CORPORATE FIXED INVESTMENT AND INTERNAL LIQUIDITY: EVIDENCE FROM GREEK LISTED COMPANIES

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Abstract

Utilizing a unique panel dataset of 273 listed firms in the Athens Stock Exchange (ASE) we explore the issue of capital market imperfections with respect to access to investment financing. In particular, we investigate the extent to which investment is sensitive to the availability of internal finance. By employing a fixed-effect model, our empirical results indicate a positive association of cash flow and investment, leading to the conclusion of imperfect substitutability between internal and external finance and thus the importance of the former for investment decisions. According to our knowledge, this is the first study covering the specific tremble period of ASE for Greek manufacturing firms.

Keywords: Capital Market Imperfections, Cash Flow, Investment, Panel Data

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1. INTRODUCTION

A large body of empirical research exploring the connection between alternative sources of finance and investment has grown rapidly over the past four decades. In particular, the effects of information asymmetries on firm's investment decisions have been at the core of research interest. The question of whether or not the level of investment depends on corporate liquidity has drawn considerable attention since the seminal paper by Fazzari, Hubbard, Petersen, Blinder, and Poterba (1988). This is an important issue since the way investment responds to cyclical variations in profits relies on whether availability of internal funds constraints capital expenditure (Bond & Meghir, 1994). In perfect capital markets, firms are indifferent to funding their investment plans with internal or external funds, since external funds are a perfect substitute for internal capital. In this context, funding an investment project should solely depend on the project's net present value. Along these lines, Jorgenson (1963) and Hall and Jorgenson (1967) developed the so-called neoclassic theory of investment where investment is primarily governed by the user cost of capital. However alternative theories have shown that internal and external capital are maybe imperfect substitutes as a result of informational asymmetries between lenders and borrowers, linking investment decisions to the severity of financial constraints.

Our paper focuses on the impact of liquidity, measured by cash flow, on investment spending for Greek listed firms. The empirical model adopts the Tobin's *q* model (Tobin, 1969) and the sales accelerator model (Abel & Blanchard, 1986), both extended by including variables capturing firm specific characteristics, such as age and size, as the benchmark models that would be operational under the absence of financial constraints. Indeed, recent studies following the theory, do recognize the fact that the availability of the external financing instruments to a company is not irrelevant, and constraints arising from capital market imperfections should not be ignored (Attig, Cleary, El Ghoul, & Guedhami, 2012; Sangali, 2013; Sasidharan, Lukose, & Komera, 2015; Simmons-Süer, 2018; Kallandranis, 2019; Tan & Avci, 2020). Hence, should be expected that internal cash flow has a positive impact on investments undertaken by the firm and the impact is more evident for the financially constrained firms than the less financially constrained firms.

To test the sensitivity of the relationship between investments in fixed capital and cash flow we used a fixed-effect regression model. The results showed that the company's internal cash flow generation represents one of the main drivers of fixed investments. The remaining of the paper is organized as follows. Section 2 discusses the relative literature, Section 3 describes the dataset and the adopted methodology, Section 4 presents the estimation results, and finally, Section 5 concludes.

2. LITERATURE REVIEW: WHY DOES CASH FLOW MATTER FOR INVESTMENT? A SUMMARY OF SOME CONTROVERSIAL CONCEPTS

Early research on investment, especially the work of Meyer and Kuh (1957), stressed the significance of financing constraints in business investment. Most research since the middle 1960s, however, has isolated real firm decisions from financial factors, with Modigliani and Miller (1958) demonstrating the so-called irrelevance theorem, being a characteristic result of this isolation. Their main conclusion was that a firm's financial structure will not affect its market value in perfect capital markets. Applied to capital expenditure, a firm's financial status is irrelevant for real investment decisions in a world of perfect and complete capital markets. In particular, the neoclassical theory of investment developed by Jorgenson (1963) and Hall and Jorgenson (1967) advocate that a firm's optimization problem could be solved without reference to financial factors qualifying the user cost of capital as the sole determinant of investment.

In contrast, recent literature has shown that capital market imperfections in the form of asymmetry of information would typically lead to external funds being generally more costly than internal funds (Greenwald, Stiglitz, & Weiss, 1984; Mayers & Majluf, 1984; Bernanke & Gertler, 1990; Gertler, 1992). This cost differential, known as external finance premium, leads to a financial hierarchy under which firms in order to fund their investment plans first use their own (internal) resources and only turn to external funds (borrowing or issuing shares) as a last resort.

Fazzari et al. (1988) in an innovative paper and a number of empirical studies that followed such as Gertler and Hubbard (1988) provided strong support for the existence of this financing hierarchy, which seems to be of greater importance for firms facing a high level of financial constraints. Fazzari et al. (1988) reported that investment decisions for more financially constrained firms exhibit higher sensitivity to firms' liquidity when compared to less financially constrained firms. Fazzari et al. (1988) interpreted this as evidence for the existence of information-driven capital market imperfections.

Subsequent studies have confirmed the central Fazzari et al. (1988) result by partitioning samples according to other a priori measures of financial constraint.[1] Hubbard, Kashyap, and Whited (1995) examine, why the standard neoclassical model is not compatible with samples of financially restricted firms, measured by a low pay-out ratio, while it is relatively successful for the unconstrained sample. They also demonstrate the importance of cash flow as an explanatory variable for investment behavior. Hoshi, Kashyap, and Scharfstein (1991) adopted a similar procedure by dividing a sample of Japanese firms into two groups according to whether the firm had a close institutional relationship with a bank (*keiretsu*) or not. They conclude that the investment outlays of 24 Japanese manufacturing firms that are not members of a *keiretsu* are much more sensitive to firm liquidity than that of 121 firms that are members of a keiretsu and are deduced to be less financially constraint. The testable hypotheses in Hoshi et al. (1991) are mainly driven by incentive and information problems that raise the cost of external finance. The former, appear due to the fact that outside financing weakens management's ownership stake leading to incentive problems that arise when managers control a company, but they do not own it (Jensen & Meckling, 1976). The latter, stress that if managers are better informed than investors about a firm's prospects, the firm's risky securities will sometimes be underpriced, thereby raising the cost of external finance (Mayers & Majluf, 1984). Hence, in both cases, managers find it more attractive in terms of cost of capital financing investment using internal funds. Thus, for firms facing information and incentive problems, liquidity will be an important determinant of investment.

Vermuelen (2002) supports this line of reasoning by showing that firms with weak balance sheets, and hence, relatively adverse access to external financing exhibit stronger dependence on internal cash flows. Carpenter and Guariglia (2008) report that cash flow sensitivities are a reflection of underlying credit frictions as cash flow remains significant for investment even when investment opportunities are controlled for.

Whited (1992) and Bond and Meghir (1994) employ an Euler equation approach to test the first-order condition of an intertemporal maximization problem. Both of these studies find the exogenous finance constraint to be particularly binding for the most constrained groups of firms, something that clearly supports the main result of Fazzari et al. (1988). A related study by Mayer (1990) examines the sources of industry finance of eight developed countries from 1970 to 1985, concluding that retentions are the leading source of finance, followed by bank finance (indirect borrowing) and then market sources of external finance (direct borrowing).

Gertler (1988) has argued that information-based financial constraints are likely to have a greater impact on small firms rather than large firms, partly because large firms tend to be mature and have more credible relations with providers of finance. The information-theoretic approach, therefore, implies that small firms are likely to be most dependent on internal finance and least dependent on external finance. Indeed, firms which are typically smaller and younger are positively related to the probability for SMEs to be financially constrained and thereby facing the increased likelihood of loan rejections and thus lowering their investment opportunities (Oliner & Rudebusch, 1992; Schaller, 1993; Carpenter & Rondi, 2000; Drakos & Kallandranis, 2005; Drakos &

[1] For a good review, see Carreira and Silva (2010).

Giannakopoulos, 2011; Öztürk & Mrkaic, 2014; Liberti & Petersen, 2018). Mullier, Schoors, and Merlevede (2016) report that for constrained firms, which face a higher cost of debt, resort to alternative sources of financing like trade credit to finance their operations and have lower investment levels. For a special case of an intangible type of investments, Sasidharan et al. (2015), for a sample of Indian manufacturing companies find a significant positive relationship between a firm's R&D expenditure and internal cash flow. In this line, Coban (2018), for a sample of Turkish firms advocates the sensitivity of internal finance to R&D investments and especially for young firms. Finally, recent studies (Duchin, Ozbas, & Sensoy, 2010; Campbell, Dhaliwal, & Schwartz, 2012; Chen & Chen, 2012; Buono & Formai, 2019) dealing with the shock of the financial crisis show that investment dropped significantly during that period and this decline was greatest for firms that are financially constrained but do not relate this to excess cash flow sensitivity.

While there is considerable support for the Fazzari et al. (1988) results, a debate over the generality of the above conclusions is still ongoing. In fact, there now seems to be significant evidence supporting an opposing view. Kaplan and Zingales (1995) classify firms according to their degree of financial constraint into three categories: not financially constraint, possibly financially constraint, and financially constrained, based on qualitative and quantitative information. They find that the most financially constrained group actually displays the lowest sensitivity of investment to cash flow of the three groups, a result that obviously challenges Fazzari et al. (1988). Contrary to previous evidence, they claim that investment-cash flow sensitivities provide no evidence for the presence of financing constraints. However, Kaplan and Zingales (1995) main criticism of Fazzari et al. (1988) was directed to the small sample size analyzed and the classification criteria used. Kaplan and Zingales' (1995) results were subsequently confirmed by several studies (Cleary, 1999, 2006; Cleary, Povel, & Raith, 2007). Indeed, Cleary (1999) following the approach of Kaplan and Zingales (1995) extends the sample, showing that while all firms are sensitive to liquidity, consistent with previous evidence, firms that are more creditworthy exhibit greater investment-liquidity sensitivity than those classified as less creditworthy as Kaplan and Zingales (1995) advocate.

As it becomes apparent from this brief review there is clearly a controversy here. The empirical literature has supported opposing views on the impact of financial constraints on the cash flow-investment relationship. One set of the literature following Fazzari et al. (1988) argue that financial constraints are important in the investment-cash flow relationship, while the other one following Kaplan and Zingales (1995) support that the investment-cash flow sensitivity criterion as a measure of financing constraints is not well-grounded in theory and is not supported by empirical evidence.

3. METHODOLOGY AND DATA DESCRIPTION

3.1. Methodology

Fazzari et al. (1988) explored the nexus between financing constraints and investment activity conditioning on the neoclassical, sales accelerator, and Tobin's q models. In particular, the null hypothesis was that under the absence of capital market imperfections a firm's investment decision and cash flow funds should be unrelated. Consequently, if a positive and significant relationship between cash flow and investment was uncovered would signify the presence of market imperfections. As mentioned earlier, conditioning is given by three alternative baseline models; the neoclassical (Jorgenson, 1971), the sales accelerator model (Abel & Blanchard, 1986), and the Tobin's q model (Tobin, 1969).

In the neoclassical model, the user cost of capital is the main determinant of corporate investment. Due to the lack of reliable data for the user cost of capital, we will focus only on the other two models. The intuition behind Tobin's q model is that absent considerations of taxes or capital market imperfections, a value-maximizing firm will invest as long as the shadow value of an additional unit of capital, marginal q, exceeds unity. However, estimating q models is not without problems for various reasons. Firstly, it is difficult to measure the replacement value of assets, since it is not reported in most European countries. Secondly, to the extent the stock market is excessively volatile, something that did occur during the sample period in the Greek market, q may not reflect market fundamentals (Goergen & Renneboog, 2001). Thirdly, the theoretical model requires the measurement of a project's marginal q. Data considerations however allow the researcher to only calculate the average q. In this context, Chirinko and Schaller (1995) show that average Tobin's q is flawed as it reflects the average return on a company's total capital whereas it is the marginal return on capital that is relevant. According to this approach, investment is determined according to:

$$\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \beta_i + \alpha_1(q_{i,t}) + \alpha_2\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \alpha_3(AGE_{i,t}) + \alpha_4(SIZE_{i,t}) + time\ dummies + \varepsilon_{i,t} \quad (1)$$

where i identifies a company, t refers to the time period, $\beta's$, $\alpha's$ are unknown parameters to be estimated, and ε is a well-behaved error term. I denotes investment expenditure, q controls for the market's evaluation of the firm's investment opportunities, CF is the value of internal funds, AGE is the age of the firm since the year of foundation, $SIZE$ is the value of the firm's total assets, and K is the beginning-of-period capital stock.

Even though the q investment model has many attractive features, in practice, however, other approaches like the sales accelerator model have shown superior empirical performance. The sales accelerator model introduced by Abel and Blanchard (1986) does not include expectations about the company's growth potential and assumes that investment grows with sales. The relevant empirical version of that is:

$$\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \delta_i + \gamma_1\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \gamma_2\left(\frac{S_{i,t-1}}{K_{i,t-1}}\right) + \gamma_3\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \gamma_4\left(AGE_{i,t}\right) + \gamma_5\left(SIZE_{i,t}\right) + time\ dummies + \varepsilon_{i,t} \quad (2)$$

where $\delta's$, $\gamma's$ are unknown parameters to be estimated, S_t and S_{t-1} are current and one year lagged sales, capturing growth opportunities.

Additionally, we consider a combined-general empirical specification model where equations (1) and (2) are merged:

$$\left(\frac{I_{i,t}}{K_{i,t-1}}\right) = \kappa_i + \theta_1\left(q_{i,t}\right) + \theta_2\left(\frac{S_{i,t}}{K_{i,t-1}}\right) + \theta_3\left(\frac{S_{i,t-1}}{K_{i,t-1}}\right) + \theta_4\left(\frac{CF_{i,t}}{K_{i,t-1}}\right) + \theta_5\left(AGE_{i,t}\right) + \theta_6\left(SIZE_{i,t}\right) + time\ dummies + \varepsilon_{i,t} \quad (3)$$

where $\kappa's$, $\theta's$ are unknown parameters to be estimated, the rest as before.

As it becomes apparent the more general model in equation (3) nests the sales accelerator and Tobin's q models, which can be obtained by imposing appropriate zero restrictions on the general model parameters. We employ the specification in equation (3) since according to Fazzari et al. (1988) it is typical to find significant effects of both sales and Tobin's q.

Partitioning the sample is a common feature in many empirical studies, procedure though which may create problems related to the method of splitting the sample. Arbitrarily restricting a firm belonging to the group of financially constrained or unconstrained over the entire sample period is suboptimal since it is possible that firms face financial constraints of varying intensity at different points in time. Moreover, there are concerns regarding the endogeneity of the sample splitting criteria. Finally, partitioning firms on the basis of a single indicator (such as the dividend payout ratio or size) may not be a sufficient statistic for the existence of financial constraints. For these reasons, we choose not to split the sample and treat firms as a homogeneous group.

3.2. Data description

We have collected the balance sheets of 273 (parent) companies listed in the Athens Stock Exchange (ASE) for the period 1997-2001. The source is the Yearly Statistical Bulletin, published by the ASE.[2] The selection of the period was made on purpose as within this time the ASE experienced a spiky incline and a subsequent sharp decline, despite the fact that the economic fundamentals of the country were not harmed significantly, and Greece successfully joined the Eurozone in 2001.

In equations (1) to (3), *I* represents investment in plant and equipment. *CF* represents internal funds and is measured as the sum of net operating profits and depreciation ratio. *S* stands for sales, while *SIZE* is calculated as the logarithm of the value of total assets and *AGE* is measured as the logarithm of the number of years in operation. *AGE* and *SIZE* are introduced in order to capture firm-specific characteristics since we believe that these variables may contain important information for firm investment. Finally, Tobin's q has been computed following the methodology outlined in Salinger and Summers (1983). All variables are divided by the beginning-of-period capital stock *K*.[3]

4. EMPIRICAL RESULTS

A fixed-effects estimation procedure[4], with intercepts allowed to vary across firms, was employed to examine the relationship between investment and internal cash flows. The Hausman (1978) test indicated fixed effects as the appropriate specification. Table 1 reports the estimated results for equations (1) to (3). The first column of Table 1 presents estimates of the q investment model, including cash flow, age, and size.

The results show a significant positive cash flow coefficient within the q framework, indicating the presence of capital market imperfections. Contrary to what was expected, the coefficient of q turned out to be negative although insignificant. We suspect that this is due to 1) problems related to mismeasurement of q, and 2) stock market volatility.[5] A large number of studies such as Hubbard and Kashyap (1992)[6] have noted the difficulty in establishing the empirical significance of q. Various explanations for its low explanatory power have been cited with most related to the difference between the market assessment of firms and the firms' own internal assessments. The high investment liquidity sensitivity for equation (1) seems to be along the lines of the existing empirical literature. This finding is consistent with the basic conclusion of Fazzari et al. (1988) who reported that investment decisions exhibit high sensitivity to firms' liquidity. It also concurs with the results of Mayer (1990) who documents the dominant role of internal financing in investment decisions, which implies that investment policy for the majority of firms is sensitive to current liquidity. Finally, our results are also compatible with the findings of Hubbard et al. (1995) who display the importance of cash flow as an explanatory variable for investment. In the second column, we test whether the pattern of cash flow effects holds up in models that include sales since one plausible explanation for the effect of cash flow is that internal finance is correlated with sales, while in the third column we report estimation results for the general model.

[2] Banks, leasing, holding and insurance companies were excluded from the sample. Four companies whose stock was under suspension were also excluded. By the end of 2001 the total number of listed firms in ASE was 364. Hence, the sample of manufacturing companies covers the 75 per cent of the market.
[3] Tables offering data descriptions and summary statistics appear in the Appendix A.

[4] For space considerations estimation results obtained using the random effects estimator is not reported here, even though the results do not change dramatically. The results are available upon request.
[5] The beginning to end of year share price index growth rate for 1996-1997, 1997-1998, 1998-1999, 1999-2000, 2000-2001 was 58.5%, 85%, 102.2%, -38.8%, and -23.5% respectively.
[6] They argue that q may be an imprecise measure because of imperfect competition and non-constant returns to scale.

Table 1. Estimation results (dependent variable: investment)

Variable/Model	*Tobin's q model (1)*	*Sales accelerator model (2)*	*(1) + (2)*
q	-0.01 (-1.29)	-	-0.01 (-1.41)
SALES	-	0.07 (5.41)**	0.12 (5.69)**
SALES LAGGED	-	-0.00 (-0.18)	0.00 (0.06)
CASH FLOW	0.56 (5.71)**	0.39 (4.68)**	0.26 (2.45)**
AGE	-0.20 (-0.55)	0.01 (0.04)	-0.16 (-0.46)
SIZE	0.57 (5.04)**	0.51 (7.74)**	0.62 (5.28)**
D_{1997}	0.15 (2.13)**	0.11 (2.48)**	0.13 (1.78)*
D_{1998}	0.22 (3.41)**	0.16 (3.77)**	0.22 (3.29)**
D_{1999}	0.23 (4.89)**	0.14 (4.51)**	0.21 (4.38)**
D_{2000}	0.14 (3.91)**	0.10 (3.70)**	0.13 (3.47)**
R^2	9.56 %	11.19 %	12.32 %
F-test	13.28 (p-value 0.00)	20.85 (p-value 0.00)	14.60 (p-value 0.00)
Time dummies X^2 *test*	7.57 (p-value 0.00)	6.46 (p-value 0.00)	6.45 (p-value 0.00)

Note: value in brackets t-stat. (*) denotes significance at the 10% level and (**) denotes significance at the 5% level. The hypothesis of zero time effects is rejected at the 5% significance level.

Both in the second and third column current sales are strongly significant indicating that investment is positively affected by current sales, whereas in contrast lagged sales seem to exert no effect. The cash flow coefficient remains significantly positive supporting the presence of imperfection in capital markets. Results for equations (2) and (3) are in line with those reported by Fazzari et al. (1988) who present estimated equations that include cash flow, current and lagged values of sales. However, the effect of *q* remains insignificant in equation (3).

Following, Hadlock and Pierce (2010) who suggested that age and size are the two most significant variables reflecting the existence of financial constraints, we examine their effect on investment spending. Across all three equations, age coefficients are negative, although statistically insignificant, while size appears to be a significant determinant in the investment process, affecting it positively. Though it was expected influence of firms' age on the cash flow-investment relationship this is not apparent revealing no actual impact (Freel, Carter, Tagg, & Mason, 2012). We suspect that age is not significant given that age differences between firms in our sample are not pronounced considering that typically a firm reaches a certain level of maturity before it is listed.[7]

The significance of size is consistent with empirical studies, such as Devereux and Schiantarelli (1990) who report that large firms are more sensitive than small firms to cash flow fluctuations using a sample of relatively large quoted firms. Along this line, Athey and Laumas (1994) find that large Indian firms are more sensitive to cash flow than small firms and explain their result as evidence of the Indian government credit policies for promoting small companies.

The fact that a firm must be listed to be included in the sample means that there is probably a selection bias in favor of picking only the best of small firms (Schiantarelli, 1996). Hu and Schiantarelli (1994) find that everything else equal, size is positively related to the probability of being financially constraint for listed firms present continuously between 1978 and 1987 in the Compustat Annual Industrial File and the Over-the-Counter File. Overall, size seems to be a useful criterion in order to signify firms that are likely to be financially constrained, but only when the sample used contains a portion of the lower sized firms in the whole range of size. Finally, time dummies were found to have a significant effect on capturing differences in investment decisions from year to year.[8]

In Table 2, we report the results after augmenting the models by lagged cash flow. Our estimation shows that our basic conclusions are not sensitive to incorporating lagged cash flow, which has an insignificant effect on investment.

[7] In order a firm to go on with an IPO, there are certainn criteria to be achieved. Firms should present minimum of three consecutive years of profitability and a minimum equity value. This means that a firm cannot be relatively young in a strict manner.

[8] We also test the hypothesis of including or not the time dummies.

Table 2. Estimation results (dependent variable: investment)

Variable/Model	*Tobin's q model (1)*	*Sales accelerator model (2)*	*(1) + (2)*
q	-0.03 (-2.04)**	-	-0.04 (-2.40)**
SALES	-	0.12 (2.43)**	0.15 (2.41)**
SALES LAGGED	-	0.00 (0.10)	-0.00 (-0.05)
CASH FLOW	1.12 (4.61)**	0.77 (4.27)**	0.79 (2.83)**
AGE	-0.26 (-0.63)	-0.18 (-0.52)	-0.26 (-0.64)
CASH FLOW LAGGED	-0.00 (-0.09)	0.01 (0.19)	-0.01 (-0.12)
SIZE	0.84 (5.18)**	0.52 (5.71)**	0.77 (4.65)**
D_{1997}	-	-	-
D_{1998}	0.29 (3.40)**	0.12 (2.26)**	0.24 (2.80)**
D_{1999}	0.19 (3.10)**	0.09 (2.23)**	0.18 (2.89)**
D_{2000}	0.12 (2.79)**	0.08 (2.45)**	0.10 (2.47)**
R^2	8.42 %	9.99 %	8.31 %
F-test	10.58 (p-value 0.00)	12.36 (p-value 0.00)	9.18 (p-value 0.00)
Time dummies X^2 *test*	4.68 (p-value 0.00)	2.57 (p-value 0.05)	3.52 (p-value 0.01)

Note: value in brackets t-stat. (*) denotes significance at the 10% level and (**) denotes significance at the 5% level. The hypothesis of zero time effects is rejected at the 5% significance level.

The empirical work in this article focuses on Greece's firms that are publicly traded. Recall, that financing constraints are the outcome of informational asymmetries. These asymmetries tend to be less severe as the level of transparency regarding firms' activities and governance increases. Publicly traded firms, like those in our sample, are expected to be associated with the lowest degree of informational symmetries. Therefore, our findings of investment sensitivity on liquidity for this particular group of firms would probably be more pronounced for non-listed firms especially in a small economy such as that of Greece.

5. CONCLUSION

We empirically explored the sensitivity of firm investment decisions to the availability of internal financing for a panel of 273 Greek listed firms over the 1997 to 2001 period. In order to find robust estimates, we examined two reduced form specifications, the sales accelerator model and the Tobin's q model. In particular, by employing a fixed effect estimation technique, we argued that cash flow really matters when considering its effects on investment and especially on those of tangible assets, indicating the existence of capital market imperfection in the Greek market. Besides, firm specific characteristics are included in order to capture the existence of financing constraints and asymmetric information. Our findings highlight that cash flow effects are not found to be dependent on firm age but only on size.

Our results follow the mainstream of the empirical literature of capital market imperfections (Fazzari et al., 1988; Hubbard et al., 1995) in which context cash flow serves as an explanatory variable for investment. Indeed, such imperfections should force policymakers to ponder on the question how they could further alleviate these financial frictions and make investment and economic growth less dependent on internally generated cash flows for publicly traded firms. The only way out of this puzzle for policymakers is to enhance even more information sharing among participants in the credit market in order to improve the availability of finance to finance seekers. According to Freel et al. (2012) in countries that have achieved to reduce information asymmetries, firms have easier access to credit. Another major concern for the policymakers may be the finding that listed companies despite their advantageous position relative to non-listed companies are facing financing constraints even during periods when the Greek economy was performing better than the European average.

In spite of a robust empirical analysis, our study is not free from limitations. Future research should extend the sample covering a longer time span and also apply dynamic panel techniques. Besides, our results would be further reinforced if future studies affirm our findings within a different context of the traditional investment-cash flow sensitivities. In particular, other important types of investments such as inventory investment or R&D investments is an interesting path for future research. Besides, important issues that may cause financial constraints like the concentration of share ownership and the monitoring role played by institutional shareholders, the level of flexibility on the local credit market, and specific institutional characteristics of the Greek market, could be a challenge for future research. However, the data limitation prevented us from undertaking such an exercise.

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APPENDIX A

Table A.1. Data description*

Variable name	*Symbol*	*Definition*
Tobin's q**	q	(E+TDBT-INV)/PK
SALES	S/K	Total Sales
CASH FLOW	CF/K	Net Operating Profit + Depreciation on fixed assets
AGE	AGE	Log(Date of observation-Date of foundation)
SIZE	SIZE	Log (Total Assets)
INVESTMENT	I/K	$\text{Fixed Assets}_{i,t} - \text{Fixed Assets}_{i,t-1}$

*Note: * variables are divided by the beginning-of-period capital stock K. ** Tobin's q: Represents the investment opportunities facing the firm. Average Q is measured as q = (E+TDBT-INV)/PK, where E represents the sum of the value of the firm's common and preferred stocks, TDBT represents the total debt of the firm and INV is the value of the firm's inventories. PK is the replacement cost of the firm's capital stock.*

Table A.2. Summary statistics (273 firms, 1997-2001)

Variables	*Mean*	*Median*	*Max.*	*Min.*	*Std. dev.*
INVESTMENT	0.17	0.07	3.73	-0.74	0.35
CASH FLOW	0.11	0.08	2.88	-0.60	0.20
SALES	0.85	0.72	19.87	0.00	1.02
SIZE	7.72	7.70	9.87	6.29	0.52
AGE	1.40	1.41	2.09	0.30	0.30
TOBIN's q	2.08	1.18	17.91	-4.81	2.74