

Investment-cash Flow Sensitivity and Growth Opportunities

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ABSTRACT

The objective of this research is to examine the investment-cash flow sensitivity on a sample of 150 US firms during the period 1995-2012. This sensitivity can be attributed either to the problem of managerial discretion (Jensen, (1986) and Jensen and Meckling, (1976)) or to the problem of information asymmetry (Myers and Majluf, (1984)). We used Tobin's Q to split our sample as appropriate. Tobin's low Q firms are thought to have a problem of managerial discretion, and Tobin's strong Q schemes are supposed to display a problem of informational asymmetry. Our empirical results, which are in the same vein as that reported by Degrise and De Jong (2006), reveal that the sensitivity of investment to cash flows is greater for Tobin's low-Q firms than for strong ones Tobin's Q. Overall, our results are in line with the predictions of the hypothesis of managerial discretion.

Keywords: Cash Flow, Investment Opportunities, Managerial Discretion, Information Asymmetry

JEL Classifications: G11, G30, G32

1. INTRODUCTION

The perfect capital markets hypothesis, initiated by Modigliani and Miller (1958), states that in such markets, the value of the firm and the investment decisions are independent of financial decisions. Some studies, however, if not contradict, at least nuance the implications of this hypothesis. Indeed, the existence of imperfections on the financial markets, and in particular the problems of asymmetry of information between the lenders and the borrowers, can generate friction which makes the investment decisions dependent on the mode of financing chosen. These information asymmetries suggest that lenders are less informed than borrowers about the actual situation of the company as well as the level of risk of the projects it wants to undertake. As a result, according to Stiglitz and Weiss (1981), Myers and Majluf (1984) and Islam and Mozumdar (2007), in the presence of information asymmetries, lenders, who seek to cover themselves against the risk of non-recovery, are led to increase the cost of borrowing by an external financing premium. This premium on external financing, required by lenders, leads to the observation that external capital is no longer a perfect substitute for internal capital, which puts into question the separation theorem of investment and financing decisions of Modigliani and Miller (1958). This mechanism suggests that internal resources cost the company little and do not

increase its risk of bankruptcy. Thus, according to the information asymmetry hypothesis, cash flow is useful for the financing of companies, from which a positive relationship between cash flow and investment expenditure is expected.

In addition to this explanation of capital market frictions, which is mainly manifested by information asymmetry, the financial literature on the interactions of investment and financing decisions seems to provide a second explanation for the positive relationship between cash flow and investment: The hypothesis of managerial discretion. This hypothesis, advanced by the theory of the agency and introduced by Jensen (1986), suggests that in the absence of an effective control, the managers would have more potential to invest the cash flows generated by the company in projects that maximize their own interests to the detriment of those of shareholders (free cash flow hypothesis). This assent was exposed and confirmed, much later, by Grossman and Hart (1988) and Hart and Moore (1995). They reveal that private profits earned by managers are proportional to the investment expenditures made by the firm. According to these authors, in such a situation, managers, who are opportunistic and have preferences to maximize their private profits, would be forced to undertake all investment projects even the unprofitable investment projects. Conyon (1998), then Conyon and Murphy (2000) and recently Renneboog and Trojanowski

(2007) have shown that the pecuniary and non-pecuniary benefits perceived by managers are greater in large firms than in small ones. Thus, the hypothesis of managerial discretion, which was rejuvenated by Stulz (1990), Harris and Raviv (1990) and further developed by Hart and Moore (1995), Blanchard et al. (1994), Zwiebel (1996) and Ding and Qian (2014) recognizes that financing decisions and investment are dependent. Specifically, she predicts that investment expenditures will increase with the company's internal cash flow.

In the light of the empirical evidences and theoretical predictions of the hypothesis of information asymmetry and managerial discretion, we plan to determine among these two hypotheses, which one explains much better the sensitivity of investment to cash flow.

This research will be organized in such a way as to develop, in section two, the theoretical predictions advanced by the hypothesis of information asymmetry as well as those of the hypothesis of managerial discretion. This section will also aim to review the research work on the positive relationship between cash flows and investment and to expose our research hypothesis. In section three, we will present our methodology to be followed as well as our model. Section four, will expose the results obtained and their possible interpretations. Finally, the conclusion will be the subject of the fifth section.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESES

Beyond its direct contribution to signaling theory, information asymmetry can also be considered as a factor that explains the sensitivity of investment expenditures to cash flows. Under the hypothesis of information asymmetry, we can claim a positive relationship between investment expenditures and internal sources of finance, a relationship that calls into question the hypothesis of independence of investment and financing decisions initiated by Modigliani and Miller (1958). This prediction may be justified by the fact that the possession of incomplete information on business investment projects pushes the lenders to demand an external finance premium which leads to the result that the external sources of finance no longer constitute a perfect substitute to internal sources of finance.

Several studies show that the disparity between the cost of internal funds and external funds can be explained by the information asymmetry between companies and external suppliers of capital. Indeed, Bernanke and Gertler (1989) and Greenwald and Stiglitz (1993) state that information asymmetries between lenders and borrowers justify the existence of a premium between the cost of external and internal funds. Holding incomplete information on business investment projects encourages lenders to be more cautious and therefore to adjust interest rates according to the particular situation of each company. Fazzari et al. (1988) suggest that a low dividend distribution rate would mean a high dependence of the firm on its internal flows due to the excessive cost of external funds. After ranking companies, according to

their dividend payment ratios, Fazzari et al. (1988) conclude that the cash flow coefficient has a positive sign and is even higher when the dividend ratio is low. Hoshi et al. (1991) show that investment expenditures of firms belonging to "Keiretsu" groups are less sensitive to internal funds than those of independent firms. This result can be explained by the cooperative links and the sharing of information with the banks, which, in general, make it possible to reduce the problem of information asymmetry and agency problems. This thesis was also developed, much later, by Vogt (1997). Over a study period stretching from 1979 to 1993, the author finds a positive relationship between investment expenditures and cash flows. More specifically, it reveals that this positive relationship is more strongly observed in small firms than in large firms. According to Vogt (1997), this result is due to the fact that small firms have a large information asymmetry and therefore they are obliged to pay a premium in case of recourse to external sources of finance. Consistent with the predictions of the information asymmetry hypothesis, Pawlina and Renneboog (2005) show that in the presence of unreliable control mechanisms, firms with excess liquidity and high growth opportunities choose to rely on internal resources. Indeed, they show that the cash flow of firms with strong information asymmetries has, on average, a positive effect on investment expenditures three times higher than that of firms that have a problem of managerial discretion. In the same vein as that reported by Love and Zicchino (2006), Aggarwal and Zong's conclusion (2006) argues in favor of the financial constraint hypothesis. In their empirical study, the authors reveal that investment expenditures are positively and significantly related to the cash flows. The authors return its results to the idea that these firms, which display a strong asymmetry of information, are financially constrained and therefore find many problems and difficulties in gaining access to external sources of finance. Arslan et al. (2006) show that firms characterized by a strong asymmetry of information and an excessive cost of external financing, exhibit a significant sensitivity of the investment to cash flow greater than that of other firms. This same observation was elaborated by Agca and Mozumdar (2008). These authors suggest, for their part, that the imperfections of the financial markets could be considered as a step towards a strong dependence of the investment expenditures towards the internal sources of finance.

The theoretical literature on the interactions of investment and financing decisions seems to provide a second explanation of the positive relationship between the cash flow and investment expenditures: It is the hypothesis of the managerial discretion. This hypothesis, advanced by the theory of the agency and introduced by Jensen (1986) and Stulz (1990), suggests that in the absence of effective control, managers would have more potential to invest the cash flows generated by the company in projects that maximize their own interests at the expense of those of shareholders (free cash flow hypothesis). Jensen's research (1986; 1993), on the fundamental principle of free cash flow theory, suggest that managers with preferences for "empire building" would exhaust all available funds in investment projects that are both profitable and unprofitable. This leads to predicting that the investment would increase with the internal sources of finance. Harford (1999) suggests that opportunistic managers, who use their hierarchical authority, inefficiently manage the firm's internal resources (cash flow) by

choosing projects that meet their personal goals rather than profitable projects. Harford (1999) notes that the 487 buy-back operations, largely carried out by cash-rich companies, generate a decrease in performance. Indeed, firms with low investment opportunities, and with a high level of free cash-flows, face an agency problem in that their managers tend to invest this excess liquidity in projects leading to growth in the firm size beyond its optimal size. The study of Opler et al. (1999) presents a great support for the hypothesis of managerial discretion. In fact, it finds that firms with excess liquidity and low growth opportunities measured by Tobin's q would be more likely to make more investment than firms with strong growth opportunities. This result helped to validate the idea that managers would be more concerned with the growth of the business rather than its profitability. The major result of Degryse and De Jong (2006) shows that it is the hypothesis of managerial discretion that prevails over that of information asymmetry. In fact, the sensitivity of investment to cash flow is higher for firms with low growth opportunities than firms with strong growth opportunities. This last result suggests that, according to Degryse and De Jong (2006), managers could use available liquidity to pursue their own interests at the expense of shareholders.

In conclusion, after a review of the empirical studies validating both the hypothesis of managerial discretion and information asymmetry, it is clear that there is a lack of consensus as to the explanation of the positive relationship between investment and cash flow. Thus, in our study inspired from the one conducted by Degryse and De Jong (2006), we suppose that, given the American context characterized by governance mechanisms whose effectiveness remains to be confirmed, poorly controlled managers may have to finance their investments with internal funds (cash flow) and thus have a great discretion on investments. Given this observation, we suggest that the positive relationship between investment expenditures and cash flows can be justified much more by the problem of managerial discretion than by that of asymmetry information. Thus, our research hypothesis to be tested is:

Hypothesis: Investment-cash-flow sensitivities of firms with low growth opportunities will be higher than those of firms with strong growth opportunities.

3. RESEARCH METHODOLOGY

3.1. Sample

Several filters have been used to produce a sample that can be used for reliable analysis. The empirical study is based on a sample of US companies listed over an eighteen-year period from 1995 to 2012. From our initial sample, we dismissed companies in the financial sector because of their specificities, such as banks and insurance companies. We also excluded firms with missing financial data. Finally, we selected a set of 150 companies spread over different business sectors, for a total of 2700 observations. Financial and accounting information is extracted from the COMPUSTAT database.

3.2. Model and Variables Measures

The approach undertaken in this research is inspired from the study of Degryse and De Jong (2006). More specifically, to test

our research hypothesis of detecting the origin of the positive relationship between investment expenditures and cash flows, we will estimate an investment model of Tobin's Q. First, we replicate the same models as Vogt (1994) and Hoshi et al. (1991) and then we expand these two models taking into account the different states of nature that may occur. We expect a positive cash flow coefficient, but higher for firms with low growth opportunities than for firms with strong growth opportunities.

Like Hoshi et al. (1991), we distinguish between the problem of information asymmetry and managerial discretion through the investment opportunities of companies measured by Tobin's Q. Firms with strong growth opportunities, measured by mean Tobin's Q above the sample median, are assumed to have an asymmetric information problem. On the other hand, companies with low growth opportunities, measured by mean Tobin's Q below the sample median, are assumed to have a problem of managerial discretion. Along the way, we start by splitting our sample of US companies into two groups depending on whether the level of investment opportunities is below or above the sample median. A first group made up of firms with strong growth opportunities and therefore presenting a problem of information asymmetry and a second group of firms with low growth opportunities and therefore suffering from a problem of managerial discretion.

Thus, based on the studies presented above, and in order to test empirically the theoretical predictions of the two hypotheses of managerial discretion and informational asymmetry (Pawlina and Renneboog, 2005) and Hoshi et al. (1991)), we develop our model as follows:

$$I_{i,t} = \alpha_0 Q_{i,t} + \alpha_1 DNWC_{i,t} + \alpha_2 SALES_{i,t} + \alpha_3 CF_{i,t} + \alpha_4 LQ_{i,t} * CF_{i,t} + \alpha_5 HQ_{i,t} * CF_{i,t} + \alpha_6 CF_{i,t} * Q_{i,t} + \alpha_7 LQ_{i,t} * CF_{i,t} * Q_{i,t} + \alpha_8 HQ_{i,t} * CF_{i,t} * Q_{i,t} + \varepsilon_{i,t}$$

Where $\varepsilon_{i,t}$ is a standard residual term and α_i ($i = 1, \dots, 8$) constitute the parameters to be estimated.

In order to keep the possibility of a comparison with the results of previous studies conducted in other countries, we adopted the same measures of variables as those adopted by Hoshi et al. (1991) and Degryse and De Jong (2006). Thus, we adopt the following measures of endogenous and exogenous variables borrowed from the literature (Table 1).

4. RESULTS

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the main variables used in our analysis. The table reveals that the average value of investment expenditures is 24.1% while the median value is 18.3%. These values are acceptable compared to those considered optimal by other studies, in particular, that led by Degryse and De Jong (2006) which are respectively 19.5% and 16.1%. These results suggest that US companies are still looking to invest and therefore maintain their assets. In addition, Table 1 shows that the average value and the median of Tobin's Q are 1.184 and 1.014, respectively. The standard deviation for the entire sample is 78.4%. These values show, in all particularity, that our sample

Table 1: Definitions and measures of variables

Variable	Measure
Investment in fixed assets (I)	Capital expenditure CAPEX (t)/capital stock (t)*
Growth opportunities (Q)	Market value of total assets (t)/book value (t)
Cash-flow (CF)	Earnings before interest, taxes, depreciation et amortization (t)/capital stock (t)
Change net-working capital (DNWC)	Net-working capital (t+1) – Net-working capital (t)/capital stock (t)
Sales (SALES)	Sales (t)/capital stock (t)

*Where capital stock (t) is the beginning-of-period capital stock to account for differences in firm size

has a fair distribution in terms of firms with low and high growth opportunities. Finally, we note that the American firms in our sample have a very interesting level of cash flow. In fact, the average value of cash flows is 44.3% and the value of the median is 29.5%. Let us add that our descriptive analysis shows that the average size of the companies selected in our sample is equal to 7.881.

This analysis leads to conclude that American companies are able to follow guidelines that allow them to increase their investment expenditures. In addition, it leaves to think that they are generating an important internal source of finance in the form of cash flows that can mitigate the problem of underinvestment. But, on the other hand, it remains to verify the allocation of these cash flows by the company's managers. In the presence of opportunistic managers, these cash flows can be the cause of an overinvestment problem and consequently they would increase conflicts of interest between shareholders and managers.

4.2. Data Bivariate Analysis

The bivariate analysis, which is manifested by the Pearson correlation matrix, makes it possible to test the problem of multicollinearity between the explanatory variables. The results we have achieved are presented in the following Table 3.

This correlation matrix only reinforces the idea of the absence of the multicollinearity problem. Indeed, the correlation coefficients between the independent variables are well below the recommended threshold by Gujarati (1995) of 0.7. This gives us confidence about the quality of the regression coefficients of subsequent empirical tests and makes it possible to measure the separate impact of each independent variable on the dependent variable.

4.3. Results and Discussions

However, before embarking on the empirical test of our research hypothesis, it seems useful to describe the estimation method adopted throughout this study. This is an estimate on panel data. Because it has many advantages, panel econometrics are still highly recommended for the validation of theoretical statements about the positive relationship between investment and cash flow. It usually combines cross-sectional analyzes of large samples with time-series analyzes over relatively short periods. As a result, it offers more reliable and less biased estimators than time-series or cross-sectional models since it uses data with a larger number of observations and the risk of colinearity is considered much lower. Moreover, unlike a cross-sectional study, panel econometrics can be used to examine the differences in behavior between individuals, which allow us to take into account the problem of

Table 2: Descriptive statistics

Variable	Mean	Median	SD
I	0.241	0.183	0.339
Q	1.184	1.014	0.784
CF	0.443	0.295	0.563
DNWC	0.089	0.032	0.636
SALES	7.881	4.359	12.585

SD: Standard deviation

Table 3: Correlation matrix

	Q	DNWC	SALES	CF
Q	1			
DNWC	0.054	1		
SALES	0.173	-0.259	1	
CF	0.158	-0.0164	0.371	1

heterogeneity that could bias the estimated coefficients (Hausman and Taylor, (1981) and Arellano and Bond (1991)).

Thus, to obtain unbiased and more precise estimators, it seems important to examine more precisely the sensitivity of investment to cash flows, by means of panel data econometrics. The estimation of empirical models, derived from those of Vogt (1994), Hoshi et al. (1991) and Degryse and De Jong (2006), shows the following results, reported in the Table 4.

The results of this table, shows that, for all the tested models, the investment expenditures depend largely on the internal sources of finance (cash-flow). More specifically, the analysis of the results of the various adjustments indicates that cash flows are a major determinant of investment. Indeed, the model (1) shows that the sensitivity of investment expenditures to cash flows is positive and statistically significant at the 1% level. Then, to test our hypothesis of research, we resorted to the model (4) which is built by Hoshi et al. (1991). Given the results of this model, it turns out that it is the hypothesis of managerial discretion that prevails over the hypothesis of information asymmetry. In fact, the sensitivity of the investment to cash flows generated by firms with low growth opportunities is 0.462. It is significantly higher than the sensitivity of the investment to the cash flows generated by firms with strong growth opportunities, which is equal to 0.198. Consistent with Deloof (1998) and Ding and Qian (2014) but contrary to Mulier et al. (2016), this result suggests that the sensitivity of investment to cash flows is higher for firms with managerial discretion than firms with informational asymmetries.

Moreover, in order to respect the principle of comparability, we have replicated the same model as Vogt (1994) who distinguishes between the two hypotheses of managerial discretion and

informational asymmetry by the introduction of an interaction variable between Tobin's q and cash flows. According to Vogt (1994), a positive sign of this interaction variable corroborates the predictions of the information asymmetry hypothesis while a negative sign confirms the predictions of the hypothesis of managerial discretion. The estimation results we have reached are given in Table 2 (Model 5). They indicate that the coefficient of the interaction variable is negative and statistically significant, thus confirming the results of the model (4) and claim, as a consequence, the supremacy of the hypothesis of managerial discretion.

Finally, to further refine our results, we used a sixth model that is a combination of both studies of Vogt (1994) and Hoshi et al. (1991). In general, we find that the results of this model are not very conclusive, which suggests that the model (4), inspired from the study of Hoshi et al. (1991), is the best specification for deciding between the hypothesis of managerial discretion and that of information asymmetry.

In summary, we note that the results obtained in this research corroborate the acceptance of our research hypothesis. Indeed, it turns out that the positive relationship between investment and internal financing decisions can be largely explained by the opportunistic behavior of managers. According to Jensen (1986), the latter always seek to increase the firm beyond its optimal size in order to satisfy their interests. Thus, it seems to be accepted that, the managers of the companies secreting important cash flows and low growth opportunities, are able to undertake, at the same time, profitable and unprofitable investment projects. As a result, according to Richardson (2006), it seems that the presence of cash flows within the firm is the main argument that could foster the emergence of conflicts of interest between shareholders and managers.

4.4. Robustness Test

Next we conduct an additional test to ensure robustness of our primary results. Particularly, to test again our first hypothesis

of research which supposes that the sensitivity of investment to cash flow is higher for companies with low growth opportunities, we divided our sample into two subsample according to the importance of growth opportunities. A first subsample brings together companies with low growth opportunities and a second subsample only retains companies with strong growth opportunities. Thus, the estimation of the first model, which is similar to that of Fazzari et al. (1988) and Bhabra et al. (2016), is showed in the Table 5.

In view of this last table, it turns out that the sensitivity of investment to cash flow is well motivated by managerial discretion. Like Erickson and Whited (2000) and Cummins et al. (2006), a strong difference appears when the sample is divided into low and strong growth opportunities firms. In fact, the positive impact of cash flow is more than three times higher when growth opportunities are low. Even more, the Wald F-test statistic to test the difference in the cash flow coefficients between low and strong growth opportunities firms is statistically significant at the 1% level. This result supports those of Lamont (1997), Harford (1999), Berger and Hann (2003) and Yan et al. (2010). These authors reconcile the idea that weak growth opportunities are accompanied by a significant risk of over-investment. Richardson (2006), Cai (2013) and Guariglia and Yang (2016) have shown that over-investment expenditure is often outpaced by a high sensitivity of the investment to cash flow.

5. CONCLUSION

The objective of this study is to implement the hypothesis of interdependence of internal financing and investment. More specifically, the positive relationship between investment and cash flow, which is strongly debated in the financial literature, seems to be due to two types of explanation. Either it is the expression of a problem of information asymmetry (Myers and Majluf, (1984))

Table 4: Sensitivity of investment to cash flows

Models	1	2	3	4	5	6
Q	0.061 (1.89)*	0.073 (2.11)**	0.075 (2.48)**	0.082 (2.72)**	0.112 (3.22)***	0.119 (3.75)***
DNWC		0.045 (1.62)	0.062 (1.88)*	0.071 (1.95)**	0.041 (1.23)	0.056 (1.35)
SALES			0.052 (1.38)	0.055 (1.51)	0.061 (1.28)	0.062 (1.21)
CF	0.194 (3.89)***	0.228 (4.38)***	0.186 (3.57)***		0.269 (4.04)***	
LQ*CF				0.462 (3.25)***		0.077 (0.59)
HQ*CF				0.198 (3.73)***		0.174 (3.23)***
Q*CF					-0.042 (1.78)*	
LQ*C*QF						0.264 (0.87)
HQ*CF*Q						0.058 (1.87)*
R ² ajusté	0.321	0.343	0.357	0.361	0.378	0.372

*indicates significant at the 10% level; **indicates significant at the 5% level; ***indicates significant at the 1% level

Table 5: Moderating effect of growth opportunities on the investment-cash flows sensitivity

Model	Firms with low growth opportunities	Firms with strong growth opportunities	Wald F-statistic
Q	0.116 (3.37)***	0.157 (3.86)***	0.70
CF	0.963 (8.52)***	0.311 (5.18)***	10.51***
R ² Overall	0.511	0.467	
Fisher	24.37	21.59	
Prob>F	0.0000	0.0000	

*indicates significant at the 10% level; **indicates significant at the 5% level; ***indicates significant at the 1% level

between lenders and borrowers, or it reflects the opportunistic and discretionary behavior (Jensen, (1986)) of firms' managers.

At the end of our empirical study, involving 150 American companies during the period 1995-2012, it appears that the sensitivity of the investment to cash flow seems to be explained mainly by the hypothesis of managerial discretion. Indeed, we have shown that the managers of firms with cash flow and low growth opportunities choose to finance themselves with internal resources. This result, which is in the same vein as that reported by Degryse and De Jong (2006), may be justified by the fact that managers tend to invest excess liquidity in projects aimed at growing the firm beyond its optimal size and this in order to maximize their own interests (Conyon and Murphy, (2000) and Renneboog and Trojanowski, (2007)).

Finally, we note that our study finds its limits in the conceptualization of certain variables, in particular, the level of growth opportunity that could have been apprehended by other finer measures. Moreover, in all particularity, it is very useful to emphasize that the common advantage inherent in our empirical study, is that it confirms the existence of an opportunistic behavior of the managers, without specifying how to overcome this problem which aggravates conflicts of interest between shareholders and managers.

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