2015

Do Internal Funds play an important role in Financing Decisions for Constrained Firms?

Barun Roychowdhury
Claremont McKenna College

CLAREMONT MCKENNA COLLEGE

Do Internal Funds play an important role in Financing Decisions for Constrained Firms?

SUBMITTED TO

Professor Matthew Magilke

AND

Professor Mitch Warachka

AND

DEAN NICHOLAS WARNER

BY

Barun Roychowdhury

for

SENIOR THESIS

Spring 2015

April 27, 2015

Abstract

In this paper, I discuss the importance of internal funds for corporate investment among financially constrained firms. I use the paper ‘Financing Constraints and Corporate Investments’ by Fazzari, Hubbard and Petersen.as a base for my framework. I focus on a specific paper refuting their findings and their response in order to fully understand the benefits and costs of the framework. I then apply the original framework to a recent sample that covers the Great Recession to see the results of the initial paper are still valid today and if the recent recession and elongated recovery had an even more adverse effect on financially constrained firms than was previously noted.

Acknowledgments

I would like to thank Professors Magilke and Warachka for agreeing to read my paper. I would also like to thank Professors Meulbroek and Zemel for their input and involvement without which this paper could not have been conceived or followed through. Finally, I would like to thank my family and friends for their continuing support and guidance, without which this paper would not have been possible.

Contents

1. Introduction

There has been considerable amount of debate among economists about the nature of financial constraints. As 'financially constrained' is a relative term, researchers have found it hard to pinpoint what indicators to use when considering financially constrained firms. The definition of financially constrained is just that the firm faces a wedge between internal and external sources of finance, which is true for nearly every firm. Thus, this traditional definition needs to be explored further While traditional models of investment rely on the assumption that firms can respond to prices set in the capital market, this paper relies on a slightly different approach that comes from the first significant paper in this topic, 'Financing Constraints and Corporate Investment' by Fazzari, Hubbard and Petersen in 1978. They discuss the existence of a wedge between external and internal finance. In a perfectly competitive market, firms would be indifferent between internal and external capital as sources of funds. However, it is apparent that we do not live in a perfectly competitive market and many issues can stop firms from accessing external funds. These include but are not limited to transaction costs, economies of scale and informational asymmetry. Thus, in reality, it is far easier for firms to access and use internal finance. This leads to a 'financial hierarchy' explained in the following section, whereby firms will first exhaust their internal funds, then issue debt and finally issue equity. Thus, the availability of internal funds can go some way in determining the level of investment undertaken by more financially constrained firms. It is on this basis that the paper whose model I am using begins to divide firms, on the basis of firms' dividend payout ratio. This is decided by considering that firms facing financial constraints are unlikely to pay out dividends due their internal

funds being more valuable than firms not facing financing constraints. By dividing firms into categories based on their dividend payout ratio, one can observe the different investment-cash flow sensitivities between more financially constrained and less financially constrained firms.

The question addressed in this paper is whether investment-cash flow sensitivity can be considered a measure of financial constraint. The paper is organized as follows. While the main body of work I am drawing from has already been mentioned, I also look at various other papers written on the topic and consider their strengths and weaknesses of the base paper. Most importantly, I focus on an argument between Fazzari, Hubbard and Petersen and the authors Kaplan and Zingales in the form of papers published between 1978 and 2000. I then focus on other papers that have influenced my thinking on this subject. This is covered in the Literature Review section. The rest of the paper outlines my research, results and conclusions based on the results.

There are some key differences between my paper and the original body of work in this topic. While their data is obtained from Value Line for the period 1970-1974, mine is obtained from the CRSP/Compustat merged dataset for the period 1998-2013. While the original authors believed that their data covered enough years to observe a time-series variation, but it was short enough that constrained companies would be allowed to mature. My database also covers this aspect. Another notable aspect of this paper is that it reflects the period of the Great Recession, 2007-2009. This period and the following period allow me to observe a time that firms in general were incredibly financially restrained. According to a paper published by the Bureau of Labor Statistics, in terms of

unemployment and long-term unemployment in the recent recession and post-recession period, it can be regarded as one of the biggest faced by the United States[1]. Thus, I believe the investment-cash flow sensitivity observed during this period must be greater than observed in the period 1970-84.

In my results and conclusion, I find that this belief does not hold true. While my results largely followed the framework and ideology of FHP [1987], the coefficients I observed were less extreme for the financially constrained and the relatively unconstrained. Even during the Great Recession, the importance of internal funds was far lower than observed during 1970-1984. This might reflect the development of the market as I will go into later. I do find that financially constrained firms are far more dependent on internal funds for corporate investment. This holds true especially strongly during the recession periods and the entire sample. However, it is interesting to note that in the period between recessions, cash flows are far less important in determining corporate investments, even in financially constrained firms.

[1] Bureau of Labor Statistics, BLS Spotlight on Statistics: The Recession of 2007-2009. http://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf

2. Literature Review

The concept of financial constraint has been part of a heated debate between economists for decades. The first paper I examine provides the base for all future discussion on this topic. Fazzari, Hubbard and Petersen (1978), from now on referred to as FHP [1987], started the discussion on financial constraints. They're paper ended in the result that more financially constrained firms are likely to show higher investment-cash flow sensitivity. Their claims were refuted by Kaplan and Zingales (2000), from now on referred to as KZ [2000], who found that firms that appear less financially constrained by FHP [1987] actually display higher investment-cash flow sensitivity in the periods described in FHP [1987]. Fazzari, Hubbard and Petersen choose to refute KZ [2000]'s findings in a response paper published in 2000, where they cite the weakness of KZ [2000]'s assumptions in terms of defining 'financial constraint'. Much of the work published on this topic so far is divided upon the true definition of financial constraint. In my literature review, I will consider the primarily these three papers to form a well-rounded understanding of the primary debate in the relevant literature. Thus, I do a detailed analysis of the three papers and then include the other papers that have influenced my work in this paper.

2.1. 'Financing Constraints and Corporate Investments', Fazzari, Hubbard and Petersen

FHP [1987], which is described by KZ [1987] as the father of the literature in this subject, begins by discussing the difference between internal and external finance between firms. In a perfect capital market, a firm would be indifferent towards these sources as the firms leverage is independent of any investment decisions. Firms would have equal access to both sources of funds. However, this is not a realistic view of the

market. In reality, there is a gap in the cost of internal and external funds that is affected greatly by financial factors surrounding the firm. These factors would definitely go into the investment decisions of the firms when choosing between raising debt or equity and using the company's existing reserves. In a practical situation, the internal choice has significant cost advantages of the external choice of financing. The more prevalent explanation of this is the existence of transaction costs, tax advantages and asymmetric information in the markets. Asymmetric information in particular leads to external financers being unable to properly evaluate firms and as such, there appears to be a gap between external and internal financing. They introduce the concept of financial hierarchy, where firms will choose to use internal funding first, followed by raising debt, and once their debt raising capacity is fully used they will look to issue new shares.

FHP [1987] analyzes manufacturing firms in the United States from 1970-84, first dividing the firms into six classes by asset size. They then evaluate the usage of debt financing and the retention rates of these classes. FHP [1987] uses the dividend payout ratio to identify financially constrained firms. The reasoning they give for this is that if the difference between external and internal financing is low, firms would be indifferent to paying out dividends. However, if the cost advantage is significant, firms facing higher costs of external finance should ideally have lower pay-outs and try and maximize their low cost internal source of funding. Thus, the investment-cash flow sensitivities in these firms should be higher. They classify firms into three classes based on the dividend to income ratio, Class 1 average dividend to income ratio of 0.1 for at least ten years. Class 2 divides firms that have a ratio between 0.1 and 0.2 over at least 10 years of the data set. Class 3 includes the rest of the firms. They only used firms that have a positive

real sales growth over the period 1969-1974. This is due to the fact that firms with little or no income are far more unlikely to pay out dividends on the basis that they have very low cash balances. They believed that this left the firms that paid out low dividends to avoid the costly sources of external finance.

As expected, class 1 firms had the highest retention ratio and experienced the most rapid growth in capital stock. They also indicate that cash flow and investment are the most volatile in class 1. In this paper, they use three different types of investment models, in my paper; I limit myself to one, i.e. the q-framework. In this methodology they use Tobin's q^2, defined as the ratio between the market value of assets and their book value, as a replacement for investment opportunities. This goes by the assumption that a value-maximizing firm will invest as long as the value of q is greater than 1. The q value for firms in classes 1-2 is far greater than those in class 3. In their regression, where they use Tobin's *q* as a measure of investment possibilities, they find that class 1 firms tend to issue shares the most while firms in class 3 tend to issue shares the least. This follows the financial hierarchy which considers that class 1 firms would have used up a lot of their debt capacity. Finally, they interpret investment-cash flow sensitivities as highest in this bracket of firms and lowest in class 3. They find that between 46-55% of the variation in investment (based on the time period) is explained by variation in cash flows.

It is important to mention that while they use a *q*-theory framework initially, they move to a *Q*-theory framework, where they control for tax or capital market

[2] Tobin, James. "A general equilibrium approach to monetary theory." *Journal of money, credit and banking* 1.1 (1969): 15-29.

imperfections. The results of the *Q* framework remain largely the same; therefore I use *q* as a substitute. They weight both investment and cash flow by capital stock, which I intend to do.

2.2. 'Do Investment-Cash Flow Sensitivities Provide Useful Measure of Financing Constraints?' Kaplan and Zingales

KZ [2000] begins by stating that investment-cash flow sensitivities do not provide useful measures of financial constraint. While they state the importance of FHP [1987] in its addition to its literature, KZ [2000] also believes that the assumptions underlying FHP [1987] were never tested. They focus on the assumption that investment-cash flow sensitivities increase monotonically with increasing financial constraint. Their paper focusses on the 49 low dividend firms identified in FHP [1987] and adds public news and qualitative data along with significant quantitative data to try and get a fuller picture of the firms described as constrained. They find that firms could have increased their level of investment 85% of the time. Most notably, Hewlett Packard could have increased their investment every year and chose to pay out low dividends at the time. This finds an inherent flaw in FHP [1987]'s assumption that firms paying out low dividends either had low income or faced a high cost of external capital. Hewlett-Packard would have faced neither of these issues yet continued to pay low dividends, as defined by FHP [1987].

In fact, KZ [2000] found that firms classified as less financially constrained exhibit higher investment-cash flow sensitivity. They also believe that there is no reason to assume that investment-cash flow sensitivity has a monotonic relationship with financial constraints. In fact they state that a multi-period model, precautionary savings

motives make it hard to judge investment-cash flow sensitivity. As they use the same sample of constrained firms as FHP [1987], they believe that there can be no disagreement that they have adversely selected their sample. They cite Regulation S-K, which requires firms to disclose whether or not they are able to fund their existing investment opportunities, as reasoning behind their quantitative research being sound. They then divide the firms further into five sub-groups, not financially constrained (NFC), likely not financially constrained (LNFC), possibly financially constrained (PFC), likely financially constrained (LFC) and financially constrained (FC). Firms were placed in the NFC group initiated or increased dividends, repurchased stock or stated that they had more liquidity than they require in their 10-K. While they entertain the possibility of management misreporting, but dismiss it on the grounds of Regulation S-K, the length of the period and their reading of the financial statements. They find that 85% of firm years fall into the LNFC or NFC categories. They find nineteen firms are never constrained and twenty-two firms are likely constrained at least one year. They see this as refuting FHP [1987]'s hypothesis that these firms were financially constrained in the first place. They also observe the median level investment falls as firms become more financially constrained. When considering the financial structure of the firms, they observe that EBITDA, the debt to total capital ratio and the interest coverage ratio falls monotonically across the classifications. Finally, they also see cash and slack (the sum of cash and unused credit lines) fall across the firms.

They then regress the investment to the cash flow in each classification. What they find is the opposite effect of FHP [1987], firms investment-cash flow sensitivities actually decline as the firms become more financially constrained. NFC or LNFC firms

have a sensitivity of 0.702 while LFC or FC firms only had a sensitivity of 0.180. In order to account for firms underreporting negative turns in the financial future of the firms, they include PFC in the second group and find that their result is insignificantly different from that of Class 3 firms described in FHP [1987] above (0.25). They then divide their data into sub periods and find the results hold stronger within the sub periods.

In further recessions, they estimate the investment-cash flow sensitivities for the 25% of sample firms who's interest coverage ratio does not fall below 2.5 and 4.5 times and have never restricted dividends. This is something I can replicate in my study as there were severe recessions in my time period as well, thus I will be able to analyze the high interest coverage firms in my sample. In the case of KZ [2000], they find that these firms have very high investment-cash flow sensitivities when compared to the entire sample. They go on to test in multiple situations, using both qualitative and quantitative factors. They include Tobin's q, a dummy variable if the firm was breaching debt covenants preventing them from paying dividends and the sales to capital ratio in the following regressions. Despite controlling for several factors, they continue to find the same opposing patterns to that of FHP [1987]. They also regress internal funds to investments but their results are insignificant. Interestingly, they divide investment internally among different forms of investment including property plant and equipment, inventory and the sum of capital investment and R&D expenditures. They find the results hold true for all forms of investment.

They conclude that investment-cash flow sensitivities are not well grounded in theory to indicate any sort of financial constraint. While the position taken in this paper is

biased towards the FHP approach, due to the following response paper, one cannot deny that KZ [2000] proved the most significant paper opposing FHP [1987].

2.3. 'Investment Cash-Flow Sensitivities Are Useful. A Comment on Kaplan and Zingales', Fazzari, Hubbard and Petersen

This paper, published as a response to KZ [2000], intimated that the method used by KZ does not capture the theoretical approach employed in FHP and subsequent studies. They also claim that the method used by KZ [2000] in identifying constraints is inherently flawed. Finally, they conclude that the results of the KZ test are uninformative about the usefulness of investment cash flow sensitivities.

The first issues they raise are with the theoretical model applied in KZ [2000]. The model identifies return on investment as *F(I)*, internal financing with a constant opportunity cost *W*, external financing *E*, and a premium for external funds *C(E,k)*, where k is the wedge between internal and external funds. They show that investment-cash flow sensitivity can be described by the following equation:

$$\frac{dI}{dW} = \frac{C_{11}}{C_{11} - F_{11}}$$

Where C11 is the supply curve for internal finance and F11 is the slope of the investment demand curve. While the paper goes into further discussion regarding KZ's assumptions regarding the second derivative of this equation, what is relevant to the discussion is that KZ's assumptions do not provide any effective critique of FHP because it does not use the level of *W* to classify firms. The FHP framework classifies firms according to a priori criteria designed to give differences in the slope of external

financing schedule C11, across groups. As is apparent by the equation above, firms facing higher levels of C11 should have a larger dI/dW, other things equal. As described by the FHP model, unconstrained firms pay-out high dividends. In contrast, financially constrained firms exhaust internal funds and finance marginal investment with external funds, facing a positive C11. A replacement variable, which is suggested by the paper as the method used in Himmelberg and Petersen (1994), who used access to public debt or debt rating in order to measure cost of external finance to firms. As firms with a better debt rating would have better access to external funds, one could assume a lower C11 for these firms. This method would be a good source for future research.

The paper goes on the raise issues about the classification of firms into five categories by KZ [2000]. They dismiss the use of Regulation S-K as any reasoning that firms will not manage reporting since firms only have to report on their ability to make good on announced investments and not on planned investments. Furthermore, they question several quantitative measures used by KZ, They say that KZ ignores the fact that companies rely heavily on cash for inventory and accounts receivable, especially for fast-growing firms. They also intimate that cash stock, unused lines of credit and leverage are unreliable measures of the relative degrees of financial constraint. For example, low-debt firms can face higher constraints as they may have difficulty in raising debt in the market. Also, forward looking firms with risky investments would keep a buffer of cash in case the risky investment fails. They believe that a more dynamic view of the capital market is required when constructing an investment-cash flow framework.

Finally, they question the results obtained by KZ in their research by describing the FC firms as possibly financially distressed. Financially distressed firms are unlikely to use cash for investment activities. Thus, for the above reasons they conclude that KZ's basic framework was flawed as well as their separation criteria. They cite support from other papers and I agree with the description given by FHP. I intend to use their framework in my own sample while using the parts of KZ I believe are relevant as detailed in the following sections.

2.4. Other Papers

While the above papers give me enough to formulate a framework, I looked to more recent studies on the topic. In a recent paper titled 'Financial constraints, asset tangibility and corporate investment' by Almeida and Campello, the authors use investment-cash flow sensitivity in order to measure financial constraint. They do not divide firms on the basis of constrained or unconstrained but use investment-cash flow sensitivity in order to help identify firms. While they do not find a monotonic relationship at high levels of asset tangibility, they do find it holds for lower asset tangibility. This follows the intuition observed both in FHP [1987] and this paper which show that investment-cash flow sensitivity is a good measure of use of internal and external funds specifically for constrained firms. While it did not hold for high levels of tangible assets, there is no doubt that investment-cash flow sensitivity has a place when estimating financial constraints.

3. Data Sources and Framework

As my data source, I used the merged CRSP/Compustat files that reports stock returns and the reported accounting figures of multiple active and inactive firms. In order to clear my data of firms that were either acquired or in financial distress, I have only included active firms. I have also removed firms with an average net loss over the period, as these firms would be more likely to use external funds at any rate. In order to specify my data within the manufacturing industry, I have used the Standard Industrial Classification codes which identify the manufacturing industry as firms with SIC codes starting with 20-39. The data taken from CRSP/Compustat pertains to all manufacturing firms between the fiscal year 2000 to 2013. This data left me with 1038 firms, which is greater than the sample used by FHP, though this makes sense as this is an updated sample, it should contain more companies that have come up and consolidated over the last three decades.

I then divide the firms into classes, based on their dividend to income ratio, as seen in FHP [1987]. The difference in methodology used here is that in FHP, firms were designated classes based on dividend ratio in at least ten years, whereas I use average dividend to income ratio. I also remove firms with a negative average payout ratio, as they pay out dividends when they have losses. I believe this gives a better picture of the firm's attitude towards dividends, especially in the cash strapped Great Recession period. The classification is as follows:

Class 1: $\frac{Dividends}{Income} < 0.1$

Class 2: $\frac{Dividends}{Income} < 0.2$

Class 3: All other firms

The average also helps control for outlier years, where firm paid unusually high dividends on low net income. Class 1 contained 518 firms, many of which had not paid a dividend at all in the sample period. Class 2 contains 106 firms. Class 3 contains 414 of the firms with a payout ratio higher than 0.2.

In my paper, I use the *q* framework used by FHP [1978] in order to estimate the relationship between cash flow and investment. In order to calculate *q* I use the market price of a share of the firm multiplied by the shares outstanding to come up with a market value of equity. I then add this to the book value of debt and divide it by total assets. This is more similar to the method employed by KZ in their paper, but was not refuted by FZ [2000] in their follow up paper. The *q* variable acts as a proxy for investment opportunities. Thus, including q in the equation allows us to view investment-cash flow sensitivity controlling for future investment opportunity. For investment, I use the sum of Capital Expenditure and Acquisitions to act as the total investment value. For cash flow, I use the sum of cash and the net change in cash of the year, in order to display the cash available for investments. This is the base of my first regression.

For my second regression, I divide the firms by time period into three different sets; 2000-2003, 2003-2008 and 2008-2013. In this regression, two of the time periods contain recessions, while the biggest wedge between external and internal funds is expected to be observed in the latter period, as this reflects the difficulty of firms to raise

external capital should be adversely affected by the Great Recession. The basic equation of my regression follows from FHP [1978]:

$$\frac{I}{K_{it}} = \beta_1 \frac{CF}{K_{it}} + \beta_2 q_{it} + \text{u}$$

Where *I* represents investments, which I calculate by adding investment in plant and equipment with acquisitions. This is a more complete measure of investment than is used in FHP [1987]. CF represents the cash available to the firm during the year. Tobin's q has been explained earlier. Both cash flow and investment are weighted by K, the capital stock value. The variables 'i' and 't' refer to a specific firm at a specific point in time. I do not used lagged cash flow as I use the cash available during the year. As the relevance of cash flow has already been tested by FHP [1987], I perform a joint regression from the start. FHP [1987] regress I/K with the independent variables individually and then together. As this only shows that cash flows increase the R^2 variable, I needn't include in my regression I will discuss the results of this in the following sections.

4. Results

4.1. Summary Statistics

The table on Summary statistics can be seen in Appendix A, Table 1. When considering the work of FHP [1987], the results of the basic summary statistic are surprising.

When considering the average amount of debt taken on by firms in different classes, class 1 has a debt to capital ratio of 39.08%. This is similar to the ratio seen in class 2. Class 3 however, has a much lower debt to capital ratio of 19.90%. This follows the theory that more constrained firms are more likely to use up their debt capital in the financial hierarchy than less constrained firms. Thus, class 3 firms are more likely to issue shares or look at internal funds in order to get their funding. This can be observed in our sample as well.

What is surprising about the sample is the ratio of Capital Stock to Assets. This remains in the range of 50-58% for all classes of firms. The amount of difference is minimal, but Class 1, as expected has the lowest ratio at 50.44%. However, Class 2 (57.30%) has a higher percentage of Capital Stocks/Assets than Class 3 (53.34%). As this is measure of how firms among the classes are funded, one can see that Class 3 firms use internal funds the most, considering their ratios. This is consistent with the ideology that Class 3 firms are the least constrained.

When considering the Tobin's q, it falls between 2 and 2.3 for all classes. Again, class 2 is observed to have highest average q with class 3 following. While this is surprising, it is important to consider that the sample period is during a very difficult financial time and thus it is biased to a lower q.

4.2 Regressions: Entire Sample and Different Classes

The results of the regression can be found in Appendix B, Table 1. As mentioned above, I use the q investment model, which did not have much difference from the Q model described in FHP [1987]. The strategy was to estimate the cash flow's importance in explaining the investment decisions made by companies. Both firm and year effects are included.

The model explains the most variation in Class 1 with an R^2 of 30.33%. As expected, R^2 falls as the model moves up classes. This shows the economic significance of the fact that cash flows explain less of the variation in investment as firms become less financially constrained. The coefficient on cash flows is significant at 1% for all Classes and the entire sample. This shows the relevance of cash flows to investing decisions made by firms.

Also conforming to expectations set by FHP [1987], cash flow sensitivity is highest in Class 1. The coefficient on Class 1 is over 3 times that of the coefficient in Class 2 and over 5 times that of the coefficient in Class 3. This is incredibly relevant as more financially constrained firms as described by this model definitely have higher investment-cash flow sensitivity. The investment-cash flow sensitivity in the entire sample is 0.34. This is slightly less than the coefficient on Class 1 and significantly more than the coefficient on Classes 2 and 3. I discuss the sub-intervals in the following sub-section.

4.3 Regressions: Time Period

The results of the regression can be found in Appendix B, Table 2. The sub-intervals are incredibly helpful when considering investment-cash flow sensitivity over time. In the 1998-2003, which was subject to the 2001 recession, the R^2 coefficient goes up for Class 1 firms. This is expected as firms would be more financially constrained during this period and more of their investment would be dependent on cash flows. The coefficient is much higher than the sample amount (0.53). This also displays the increasing importance of cash flows in periods of financial constraint. The coefficients follow the same trend as in the full sample, with investment-flow sensitivity the highest in Class 1 and reducing as the classes increase. The R^2 of the entire sample is higher, which indicates that cash flows do play an important role in financially constrained times for firms.

The results of the regression can be found in Appendix B, Table 3. In the following sub-interval, 2003-2008, the economy is rebounding before the Great Recession in 2007. The R^2 of the entire sample falls significantly to just 6.14%, compared to 25.98% in the prior period. Interestingly, the R^2 for Class 2 goes up during this period. As this is a period of increased investment, in a less constrained economic environment, the coefficients on CF/K are considerably lower for all classes apart from Class 2. This follows the theory as firms would depend less on cash flows during less constrained times. That being said, the R^2 in this sample is the lowest of all the regressions, indicating that in times of economic boom, investment-cash flow sensitivity does not prove as vital for investing decisions. This should be reversed in the following period.

The results of the regression can be found in Appendix B, Table 4. As expected, the R^2 of the sample goes up to nearly the same as the period 1998-2003 (25.01%). This proves to be no surprise as the Great Recession and the slow recovery happens at this time. The coefficients for CF/K are higher for every Class compared to the previous period. This follows the idea that firms are more constrained during recessions. A significant difference is observed between the coefficients in recession and non-recession time.

Another point of interest is the variable q. While it is being used as a proxy for investment opportunity, the coefficient on all of the regressions is negative. In many cases, it is statistically significant up to 1%. The coefficient is even lower during the non-recession period of 2003-2008.

The following section highlights my conclusions based on the above results.

5. Conclusions

The results of the tests applied based on the FHP [1987] came out largely as expected. During recessions, it is safe to say that cash flows have a large impact on investments, especially in Class 1 firms. The most financially constrained group should be the most likely to base its investment decisions on the available internal funds and this is seen in the results of the test. Class 3 firms have very low coefficients during the entire sample, only marginally higher during recessions, thus, the least financially constrained firms, depend the least on cash flows in order to make investment decisions. Even during recession time, the R^2 on the Class 3 variables is never higher than 3.57%. Comparing this to the 35% and 32% that the Class 1 variables have during recessions, it is clear that Class 3 firms who pay out high dividends, are far less affected by cash flows when considering investments. It is also interesting to note that cash flows influence on investment decreases dramatically during periods of investment. The R^2 for the entire sample during 2003-2008 is 6.14%, compared to 25.98% during 1998-2003 and 25.01% during 2008-2013. This might be due to the fact that debt and equity are easier to raise in periods of investment, and firms are far less dependent on internal funds during economic boom.

When considering all four regression tables, it is clear that investment-cash flow sensitivity goes some way in explaining the investing decisions of Class 1 firms. This affect is diluted for Class 2 firms and further diluted for Class 3 firms. What does this say about the wedge between internal and external finance? I believe that it follows the logic of FHP [1987] in that Class 1 firms face the highest difference between internal and external capital, especially during recession time. It is interesting to note that the

importance of internal funds reduces dramatically in non-recession periods. Even though internal funds are evidently vital for Class 1 firms during recessions, this effect reduces dramatically in the period 2003-2008. At this time, the coefficient on Class 1 firms for CF/K is not significantly different from those in Class 2.

The coefficients I got as a result are far lower than those observed by FHP [1987] particularly in Class 2 and 3 firms. This may indicate the falling importance of cash flows as a method of funding corporate investments. As the paper is nearly three decades old, it suggests that the market over time has improved considerably. Even Class 1 firms in my sample, have far lower investment-cash flow sensitivity than the corresponding firms in FHP [1987]. Even Class 1 firms are less dependent on internal funds than they were thirty years ago. This indicates the growth and development of the market during this time. This holds true even during the Great Recession of 2007-2008, largely seen as the worst economic downturn since the Great Depression. In fact, the results for both the recession periods were similar. One would assume that the recession of 2007-2008 and the subsequent recovery should have a far larger impact on investment-cash flow sensitivity among constrained firms than the recession of 2001-2002. However, this is not what I have observed. This could be due to the fact that my model does not take into account the intensity of these recessions or that firms are more capable of coping without internal funds today.

Another point of note is the largely negative coefficient on q, with up to 1% significance in many cases. One possible explanation is that firms forgo present investments in order to invest in the future. Firms that plan huge projects in the future

would be more likely to keep a cash buffer against the risk of the investment. Also, the q value was not significantly different between the classes. This may indicate that q is a poor proxy for investment possibilities.

In conclusion, my paper's results and conclusions largely align with FHP [1987] for the whole sample and the recession periods. I would say that internal funds go a long way in deciding investment choices among the more constrained firms. However, the extreme fall of importance of internal funds during 2003-2008 show that cash flows, while important, do not tell the complete picture of financing decisions. When considering topics for future study, it is vital to consider other measures of financial constraint. While dividend payout ratio was consistent with the results found in this paper and FHP [1987], there may be other ways to measure financial constraint, Also, it is increasingly obvious, that investment-cash flow sensitivity, while a good measure, cannot be the only criteria by which constrained firms choose to spend their funds. It would be interesting to consider other possibilities, especially among unconstrained firms that may lead to firms' choice between internal and external finance.

Bibliography

Fazzari, Steven, R. Glenn Hubbard, and Bruce C. Petersen. "Financing constraints and corporate investment." (1987).

Kaplan, Steven N., and Luigi Zingales. *Investment-cash flow sensitivities are not valid measures of financing constraints*. No. w7659. National bureau of economic research, 2000.

Fazzari, Steven M., R. Glenn Hubbard, and Bruce C. Petersen. "Investment-cash flow sensitivities are useful: A comment on Kaplan and Zingales."*Quarterly Journal of Economics* (2000): 695-705.

Gilchrist, Simon, and Charles P. Himmelberg. "Evidence on the role of cash flow for investment." *Journal of monetary Economics* 36.3 (1995): 541-572.

Bureau of Labor Statistics, BLS Spotlight on Statistics: The Recession of 2007-2009. http://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf

Almeida, Heitor, and Murillo Campello. "Financial constraints, asset tangibility, and corporate investment." *Review of Financial Studies* 20.5 (2007): 1429-1460.

Tobin, James. "A general equilibrium approach to monetary theory." *Journal of money, credit and banking* 1.1 (1969): 15-29.

Appendix A

Summary Statistics

This table provides the basic summary statistics for the divisions I make on the basis of the dividend payout ratio. The Sample Size refers to the number of firms in each division. Debt/Capital Ratio refers to the average Debt/Capital Stock ratio of all the firms within the class. The median value is also displayed. Capital Stock/Assets is the average value of Capital Stock/Assets of all the firms within the class. The median value is also displayed. Tobin's q refers to the average value of the q variable of all the firms within the class.

Divisions	**Sample Size**	**Debt/Capital**	**Capital Stock/Assets**	**Tobin's q**
Class 1	518	39.08%	50.44%	2.08
Median		15.85%	55.35%	
Class 2	106	39.72%	57.30%	2.3
Median		12.59%	57.90%	
Class 3	414	14.90%	53.34%	2.15
Median		19.88%	55.34%	
Total	1038			

Appendix B

Regression Tables

The follow is a key to all the regression tables:

The dependent variable for all the regressions is I/K, which is investment weighted by the replacement value of capital stock. The independent variables are q and C/K. The sample size denotes the number of firms in the sample. The coefficient of the independent variable is given on the top row. *, ** and *** denote indicate significance at 10%,5% and 1% respectively. The heteroskedasticity-robust standard errors are given in parentheses.

Table 1

1998-2013

Group	Sample Size	q	C/K	R^2
Class 1	518	-0.0014868	0.3763752***	30.33%
		(0.0016007)	(0.0070125)	
Class 2	106	-0.01976***	0.114671***	8.43%
		(0.0037158)	(0.0144592)	
Class 3	414	-0.007163***	0.0719661***	2.06%
		(0.0012507)	(0.0148068)	
Total	1038	-0.0028286*	0.3422981***	22.26%
		(0.0010232)	(0.0052985)	

Table 2

1998-2003

Group	Sample Size	q	C/K	R^2
Class 1	353	-0.0023066	0.5351715***	35.64%
		(0.001888)	(0.0158196)	
Class 2	90	-0.0208728***	0.0382134***	7.35%
		(0.0048475)	(0.0427787)	
Class 3	347	-0.0050525***	0.0562792***	2.72%
		(0.0012247)	(0.0248056)	
Total	790	-0.0026876	0.4798302***	25.98%
		(0.0011521)	(0.0115842)	

Table 3

2003-2008

Group	Sample Size	q	C/K	R^2
Class 1	410	-0.0216526***	0.1622688***	7.04%
		(0.0039311)	(0 .0149445)	
Class 2	98	-0.0297343***	0.1686028***	17.28%
		(0.0070172)	0.0200194	
Class 3	376	-0.0355662	0.013762***	3.57%
		(0.0059242)	(0.0329882)	
Total	884	-0.0240996***	0.1565399***	6.14%
		(0.0029765)	(0.0112201)	

Table 4

2008-2013

Group	Sample Size	q	C/K	R^2
Class 1	491	-0.0136773	0.3582456***	32.48%
		(0.0066808)	(0.0087159)	
Class 2	102	-0.0203832**	0.1651259***	12.37%
		(0.0080525)	(0.0186698)	
Class 3	374	-0.0319487***	0.030934***	3.38%
		(0.0043917)	(0.0230167)	
Total	967	-0.0161372***	0.3385171***	25.01%
		(0.0046011)	(0.0072624)	