as a dependent variable.

[Insert Table 6 here]

CONCLUSIONS

In this paper we develop a theoretical model that makes quantitative predictions about the magnitude of the cash flow-investment sensitivity in the light of financing constraints. Relying on a sample of more than 5,000 euro area firms we document a non-monotonic investment-cash flow sensitivity, which strongly supports the model's predictions. The explanation for the higher sensitivity of partially constrained firms relative to the absolutely constrained is twofold. First, only a part of internal sources is invested, since there is a need of precautionary cash savings for liquidity reasons. Second, investments increase the borrowing capacity of the firm, so the amount of credits depends also on cash flow shocks. Through this indirect leverage effect, an additional dollar of internal finance will generate slightly more than an additional dollar of total investment. These findings are in line with the amplification effect of Almeida and Campello (2006) and the leverage effect presented by Carpenter and Petersen (2002) and Moyen (2004).

Moreover, we identify a group of least constrained firms among the firms relying on external financial market, for which the sensitivity is lower than those with less favourable credit contracts (only short-term borrowings are available). Firms are defined as least constrained if they are able to borrow long-term without requiring the perfect market conditions. We find evidence that the favourable financing contracts are less dependent on current cash flow shocks (indirect effect) and/or some of these firms are able to finance all of their positive net value projects with the help of external financing (direct effect).

The non-monotonic relationship of the theoretical literature relies partially on the existence of the totally unconstrained firms. Contrary to the simulated sample, where unconstrained firms by definition have zero sensitivity, in real world none of the firms operates in perfect market conditions. The non-monotonic relationship derived in this paper is independent of the presence of the totally unconstrained firms. We provide both theoretical and empirical evidence for the non-monotonic investment-cash flow sensitivity from a new perspective. The estimated cash flow sensitivity of investment led us to conclude that financing conditions may determine investment and growth of the European firms.

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Table 1.

Firm-years' classification

Financing condition (% from total)	Total investment	Financing gap	Changes in Long-term debt	Changes in Short-term debt
Firm-years financed by internal capital (I.)				
1. (10%)	≥ 0	≥ 0	≤ 0	≤ 0
2. (19%)	< 0	-	≤ 0	
Firm-years financed by short-term external capital (II.)				
1. (8%)	≥ 0	< 0	< 0	-
2. (24%)	≥ 0	≥ 0	≤ 0	> 0
3. (3%)	< 0	-	> 0	-
Firm-years financed by long-term external capital (III.)				
1. (20%)	≥ 0	< 0	≥ 0	-
2. (16%)	≥ 0	≥ 0	> 0	-

Table 2.

Firms' classification

Final outcome	No. of observation (firm-years)	No. of firms	% of firms
Absolutely constrained firms (I.)	6,709	1,112	21%
Partially constrained firms (II.)	17,266	2,767	54%
Least constrained firms (III.)	7,524	1,252	25%

Table 3.

Summary statistics

Variables	Mean	Median	Std. Dev.	P-value ($I. = II.$)	P-value ($II. = III.$)
1. Firms' size (logarithm of total assets)				0.00	0.00
I.	10.745	10.705	1.732		
II.	11.198	11.041	1.725		
III.	11.758	11.584	1.870		
2. Firms' total investment to beginning of year total assets				0.00	0.00
I.	0.078	0.048	0.187		
II.	0.130	0.099	0.179		
III.	0.167	0.127	0.188		
3. Sales' growth				0.00	0.00
I.	0.036	0.029	0.202		
II.	0.072	0.060	0.176		
III.	0.099	0.081	0.180		
4. Cash flow to the beginning of year total assets				0.00	0.00
I.	0.088	0.079	0.077		
II.	0.100	0.090	0.072		
III.	0.114	0.102	0.075		
5. Obtained long-term credit to the beginning of period total assets				0.00	0.00
I.	-0.007	0.00	0.044		
II.	- 0.001	0.00	0.058		
III.	0.024	0.001	0.074		
6. Obtained short-term credit to the beginning of period total assets				0.00	0.23
I.	-0.003	0.00	0.064		
II.	0.016	0.002	0.082		
III.	0.015	0.000	0.072		
7. Leverage (total debt to total assets)				0.00	0.00
I.	0.143	0.080	0.165		
II.	0.230	0.212	0.163		
III.	0.257	0.245	0.186		
8. Cost of credit (interest payments to total debt)				0.00	0.00
I.	0.150	0.091	0.161		
II.	0.116	0.076	0.125		
III.	0.098	0.065	0.115		

Note: Firms' total investment is calculated as investment in fixed and current assets plus depreciation. Cash flow is defined as profit for the period plus depreciation. Sales growth is calculated as the first difference of the logarithm of annual sales. The obtained credits are calculated as the yearly change of the financial debt. Interest payments include all interest paid and similar charges in the given year. We assign the letter $I.$ for absolutely constrained firms, $II.$ for partially constrained firms and $III.$ for the least constrained firms. We test the hypothesis that the mean value of variables of one group is not significantly different across firm groups using a t-test. P values of t-test are presented in the last two columns.

Table 4.

Summary statistics of variables used in regressions

	No. of Obs.	Mean	Med.	Stand. Dev.	Min.	Max.
All type of firms						
$\frac{Inv_{i,t}}{TA_{i,t-1}}$	31,434	0.13	0.10	0.19	-0.36	1.47
$\frac{CF_{i,t}}{TA_{i,t-1}}$	31,499	0.10	0.09	0.07	-0.17	0.45
$\Delta \log Sales_{i,t}$	25,129	0.07	0.06	0.18	-0.82	1.29
$\left(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right)$	25,129	2.01	1.95	0.77	-1.48	8.35
$Er.Correction\_term$	25,129	0.011	0.011	0.002	0.010	0.029
$I.$						
$\frac{Inv_{i,t}}{TA_{i,t-1}}$	6,685	0.08	0.05	0.19	-0.36	1.41
$\frac{CF_{i,t}}{TA_{i,t-1}}$	6,709	0.09	0.08	0.08	-0.16	0.45
$\Delta \log Sales_{i,t}$	6,709	0.04	0.03	0.20	-0.82	1.27
$\left(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right)$	5,278	1.81	1.76	0.76	-1.48	6.33
$Er.Correction\_term$	5,278	0.011	0.011	0.002	0.010	0.029
$II.$						
$\frac{Inv_{i,t}}{TA_{i,t-1}}$	17,242	0.13	0.10	0.18	-0.36	1.47
$\frac{CF_{i,t}}{TA_{i,t-1}}$	17,266	0.10	0.09	0.07	-0.17	0.45
$\Delta \log Sales_{i,t}$	17,266	0.07	0.06	0.18	-0.81	1.29
$\left(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right)$	13,878	1.977	1.939	0.717	-0.433	7.386
$Er.Correction\_term$	13,878	0.011	0.011	0.002	0.010	0.023
$III.$						
$\frac{Inv_{i,t}}{TA_{i,t-1}}$	7,507	0.17	0.13	0.19	-0.36	1.46
$\frac{CF_{i,t}}{TA_{i,t-1}}$	7,524	0.11	0.10	0.08	-0.17	0.45
$\Delta \log Sales_{i,t}$	7,524	0.10	0.08	0.18	-0.81	1.26
$\left(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right)$	5,97	2.24	2.16	0.85	-0.34	8.35
$Er.Correction\_term$	5,973	0.012	0.011	0.002	0.010	0.024

Table 4. (Continued)

Note: $\frac{Inv_{i,t}}{TA_{i,t-1}}$ is the total investment of the firm i at time t, measured as the change in fixed and non-cash current assets plus depreciation divided by the beginning of period total assets. $CF_{i,t}$ denotes the current cash flow calculated as the profit for the period (profit after tax plus extraordinary profit) plus depreciation and $\Delta \log Sales_{i,t}$ is the first difference of the logarithm of sales. $\log Assets_{i,t-1}$ and $\log Sales_{i,t-1}$ refer to the first lag of the logarithm of total assets and sales. The $Er.Correction\_term$ is the first lagged estimated residuals of the equation: $\log TA_{i,t} = \alpha + \beta \log Sales_{i,t} + \gamma_i + \varepsilon_{i,t}$, where $\log TA_{i,t}$ and $\log Sales_{i,t}$ refer to the logarithm of total assets and sales. γ_i and $\varepsilon_{i,t}$ represent the firm fixed effects and a random disturbance, respectively.

Table 5.

Error correction model

Dependent variable: $\frac{Inv_{i,t}}{TA_{i,t-1}}$	*I.*	*II.*	*III.*
Intercept	-0.295 (-0.21)	0.120 (0.08)	0.188 (0.43)
$\frac{Inv_{i,t-1}}{TA_{i,t-2}}$	-0.230 (-1.26)	-0.157 (-1.03)	-0.004 (-0.04)
$\frac{CF_{i,t}}{TA_{i,t-1}}$	0.960 (2.71)***	1.153 (3.68)***	0.793 (2.21)**
$\Delta \log Sales_{i,t}$	0.387 (2.31)**	0.264 (2.09)**	0.393 (2.73)***
$\left(\log Assets_{i,t-1} - 0.8 \times \log Sales_{i,t-1}\right)$	-0.013 (-0.24)	-0.069 (-1.43)	-0.029 (-0.97)
N	5,266	13,860	5,962
Hansen test - χ^2 (prob.)	43.0 (0.30)	48.1 (0.15)	40.2 (0.42)
AR(1) – z statistic (prob.)	-2.56 (0.01)	-2.55 (0.01)	-4.44 (0.00)
AR(2) – z statistic (prob.)	-0.78 (0.44)	-0.72 (0.47)	0.78 (0.43)

Note: We assign the letter *I.* for absolutely constrained firms, *II.* for partially constrained firms and *III.* for the least constrained firms. Two-step system GMM estimates are presented with finite-sample correction to the two-step covariance matrix (robust standard

errors). $\frac{Inv_{i,t}}{TA_{i,t-1}}$ is the total investment of the firm i at time t, measured as the change in fixed and non-cash current assets plus depreciation divided by the beginning of period total assets. $CF_{i,t}$ denotes the current cash flow calculated as the profit for the period (profit after tax plus extraordinary profit) plus depreciation and $\Delta \log Sales_{i,t}$ is the first difference of the logarithm of sales. $\log Assets_{i,t-1}$ and $\log Sales_{i,t-1}$ refer to the first lag of the logarithm of total assets and sales. All regressions include a set of industry, time and country dummies (not reported). Instruments are the 3rt lags of the dependent and independent variables. The 2nd lag of the error correction term is used as an instrument only in the level equation. Industry and time dummies are also taken as strictly exogenous instruments for the level equation. t-statistics are reported in parenthesis. *, ** and *** indicate statistical significance at the 10%. 5% and 1% level, respectively.

Table 6.

Robustness: alternative error correction term specification

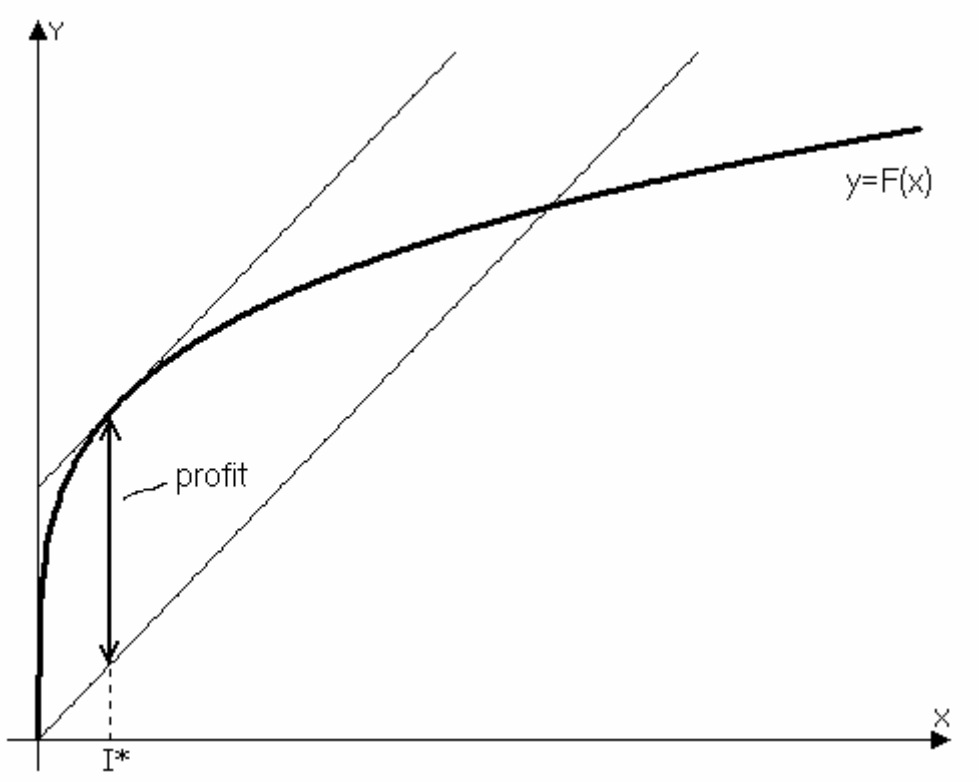
Dependent variable: $\frac{Inv_{i,t}}{TA_{i,t-1}}$	*I.*	*II.*	*III.*
Intercept	0.163 (0.11)	-0.418 (-0.26)	0.174 (0.39)
$\frac{Inv_{i,t-1}}{TA_{i,t-2}}$	-0.146 (-0.80)	-0.173 (-1.15)	-0.048 (-0.49)
$\frac{CF_{i,t}}{TA_{i,t-1}}$	0.959 (3.11)***	1.341 (4.55)***	0.951 (3.01)***
$\Delta \log Sales_{i,t}$	0.141 (1.09)	0.268 (2.13)**	0.391 (2.85)***
Er.Correction _ term	-4.804 (-0.31)	-7.312 (-0.99)	2.524 (0.39)
N	5,266	13,860	5,962
Hansen test - χ^2 (prob.)	49.1 (0.13)	41.6 (0.20)	45.1 (0.15)
AR(1) – *z* statistic (prob.)	-2.64 (0.00)	-2.09 (0.04)	-2.79 (0.01)
AR(2) – *z* statistic (prob.)	-0.95 (0.34)	-0.49 (0.63)	-0.75 (0.46)

Note: We assign the letter *I.* for absolutely constrained firms, *II.* for partially constrained firms and *III.* for the least constrained firms. Two-step system GMM estimates are presented with finite-sample correction to the two-step covariance matrix (robust standard

errors). $\frac{Inv_{i,t}}{TA_{i,t-1}}$ is the total investment of the firm i at time t, measured as the change in fixed and non-cash current assets plus depreciation divided by the beginning of period total assets. $CF_{i,t}$ denotes the current cash flow calculated as the profit for the period (profit after tax plus extraordinary profit) plus depreciation and $\Delta \log Sales_{i,t}$ is the first difference of the logarithm of sales. The $Er.Correction\_term$ is the first lagged estimated residuals of the equation: $\log TA_{i,t} = \alpha + \beta \log Sales_{i,t} + \gamma_i + \varepsilon_{i,t}$, where $\log TA_{i,t}$ and $\log Sales_{i,t}$ refer to the logarithm of total assets and sales. γ_i and $\varepsilon_{i,t}$ represent the firm fixed effects and a random disturbance, respectively. All regressions include a set of industry, time and country dummies (not reported). Instruments are the 3rt lags of the dependent and independent variables. The 2nd lag of the error correction term is used as an instrument only in the level equation. Industry and time dummies are also taken as strictly exogenous instruments for the level equation. t-statistics are reported in parenthesis. *, ** and *** indicate statistical significance at the 10%. 5% and 1% level, respectively.

Figure 1.

The profit function is increasing up to the first-best investment and decreasing afterwards.



APPENDIX:

Table A1.

Sample selection

	Selection criteria	Size No. of firms 1995-2004	Size No. of firm-years 1995-2004
1.	Non-financial sectors, excluding agriculture, forestry, fishing and mining, government sectors and undetermined sectors (not in A, B, C , J, L, M, N, O, P, Q) [7]	15,145	69,136
2.	Exclusion of firms with Inactive legal status[8]	14,852	67,865
3.	Firms with consistent balance sheet at 5% (i.e. 5% deviation is allowed) and cash and cash equivalent ≤ other current assets (when available)	14,227	65,434
4.	Trimming of the variables of main interest: logarithm of total assets, total assets growth, sales growth, total investment, cash flow to beginning of period total assets and short/long term borrowings	14,152	61,799
5.	Exclusion of observations with missing growth variables (total assets and sales growth)-first year of each firm plus observations following a year gap	11,114	43,148
6.	Minimum of three consecutive years per company	5,131	31,499

7 A-Agriculture and related service activities, B-Fishing, operation of fish hatcheries and fish farms, C-Mining and quarrying, J-Financial intermediation, L-Public administration and defence, compulsory social security, M-Education, N-Health and social work, O-Other community, social and personal service activities, P-Private households with employed persons, Q- Extra-territorial organisations and bodies

8 *Selected firms with legal status defined as Active, Active (default of payments), Active (receivership) or not available. Excluded those under legal status defined as Bankruptcy, Dissolved, Dissolved (demerger), Dissolved (merger), In liquidation, Inactive (no precision), Credito incobrable, Naar buitenland, Not classified, Not defined, Removed.

Table A2.

Country coverage

		Size No. of observations	Percentage from total
1.	Austria	75	0%
2.	Belgium	991	3%
3.	Finland	6,893	22%
4.	France	5,583	18%
5.	Germany	1,661	5%
6.	Italy	4,055	13%
7.	Luxemburg	21	0%
8.	Netherlands	8,616	27%
9.	Portugal	621	2%
10.	Spain	2,983	9%

Table A3.

Observations per years

		Size No. of observations
1.	1995	1,036
2.	1996	1,772
3.	1997	2,482
4.	1998	3,006
5.	1999	3,693
6.	2000	4,074
7.	2001	4,602
8.	2002	4,410
9.	2003	3,470
10.	2004	2,954

Table A4.

Firm distribution by market quotation

		Size No. of observations	Percentage from total
1.	Listed	6,993	22%
2.	Unlisted	24,506	78%

Table A5.

Industry distribution.

		Size No. of observations	Percentage from total
1.	Construction	2,475	8%
2.	Manufacturing	8,817	28%
3.	Utilities	2,343	7%
4.	Wholesale and retail sales	7,326	23%
5.	Transport and communication	1,947	6%
6.	Services (business activities, hotels and restaurants)	8,591	27%

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