

# Financial constraints, information asymmetry and Tunisian firm investment

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## Abstract

The aim of this paper is to empirically analyze the effect of financial constraint, information asymmetry on the firm investment. On the basis of a data relating to 394 Tunisian firms observed over the period 2001-2008 and by adopting the panel data method, our findings show that the effect of financial constraints varies according to the number of bank-firm relations, the funding mechanisms and the investment type.

**JEL classification numbers:** D9, G3, M2

**Keywords:** Financial constraints, Cash flows, Investment, information asymmetry, Tunisian firms, Panel data analysis

## 1 Introduction

In front of the importance of the companies in the growth economic, the relationship between the companies' investment and the financial constraints remains a significant topic.

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The traditional approach generally used to locate a situation of financial constraint goes up with work of Fazzari, Hubbard and Petersen (1988), which are considered as the first authors who were interested on the concept of “financial constraint” and more particularly on the dependence relation “investment-financing”. Empirically the relation investment-financing, is based on a positive and significant relation between the cash flows and the investment. Those authors classified the companies in constraint companies and not constraint companies according to the dividend distribution. They concluded that the investment sensitivity to the financial variables indicates on the presence of more opportunities of investment rather than a situation of financial constraints. However, their result was contradicted by Kaplan and Zingales (1996), then by Cleary (1999). Thus, the use of the investment sensitivity to cash the flows led to very heterogeneous conclusions. More recent studies (Carpenter and Guariglia (2003), Gugler, Mueller and Yurtoglu (2004)) did not bring final answers.

Thus, the identification of the measures of the firm’s sensitivity to the cash flows poses a problem (Moyen (2004) and Cleary and al. (2007)). Indeed, several variables are used in order to study this relation; the availability of internal funds (Minton and Schrand (1999), the age of the firm (Oliner and Rudebusch, 1992), the structure of property (Gugler, 2002), the dependence to an industrial group (Hoshi, Kashyap, and Scharfstein, 1991) and the firm size (Erickson and Whited, 2000).

In the same way, the problems of information asymmetry represents the central reason of the existence of the financial intermediaries (Leland and Pyle, 1977; Diamond, 1984 and Diamond, 1991) and which explain the remarkable consequences on the company financing conditions, the type of financial contract suggested, its cost and its availability, but also on the investment behavior. Indeed, following the problems of information asymmetry, the cost of external finance becomes higher than the cost of internal finance. This is explained by the presence of an additional cost, like the agency cost which affects the investment behavior of the companies. In this stage, Boot (2000) and Shy, (2002) advance that the bank various sources of information resulting from the increase of the number of products and services offered, the level of information asymmetry which exists between the principal bank of the company and the other rival banks increases. So the costs of switching for the other borrowers increase what increases the problem of extraction of the informational revenues. As solution for this problem, De Bodt et al. (2005), propose the multiplicity of the number of banking relationships.

The articulation of this paper is presented as follow. First, we introduce our paper. The second part will be devoted to the literature review relating to the fundamental concept of the financial constraints, information asymmetries and their effect on the companies’ investment. The third part will treat the impact of the banking exclusiveness and its multiplicity as well as the impact of the firm characteristics on the investment sensitivity to the cash-flow. Finally, we conclude.

## 2 Financial constraints and investment decision: a literature review

Independently of its size, the firm objective is the growth which is dependent to the investment possibility. But for certain companies, the investment represents a financial constraint. Indeed, taking the example of the small and medium size companies characterized by their low dimension, their low capacity of self-financing, their more fragile financial situation, they have only the traditional financings sources, generally the banking debt. However, the banking establishments do not lend to these companies because the critical situation. However, the large companies more easily find the necessary funds and, consequently, develop and guarantee their survival.

The literature related to the investment importance, especially the firm investment within the framework of information asymetry, depends on the financial situation, the financial capacity and not only on the level of the necessary funds. At this level, a special consideration was allotted to the importance of financial constraints in the investment decision.

It is important to present the financial constraints definition. The financial constraint is a situation of a financing need following a spread cost between the internal and external financing. In practice, a company not being able to finance all the available profitable projects knows in this case a situation of financial constraints.

Within the framework of this study, we direct our literature review towards the relations between the investments and the cash-flows. Several work such as Hall (1992), Jump et al. (1998) estimated the investment sensitivity with the cash flows compared to the size of the company. Contrary to the findings of Hall (1992), Bond et al. (1998) reveal that the investment susceptibility to the cash flows is more remarkable and more significant for small and medium-sized firms. Moreover, these results were confirmed by Harhoff and Körting (1998) for the case of the German firms. This result can be explained by the fact that the small companies have more difficulties to finance their investments because they have fewer guarantees.

Contrary to these companies of big size, for which information (for the credit, the guarantee, government intervention) is accessible, those of small and medium-sized always causes a strong debate on their multiple disadvantages or advantages: difficulties with obtaining the loans and to support their costs, level of the equity, more significant dependence with customers or suppliers. However they have many benefits such as: determination, flexibility, capacity of growth which leads to keep a particular economic and financial position in the productive system. From where the formulation of the first assumption:

**H1:** There is a positive relation between the investment behaviour and the size company.

Several researches studied the relation between the investment type carried out (tangible fixed asset or R&D) and the financial structure of the company. Hall (1999) was interested on this subject and show that for the American manufacturing companies, the debt is not the financing source supported for the companies massively engaged in the R&D investments. He concluded that an increase in debts leads to a fall from the activities in R&D investments.

Moreover, Opler and Titman (1994) interested on the relations between the financial situation and the firm investment activities, especially the R&D investment. They affirmed that, among the companies with a weak debt, those committed in usual activities such as the tangible fixed assets investments have a higher performance than those committed in activities of R&D. Other authors such as: Hall (1992), Himmelberg and Petersen (1992, 1994) were interested on the investments comparison in R&D and tangible fixed assets according to their sensitivity to the cash flows. Indeed, Hall (1992) affirms that the investment in tangible fixed assets proves to react more than the investment in R&D. This study was reproduced by Himmelberg and Petersen (1992) on a more restricted sample and a shorter period in order to confirm the results of Hall (1992), by introducing the liquidity variable like explanatory element of the investments in R&D and of those in tangible fixed assets. They concluded also that the sensitivity of the investment in R&D to the cash flows is lower than that of the investments in tangible fixed assets. This findings leads to put the two following assumptions:

**H2:** The debt increase involves more significant the investment.

**H3:** The long term debt reduces the investments in intangible fixed assets and increases the investments in tangible fixed assets.

The concept of financial constraints represents in this article the difficulty of a company to have access to the different financing sources. Indeed, Fazzari, Hubbard and Petersen (1988), Fazzari and Petersen (1993), Kaplan and Zingales (1995) and Cleary (1999) used the distribution of dividend to the shareholders like means of companies classification in constrained and not constrained firms. According to these authors, the companies which distribute fewer dividends are financially constrained. For this reason, managers try to preserve the maximum of their internal financing sources and negotiate to increase the dividends distributed to the shareholders. As for Chow, Mun and Fung (2000) they integrated the impact of the size on the constraint level. Other authors introduce various characteristics of the companies such as the age, the structure of property, the volatility of the internal funds and the membership industrial.

Fazzari, Hubbard and Petersen (1988) are the pioneer authors having identified the significant relation between the cash flows and the firm investment. Although the empirical literature distinguishes four categories of investment model, by using a sample of 421 industrial companies in the United States over the period 1970-1984. Their objective is to see whether the companies having a weak rate of dividend distribution are obliged to generate internal funds to more

support the financial constraints as well as the high costs of external financing. For these companies and contrary to those having a high rate of distribution, the investment level is alleged being very sensitive to any variation of internal funds (cash flows). Thus, they show that the companies which are constrained have a strong sensitivity of the investments to the cash flows. In the same way, the result obtained by Fazzari and Petersen (1993), Jump et al. (1997), Fohlin (1998), and Audretsch and Elston (2002) confirmed the findings of Fazzari, Hubbard and Petersen (1988): the investment of the constrained companies are more sensitive to the cash flows than those which support less financial constraints. Although these results were confirmed by several authors, there are controversies on this subject.

Thus, Kaplan and Zingales (1995) showed that the firms which are financially constrained are those having the greatest sensitivity to the cash flows. However, these results knew many criticisms. First, the sensitivity between investment and cash flows do not means that there is an absence of maximization of the company. Moreover, the Tobin Q is not the good indicator to well estimate the investment. Since a Tobin Q higher than 1 does not mean inevitably than there are good investment opportunities. Thus we present the two following assumptions:

**H4:** The cash-flow constitutes a good indicator of the firm investment behavior.

**H5:** Financial constraints are more significant for the investments in tangible fixed assets than for those intangible.

In the same way, following the Modigliani and Miller (1958) theorem on the absence of effect of the financial structure on the firm investment decision in a perfect economy, many authors, such as Meyer and Kuh (1957), had stressed the importance of the self-financing like determinant of the investment of the companies. Indeed, the recourse to the external debt is often related to the insufficiency of firm equity which can be explained by a difficult financial situation of the company. These funds make it possible to guarantee the company solvency. They constitute for the company and the economic agents an “insurance” against the risks of internal or external origin. For example, in period of low business, the companies less indebted are privileged compared to those which supported the bank loan to the own equity. The first can extend in time the remuneration of their external lenders whereas the seconds must refund their debts in the obligatory term.

The most of empirical results suppose that in general, the company initially seeks to finance their investments on their internal resources, before it turns to external sources. In our case, they are the debt banks. The importance of the self-financing and the financial constraints is, obvious in many studies founded on the firm investment. Following this report, we formulated this assumption:

**H6:** The insufficiency of the firm equity reduces the investments of the Tunisian firms.

In many former studies, an exclusive banking relationship leads to an easier access to the bank credit, but increases the problem of information extraction (*Hold-up problem*) which can influence the investment behavior of the companies. In the same ideas, and according to Bodt et al. (2005), the multiple banking relationships constitute a means which avoids the informational capture problems. Thus, the higher number of banking relationships repairs competition between banks and avoids the excessive increase of the interest rates.

However, according to Kim et al. (2000) since the new bank is less informed on the firm quality, the costs related to the loss an exclusive relation increases. In other words, Von Rheinbaben and Ruckes, (2004) stipulate that, the cost switching from a single banking relationships returns to another multiple is more important, because of the additional costs generated by the search information costs. Moreover, following a financial difficulties, the bank can refuse to grant the necessary fund to the firm (Farinha and Santos (2002) and Elyasiani and Goldberg (2004)). In other words, with a situation of less credit availability in a context of information asymmetry, the firm level investment is seen to be more limited. From where the later assumption:

**H7:** The number banking relationships constitutes a determinant of the investment behavior of the Tunisian companies.

### 3 Financial constraints and the investment behavior of the Tunisian companies: An empirical study

#### 3.1 Data and model specification

In order to detect the impact of the financial constraints and the number of banking relations on the Tunisian companies' investment, we constituted a panel sample of 394 Tunisian companies. The data were collected from the financial statements of the companies, from 2001 to 2008.

Within the framework, we check the assumptions evoked before. With this intention, it is necessary to choose a suitable methodology which makes it possible to analyze the effect of the financial constraints on the investment decisions of the Tunisian companies. More specifically, we examine the investments behavior of the Tunisian companies according to the number of their banking relations and their characteristics. Thus, we consider the following models:

$$(I/K)_{it} = \alpha + \alpha_1 M_i + \alpha_2 (CF/K)_{it} + \alpha_3 (AC/K)_{it} + \alpha_4 (LTA)_{it} + \alpha_5 (DLT/K)_{it} + \varepsilon_{it} \quad (1)$$

$$(IIN/K)_{it} = \alpha + \alpha'_1 M_i + \alpha'_2 (CF/K)_{it} + \alpha'_3 (AC/K)_{it} + \alpha'_4 (LTA)_{it} + \alpha'_5 (DLT/K)_{it} + \varepsilon'_{it} \quad (2)$$

$$(IC/K)_{it} = \alpha + \alpha_1 M_i + \alpha_2 (CF/K)_{it} + \alpha_3 (AC/K)_{it} + \alpha_4 (LTA)_{it} + \alpha_5 (DLT/K)_{it} + \varepsilon_{it} \quad (3)$$

where

*(INV)* our dependent variable dependent relating to the companies investments. It's calculated in a first time by the total of intangible fixed assets (*IIN*) and by the total tangible fixed assets (*IC*). Then we will use separately each measure. Several researches studied the relation between the investment type of investment (tangible fixed asset or R&D) and the firm financial structure such as those of Opler and Titman (1994) Hall (1999).

*(M)* The multiple of bank-firm relationships. It's a dichotomy variable which takes the value 1 if the number of relations is higher than 1 and 0 if not. In this study, this variable can leads to analyze the effect of the bank informational capture on the firm investment decisions.

*(AC)*, self-financing of the company: measured by the total current assets of the company since it represents the cash fund or which will be available at a short-term and which makes it possible to finance the firm investments.

*(CF)*, cash-flow: this variable is measured by the result of the ordinary activities before taxes and extraordinary elements. Since, in the majority of studies relating to the relation between investment and cash-flow, *(CF)* indicates the available internal funds.

In order to study the relation between the financial constraints and the level of investment, it is necessary to introduce certain control variables likely to reflect the firm risk factor which is able to influence this relation. The choice of the control variables was inspired through panoply of variables indicated by the theory and used in the former studies. Indeed, in our study, we will consider two variables of control: firm size and banking debts.

*(LTA)*, the firm size measured by the Neperien logarithm of the total assets expressed in million dinars.

*(DLT)*, the total debts are defines by the total long term debts contracted by the company. Certain authors integrated the companies' debts to measure the effect of the financing access on the investment decision.

$\varepsilon_{it}, \varepsilon'_{it}, \varepsilon''_{it}$  Errors terms corresponding to the first, the second and the third model.

To estimate these models, we used the panel data method. This method makes it possible to specify if the individual effect for each company is fixed or random. Indeed, the results of the regression relating to these three models indicate that the fixed effect regression provides results statistically better significant in comparison to the random effect regression.

### 3.2 Results and interpretation

Based on the various variables presented before, the sample of our study shows the distribution characteristics summarized in the Table 1.

Table 1: descriptive statistic

Variables	Observation	Mean	St.Dev.	Minimum	Maximum
I/K	3152	2,012	4,743	0	116,6
IIN/K	3152	0,153	3,066	0	111,8
IC/K	3152	1,859	3,531	0	106,228
LTA	3152	9,646	0,943	2,399	13,738
M	3152	0,798	0,400	0	1
CF/K	3152	0 ,574	2,462	-6,604	53,9
DLT/K	3152	0,866	2,619	0	78,130
AC/K	3152	5,913	15,136	0	6777,182

This table presents the descriptive statistics, (mean, standard deviation, minimum and maximum) of the continuous variables. Our sample is composed of 394 Tunisian companies over the period 2001-2008. K is the stock capital. I, is the amount of the intangible and tangible fixed assets investment. IIN is the intangible investment; IC is the amount of the tangible fixed assets investment. CF is the result of ordinary activities before tax. DLT is the long term debt. LTA is the Neperien logarithme of the total Assets.

The investments mean level is about 2,012. It varies between 0 and 116,6. We notice that the average is closer to the minimal value of the investments, the same way, as for the intangible and tangible fixed assets investments. It's enabling to conclude that the Tunisian companies are still reticent as for their investment policy. Moreover, the standard deviation of these variables makes it possible to conclude that these indicators are volatile between the various companies (4,743/3,066/3,531).

The average size of the companies of our sample is 9,646; it varies between 2,399 and 13,738. This leads to conclude that on average, the Tunisian companies of our sample are of big size. However, we notice that the volatility of this indicator is high (2,399). This volatility value implies that the firm size measured by the logarithm of the total assets varies in a no significant for the entire sample. Consequently, the majority of the companies of our sample can have multiple banking relationships. Indeed, the average of the multiplicity is about 0,798. This value is framed by 0 and 1. Moreover, its standard deviation makes it possible to notice that this indicator is not too volatile for the entire companies.

The standard deviations of the different variables of our study: debts, cash-flows and self-financing are between 2,462 and 21,823. This leads to conclude that the distribution of these variables is volatile.



In order to determine the correlations between the various variables, we present the Pearson correlation matrix in Table 2. It concludes that there is not a problem of multicollinearity. In fact, the highest correlation is about (0,44).

Table 2: Pearson correlation Matrix

	FTA	M	CF/K	DLT/K	AC/K
FTA	1.0000				
M	0.1629 0.0000***	1.0000			
CF/K	-0.0626 0.0004 ***	-0.0548* 0.0021	1.0000		
DLT/K	0.0895 0.0000***	0.0015 0.9320	0.1957 0.0000***	1.0000	
AC/K	0.0404 0.0234**	-0.0257 0.1489	0.4443 0.0000***	0.5232 0.0000**	1.0000

This table presents the Pearson correlation Matrix. This matrix gives an idea about the correlation degree between the various exogenous variables. The coefficient of correlation measures the intensity of the linear relation between two variables. For each variable, the first line presents the correlation values and the second presents the P-value.

\* \*\*significant at 1%, \*\* significant at 5%.

To check the non existences of autocorrelation between the explanatory variables, we carried out the test of multicollinearity through the VIF method. According to the posted values, we note that the multicollinearity problem does not arise. Moreover, the highest value of VIF is 1, 66, whereas the average VIF is about 1, 28.

The result of the first model presented in Table 3 shows, that before taking into account the difference between the two types of investments, we note that the coefficient of the exogenous variable M, relating to the exclusiveness and the multiple bank relationships, is positively and significantly correlated with the investment of the Tunisian companies. This is enables to accept the hypothesis H7. This hypothesis is considered as a means which leads to analyze the effect of the informational capture by the banks on the investment decisions. Indeed, according to Klein, (1971), the capture of the borrower supposes the decrease of the problem of Hold-Up through excessive banking interest rates. Our results show that, to

avoid the problem of Hold-Up within the framework of exclusive banking relation, the Tunisian companies choose to multiply their banking relations.

Table 3: Firm characteristics, number of bank relationships, and investment behavior

	Coefficients	t- statistic	Probabilité
LTA	0,005	0,09	0,926
M	0,331	2,45	0,014*
CF/K	0,268	9,46	0,000**
DLT/K	1,352	53,50	0,000**
AC/K	-0,019	-4,54	0,000**
Cons	0,482	0,85	0,396
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Test Hausman	= 0.0000		
Wald chi2	= 970.58		
Within	= 0.638		

\*sig at 10% \*\*sig at 1%. K is the stock capital. IC is the amount of the tangible fixed assets investment. CF is the result of ordinary activities before tax. DLT is the long term debt. LTA is the Neperien logarithme of the total Assets. The sample is composed from 394 Tunisian firms over the period 2001-2008.

Our finding is homologous with the results of Hellwig (1991) and De Bodt et al. (2005). An advanced explanation was presented by Hiraki et al. (2003) which suppose that if two banks at least are more informed on the same company, the level of competition between these two banks eliminates the problem of monopoly information. This avoids the increase of the interest rates and encourages banks to more invest. However, the size of the company does not constitute in our study a determinant of the investment behavior for the Tunisian companies. This result leads to reject the hypothesis H1.

The external debt recourse is often related to the insufficiency in the own equity. Indeed, Meyer and Kuh (1957) stressed the importance of the self-financing like determinant of the company investment. In other words, a firm which wants to invest it must use initially its internal resources and if they prove to be insufficient it is obliged to pass to the bank credits. This conclusion confirms the results obtained, which show that the investment is correlated significantly at the same time with the capacity of self-financing and with the debt financing. This correlation proves to be negative with the self-financing (thus with its own equity) and positive with the long term debts. This leads to accept the two hypotheses H6 and H2.

Table 4: Firm characteristics, number of bank relationships, and intangible investment behavior

	Coefficients	t- statistic	Probabilité
FTA	-0,019	-0,35	0,725
M	0,095	0,73	0,467
CF/K	0,117	4,25	0,000**
DLT/K	0,996	40,59	0,000**
AC/K	-0,122	29,79	0,000**
Cons	0,059	0,11	0,914

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Test Hausman = 0.0000  
Wald chi2 = 340.61  
Within = 0.3581

\*\*sig at 1%. K is the stock capital. IC is the amount of the tangible fixed assets investment. CF is the result of ordinary activities before tax. DLT is the long term debt. LTA is the Neperien logarithme of the total Assets. The sample is composed from 394 Tunisian firms over the period 2001-2008.

Table 5: Firm characteristics, number of bank relationships, and tangible investment behavior

	Coefficients	t- statistic	Probabilité
FTA	0,025	0,64	0,525
M	0,235	2,55	0,011*
CF/K	0,151	7,80	0,000**
DLT/K	0,356	20,61	0,000**
AC/K	0,102	35,65	0,000**
Cons	0,423	1,09	0,276

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Test Hausman = 0.0000  
Wald chi2 = 1108.30  
Within = 0.668

\*sig at 10% \*\*sig at 1%. K is the stock capital. IC is the amount of the tangible fixed assets investment. CF is the result of ordinary activities before tax. DLT is the long term debt. LTA is the Neperien logarithme of the total Assets. The sample is composed from 394 Tunisian firms over the period 2001-2008.

According to Tables 4 and 5 relating to the investment behavior in tangible and intangible assets, we see that the coefficients of the exogenous variable (CF)

are fairly high and statistically significant with the level of 1% as well for the tangible investment as for the intangible assets. This concludes that the cash-flows affect positively and significantly the two types of investment. The value of the coefficient is higher for the endogenous variable (IIN) what announces that the capital expenditures in tangible fixed assets are correlated better on the level of the cash-flow. Thus, our hypothesis H5: *Financial constraints are more significant for the investments in tangible fixed assets than for those intangible is accepted.*

In the same way, our H4 assumption which suggests that the cash-flow is a relevant determinant of the financial constraints is accepted. These results confirm the findings of Fazzari (1988), Hubbard (1996) and Petersen (2000) which consider that the investment sensitivity to cash the flows is a relevant measurement of the level of financial constraint. This constraint appears higher when the firm invests in tangible fixed assets.

The variable long-term debt is correlated significantly with the investment behaviour in tangibles and intangible assets. These results imply that the long-term debt has a significant effect on the investment behavior. These conclusions coincide with the assumption of Carpenter (1992) who suggests that, for the financially constrained companies, a new granted debt means reduction in the financial constraints known by the company. So the hypothesis H3 is accepted.

For the (AC) variable, it is statistically non significant as well for the intangible and tangible investment, which suppose the absence of a relation between the firm size and its investment behaviour. What leads us to reject the assumption H1.

The capacity of self-financing variable, is statistically significant with the level of 1% for the two types of investments, however it has a negative influence for the intangible investment and positive effect for the tangible investment. What confirms besides the existence of a relation, between the capacity of self-financing and the investment behavior. Thus, when the firm capacity of self-financing increases by 1%, the level of investment decreases by 12,2% for the tangible assets and increases by 10,2% for the investment in tangible assets.

Concerning the multiple banking relationships, it is correlated positively with (IIN) and (IC). However, it is non significant for the investment in intangible fixed assets. According to Table 3, if the number of bank relationships increases by 1%, the level of tangible investment increases by 23,5%.

## 4 Conclusion

In this study we have explained the relevance of the financial constraints concept by using the investment sensitivity to the cash-flows like indicator of the level of these constraints. The empirical results prove overall in agreement with the predictions of the Theoretical models and the conclusions of the empirical literature. The results of the regression validate the majority of the assumptions.

The hypothesis of the impact of financial constraints on the firm investment

behavior is well checked. Their effects on the investment behavior vary according to the project type (intangible or tangible assets). We also showed that the firm size does not influence the investment behavior of the Tunisian firms. Moreover, the debt, the number of banking relationships and the capacity of self-financing exert a significant role in the determination of the firm investment behavior. In the same way, the introduction of other variables representative of the size variable would have given more detailed results. In addition, the introduction of other explanatory variables such as Tobin Q, the structure property constitutes an incentive for further researches.

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