

CASH FLOWS – INVESTMENT SENSITIVITY UNDER FINANCIAL CONSTRAINTS: THE CASE OF VIETNAM

Thai Thi Hong An*, Ha Le Hong Ngoc

The University of Danang - University of Economics

*Corresponding author: anth@due.edu.vn

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Abstract - This paper focuses on examining the relation between cash flow and investment within different corporate financial status in the context of Vietnamese market. Using a sample of non-financial quoted firms over the 13-year period from 2005 to 2017; We document a strong positive correlation between corporate investments and cash flows. Importantly, our results indicate that firms suffering lower level of financial constraints appear to experience stronger investment to cash flow sensitivity and vice versa. This finding provides new evidence to re-examine the existing controversy on the use of investment & cash flow co-movement as a measurement of corporate financing constraints.

Key words - Investment; cash flow; financial constraints; Vietnam

1. Introduction

Corporate investment decisions - cash flow relation, and moderating role of financial constraints have been intensively debated for many years. These issues are particularly relevant in transition economies, where a capital market is characterized by some adverse financial attributes, such as insufficient market information, loose corporate governance mechanisms, and problem of financial restrictions. This, in turn, has limited the entry into financial markets for financially constrained firms, which has been an evident phenomenon for Vietnam financial system especially.

In this paper, we focus on Vietnamese market, where the corporate bond market is underdeveloped; equity market is blooming but too small to meet capital demand from firms [1]. According to 2017 report of General Statistics office of Vietnam, a large number of Vietnamese firms have to base on short-term bank loans as the main resources to finance their activities. Thus, as an emerging market, Vietnam provides a unique context to investigate topic of cash flow-investment relationship under effect of financial restrictions.

Even though the investment – cash flow sensitivity and extent of capital restriction have been researched for years, both theoretical and empirical researches find inconsistent views regarding these issues. For example, meanwhile [2] state that companies displaying higher such sensitivity is more likely to be constrained, [3] present oppose finding that the highest sensitivity levels are found in firms being the least constraints firms. [3]'s result is later supported by [4].

In the context of Vietnam there are relatively few papers focusing on the investment decision-making in association with financial constraints. In particular, [5] find the U – shape relation between investment and cash flow. In contrast, [6] finds a statistically significant and positive

association between cash flow and investment. This result implies that cash flow (or internal funds) is a key determinant of investment decisions at the firm level, with greater resources resulting in additional investment expenditure. This finding is further supported by [7].

Our study, can be seen as the first one that covers all Vietnam listed firms through the 13-year period to provide the broadest view on such a topic. Importantly, results indicate that firms suffering lower level of financial constraints tend to experience a stronger investment to cash flow sensitivity, and vice versa. This study, therefore, contributes to fill research gaps in the corporate finance literature by providing new evidence to re-examine existing controversy on the use of the cash flow-investment responsiveness as a measurement of firms' financial limitation in this market. The findings also contribute to provide some important practical implications for stock market investors, corporate regulators, and policy-setting bodies.

2. Literature review

2.1. Evidence of traditional view: Firms, that face tighter financial constraints, exhibit stronger investment – cash flow sensitivities

Applying different proxies of budget constraints, many empirical studies argue that the more financially constrained firms suffer the higher level of estimated investment–cash flow sensitivities are. [2] employs the data of US manufacturing firms and bases on earnings retention to analyse differences firms' investment behaviour. In which, firms with higher earnings retention are more likely to be identified as financial constrained and thus, they tend to make investment decisions relying on internal cash flow rather than on external source of fund. For those firms, larger gap between cost of internal and external funds caused by informational asymmetry problems leads to higher estimated investment-cash flow sensitivity. Explanations for this rely on financing hierarchies following pecking-order theory of [8] and the free cash flow (FCF) theory raised by [9].

Related studies confirm the basic [2]'s outcome when splitting data using other proxies of financial constraints ([10]; [11]; [12]).

2.2. Conflicting view: Fewer financial constraints - stronger cash flow - invest sensitivities

[3] challenges the generality of the above empirical literature when finding opposing evidence based on the low dividend pay-out subsample of [2]. [3] indicates that within

this subset, despite the existence of additional low cost of capital, least financial constrained companies tend to mainly rely on their internal cash flow to invest. Thus, these enterprises appear to experience the greatest investment-cash flow sensitivity. Their result contributes to confirm the significance of internal wealth on firms' investment behaviours. The [3]'s result is further confirmed by [4]. In this study author uses similar approach of identifying firms into financial constraints or non-constraints groups using related financial variables of constraints. Importantly, [4] documents that investment level of the low budget-limited firms are the more sensitive to changes in the internal cash flow. The finding is obviously in the line of [3]'s conflicting view presented above.

In the same spirit as [3] and [4], study of [13] focuses on examining whether the findings of [3] and [4] can be explained by the so-called "adequately bad-shape of cash flow". He explains that when a firm is in adequately bad-shape (i.e., its cash-flow is extremely loss), investment cannot rely on cash flow. Using similar sample and methodology of [4]'s study, [13]'s provides the causal link that when firms face significant cash shortfall, they are only able to invest money into very necessary projects. Falling into this status, firms' further reduction in investment is impossible even if the level of cash flow keeps decreasing. Thus, investment-cash flow sensitivity is found to be very weak. Basing on this explanation, when a firm is more constrained, it suffers higher restriction level in accessing external funds and so reaches the "minimal investment" phase more quickly. Therefore, when internal funds are extremely inadequate, the less constrained companies are more likely to exhibit strong investment-cash flow sensitivity than firms that are more constrained. The results of [13] also demonstrate usefulness of negative cash flow as the proxy to classify firms into different degree of financial distressed positions.

According to [14], inconsistent views regarding investment-cash flow sensitivity can be explicated by the way financial constraints are measured. On the one hand, [2] primarily use the degree of external financial constraints to define firm's financial constraint extent, such as firm age and size; pay-out ratio; or information relating to bond rating, or accessibility to commercial papers. The mentioned criteria mainly measure the effect of information asymmetries, which create obstacles to firms in obtaining external funds. Such as, for small firms, as they often have little available public information, they then severely suffer from the problem of information asymmetry, and so, financial institutions subsequently find it is difficult to collect financial information about these firms. This transfers into higher interest rate (high repayment cost) in obtaining external funds ([15]; [16]). Similarly, since firms must reach required size, age, and collateral level to be able to access to commercial paper market or make bond issuance feasible. In other words, those related criteria can also be used as proxies of external financial constraints [17].

On the other hand, most studies that have similar findings as [3] and [4] use variables that are highly related to firms' liquidity and internal funds as measurements for

firms' financial constraints, for example firm liquidity ratios or coverage ratios. These considerations strongly suggest potential different impacts of internal and external financial constraints on investment to cash flow sensitivity.

Stemming from Vietnamese context, where the capital market is characterized by some adverse financial attributes, such as insufficient market information, loose corporate governance mechanisms, and problem of financial restrictions; and following [3], [4], [13], [18] we propose the following research hypothesis: "While firms suffering lower level of financial constraints tend to experience a stronger investment to cash flow sensitivity, more constrained firms exhibit lower level of investment to cash flow sensitivity"

3. Methodology

3.1. Data

Our data is provided by FiinPro for the period from 2005 to 2017. Since in a developing market like Vietnam, data from listed firms is more reliable than that of unlisted firms, all investigated firms are publicly listed firms. We exclude financial institutions and utility firms as they have many differences in the operating, investing and financing activities compared to the other industries. To deal with outliers, we winsorize all variables at 1% level. As a result, our panel-sample includes 7,026 observations from 1037 firms which span over 8 sectors, including Basic-Materials, Consumer-Goods, Consumer-Services, Health Care, Industrials, Oil & Gas, Technology and Telecommunications

3.2. Research model

Follow [18, 19], we use the equation to investigate the relationship between investment outlays and corporate cash flow is as follows:

$$INV_{i,t} = \beta_0 + \beta_1 INV_{i,t-1} + \beta_2 CF_{i,t-1} + \sum CONTROL_{i,t-1} + \sum Year + \sum Industry + u_{i,t} \quad (1)$$

Where: $INV_{i,t}$ indicates capital expenditure of firm i at time t , measured by taking the total of depreciation in year t and change in tangible fixed assets from year $t-1$ to year t divided by tangible fixed assets ratio in year $t-1$. This measure is suggested by [14]. $CF_{i,t-1}$ denotes cash flow of firm i at time $t-1$, measured by taking earnings before extraordinary items and depreciation in year t divided by tangible fixed assets in year $t-1$. Follow prior research, including [18], and [19], and the information availability of the stock market, our control variables include firm size (Size) (logarithm of total assets), total debt to assets ratio (Blev), Sales growth (Growth), and market-to-book ratio (Mtb). Please find the full description of all variables in Appendix 1.

Among dynamic estimators, system-GMM is one of the most effective methods to solve endogeneity and reverse causality problems. Besides, we include a set of year and industry dummies to control for time- and industry- fixed effects.

To classify firms to low- and high-constrained group we use WW [20] and ASCL [19] indexes. With WW, we can rely on the industry median to separate "constrained"

and “un-constrained” firms.

$$WW = -0.091* (\text{Cash Flow/Total assets}) - 0.062*(\text{Dividend dummy}) - 0.044* \text{Natural-logarithm}(\text{Total assets}) - 0.035* \text{Growth-in-sales} + 0.102* \text{Industry's Growth-in-sales} + 0.021*(\text{Long-term debts/Total assets})$$

Where: Dividend dummy = one if the firm pays dividend, and zero otherwise.

[19] built their index (ASCL) with scores range from 0 to 4, and level of constraint increases from low to high correspondingly. Following his approach with due caution, we label “low constrained” for firms who have ASCL score either 0 or 1, “high constrained” for firms who have ASCL score from 3 to 4. The score of 2 denotes for “neither” firms.

$$\text{ASCL} = \text{Size dummy} + \text{Age dummy} + \text{Cash flow dummy} + \text{Long-term leverage dummy}$$

Where: Size dummy=1 if size is smaller than industry median, and 0 otherwise. Age dummy = 1 if firm is younger than industry median, and 0 otherwise. Cash flow dummy = 1 if average value of cash flow-to-capital ratio of the previous two years is lower than industry median, and 0 otherwise. Long-term leverage dummy = 1 if average value of long term-debt-to-assets ratio of the previous two years is higher than industry median, and 0 otherwise

3.3. Summary of variables

Table 1 presents the statistics summary of all variables in our model. The investment ratio of non-financial quoted firms between 2005 and 2017 is 0.45, on average. The average level of CF is high while the sum of earnings before extraordinary items and depreciation is 1.56 times higher than tangible fixed assets.

Table 1. Variable summary

Var.	N	Mean	S.D.	Min	Max
INV	7,026	0.45	1.66	-1.00	14.60
CF	7,026	1.56	6.07	-12.80	68.46
Size	6,676	26.69	1.41	23.46	30.51
Blev	6,676	0.25	0.21	0.00	0.80
Growth	7,017	0.13	0.75	-1.00	9.26
Mtb	6,871	3.71	4.24	0.00	26.94

Table 2 presents the pairwise correlation matrix across variables in our model. As shown, CF has a positive correlation coefficient with investment. Cash flow is correlated positively with INV at a coefficient of 0.354. In addition, size, book leverage, and growth also have positive correlations with level of investment while Market-to-book ratio show a negative association with investing measures

Table 2. Pairwise correlation matrix

	INV	CF	Size	Blev	Growth	Mtb
INV	1.000					
CF	0.354	1.000				
Size	0.051	-0.002	1.000			
Blev	0.044	-0.108	0.409	1.000		
Growth	0.189	0.140	-0.017	-0.033	1.000	
Mtb	-0.031	0.001	0.114	0.270	-0.012	1.000

4. Result

4.1. Relationship between cash flow and investment

Table 3 shows the regression results of Eq. (1) that provides the estimation of investment levels. In this section, we use both static (POLS, FE) and dynamic (system-GMM) estimators. The coefficients of lagged terms of cash flow are statistically significantly positive at the 99% confidence interval regardless the estimators used. Although the outcomes of POLS and FE estimators suffer problems of unidentified firm-specific heterogeneity and endogeneity, we still employ them to ensure the finding of GMM about the influence of cash flows. With system-GMM, the coefficient for the lagged cash flow is 0.0651, suggesting that expenditure for investment goes up with the rise in cash holdings. AR(2) test for no autocorrelation has the p-value of 0.651, so the serial correlation of the error term is not large. Besides, Hansen J-Test for over identification problem gives favourable results with p-value at 0.168, which is higher than 0.05 thresholds.

Table 3. Investment-cash flow sensitivity of Vietnamese listed firms from 2005 to 2017

	POLS	FE	System-GMM
L.INV	-0.051** (0.019)	-0.155*** (0.022)	-0.032 (0.021)
L.CF	0.067*** (0.008)	0.083*** (0.010)	0.065*** (0.008)
L.Size	0.050** (0.015)	-0.074 (0.087)	0.049** (0.015)
L.Blev	0.145 (0.119)	0.215 (0.285)	0.131 (0.118)
L. Growth	0.019 (0.025)	-0.032 (0.032)	0.013 (0.024)
L.Mtb	-0.017*** (0.005)	-0.015* (0.007)	-0.017*** (0.005)
R2	0.086	0.082	
Obs.	7026	7026	7026
AR2			0.651
Hansen			0.168

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In short, we find a positive relation between firm cash flow and investment levels, implying that Vietnamese listed firms tend to increase their investment level with the rise in cash-flow on their hand.

4.2. Financial constraints and cash flow –investment sensitivities

In this section, we will clarify the effects of financial shortage on the sensitivity of investment outlays to changes in cash flow. First, run Equation (1) for 2 different groups, including high- and low-constrained firms, which are classified by WW and ASCL. The outcomes are reported in Table 4. With WW, we use median-based methods to identify firms into different budget limited schemes. The estimates of the system-GMM with these two indexes document positive CF-INV

sensitivities, for both low- and high-constrained enterprises, which are consistent with what we found in section 4.1. Interestingly, investment of the low-constrained firms is highly sensitive to cash flow whatever the indexes used, reflecting through higher coefficients of lagged CF. With WW, a higher significantly coefficient of lagged CF is found in low-constrained firms (0.0832 compared with 0.0268 for high-constraints group). With ASCL, again, the levels of investment of low-constrained companies are more sensitive to changes in cash flow (0.0688 compared with 0.00964 for high-constrained group).

It is important to emphasize that our findings document that low constrained firms tend to experience higher level of investment – cash flow sensitivities and this level lower for more constrained companies. This is contradicted with [2]'s findings but consistent with the results obtained by [3], which imply that investment – cash flow sensitivity is not a reliable measure of budget limitations, at least in the context of Vietnamese market.

Table 4. Results with WW and ASCL

	WW		ASCL	
	Low	High	Low	High
L.INV	-0.104*** (0.0312)	0.0279 (0.0245)	-0.168*** (0.0411)	0.0389 (0.0268)
L.CF	0.0832*** (0.0103)	0.0268* (0.0112)	0.0688*** (0.0120)	0.00964* (0.0133)
L.Size	-0.0836** (0.0301)	-0.0216 (0.0247)	0.0224 (0.0261)	0.00513 (0.0264)
L.Blev	0.636*** (0.1720)	-0.136 (0.1490)	0.656** (0.2230)	0.221 (0.2580)
L. Growth	-0.00755 (0.0332)	0.05 (0.0377)	0.0322 (0.0478)	-0.0419 (0.0311)
L.Mtb	-0.0328*** (0.0091)	-0.0024 (0.0046)	-0.0290** (0.0091)	-0.0056 (0.0074)
Obs.	3960	3066	2827	1336
AR2	0.270	0.525	0.184	0.570
Hansen	0.163	0.394	0.123	0.308

4.3. Further robustness check

To measure the budget shortage, some studies also use stand-alone ratios, for example, interest coverage ratio, the position of corporate cash flows, and dividend pay-out ratio. In the past, [2] use pay-out ratio as ex-ante splitting scheme. Following them, we run additional regression for subsample classified based on new metrics and report results in Table 5. First, we put firms that pay dividend higher than industry median to “low constrained” group and vice versa. In line with the concept of information asymmetry, the dividend pay-out ratio is widely used as a sign of firms’ long-term prospects, the lower the dividend pay-out ratio, the worse firms’ long-term prospects are perceived by the market, and, hence, the more difficulty for such firms in accessing external funds. This classification has some problems when, for instance, some high-constrained firms can still pay considerable dividend to protect their stock price,

and sometimes, low constrained firms do not pay large dividend to retain funds for their re-investment projects. Next, with cash flow, we compare firm value with industry median. Firms with high cash flow level are classified as “low constrained”. When we based on dividend pay-out ratio, or corporate cash flow position, we find consistent outcomes with WW and ASCL since positive coefficients of lagged cash flow are found, and such effect is still stronger for low-constrained enterprises.

Table 5. Results with dividend payment and cash flow

	Dividend pay-out ratio		Cash flow	
	Low	High	Low	High
L.INV	-0.100* (0.0462)	-0.0327 (0.0465)	-0.248*** (0.0544)	-0.0216 (0.3060)
L.CF	0.0753*** (0.0116)	0.0588* (0.0238)	0.0843*** (0.0124)	0.029* (0.0473)
L.Size	0.0403* (0.0190)	-0.121* (0.0612)	0.00761 (0.0288)	0.0667* (0.0298)
L.Blev	0.392* (0.1620)	0.497 (0.4350)	1.010*** (0.2410)	0.179 (0.2310)
L.Growth	0.0569 (0.0538)	-0.0372 (0.0558)	0.0408 (0.0375)	0.0355 (0.1330)
L.Mtb	-0.0161 (0.0087)	-0.0273** (0.0094)	-0.0409*** (0.0103)	-0.00594 (0.0088)
Obs.	3777	815	3555	3440
AR2	0.736	0.644	0.141	0.849
Hansen	0.158	0.206	0.180	0.405

5. Conclusion

Using the sample of Vietnamese quoted firms from 2005 to 2017; Our paper demonstrates that low constrained firms experience stronger cash flow-investment sensitivity. This finding provides new evidence to re-examine the existing controversy on the use of the investment–cash flow sensitivity as a measurement of firms’ financing constraints. This also reproduces the findings of [3] that investment-cash flow is not indeed the effective measurement of financial constraints for emerging markets. Given the tight dependence of investment decisions on internal cash flow within the context of a highly financially constrained market such as Vietnam, the government should focus on improving capital market efficiency by providing other available financial resources, such as enhancing the banking sector’s efficiency in resource allocation [21]. As most of firms listed in Vietnamese stock exchanges have large size, our investigation may not reflect the whole story of the market. Therefore, a next step will be to study these issues for medium and small-size firms, and unlisted Vietnam firms. We leave this extension for future research.

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