Econometric Analysis of Investment and Internal Finance under Asymmetric Information: A Case Study of Manufacturing companies of Pakistan

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Abstract: The current research investigates Econometric Analysis of Investment and Internal Finance under Asymmetric Information: A Case Study of Manufacturing companies of Pakistan. This study also aims to explore the relationship between internal finance and corporate investment outlays of Pakistani manufacturing firms in the presence of asymmetric information in the capital market. The fixed effect model has been employed on a sample of conveniently selected 272 listed manufacturing firms (with 2720 observations) over the period 2001 to 2010. Two different proxies of asymmetric information (i.e. Firm size & age) are used. Based on each of these two measures the sample is split into two subsamples (i.e. Small & large size and young & old firms respectively). Firms with small size and young firms are facing the asymmetric information while the other two subsamples are not considered so. The results based on all of the two measures indicate that there is a statistically significant and positive relationship between investment and internal finance or the cash flows. The investment of those firms where there is asymmetric information (i.e. small size, and young firms) such firms are more sensitive to the changes in their internal finance.

Key words: Asymmetric information, Tobin's Q, manufacturing firms, internal finance, external finance.

Investment has been categorized by Baddeley (2003) into the following five groups i) investment in fixed assets[1] ii) investment in inventory[2] iii) residential investment[3] iv) intangible investment[4] v) financial investment[5]. In this study investment is referred to the investment in fixed assets like; machinery, plant and equipment etc.[6] Finance (capital funds or the resources of capital) is the basic need of the firms to make investments which they can raise through internal as well as external sources. For this purpose firms make their financing decisions on the basis of their relative capital structure. ButModigliani & Miller (1958), in their theorem (Well-known Irrelevance Theorem)[7] state that in a capital market

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[1] An investment that is made in physical fixed assets like plant, machinery and equipment etc

[2] It is referred to as the investment in working capital

[3] It is the investment that is made in housing

[4] It means the investment in non-physical assets like goodwill, investment in human capital

[5] Investment in financial assets like shares, bonds etc of the firms

[6] A large number of researchers have taken investment as investment in fixed assets. Some researchers use gross fixed assets and the others use net fixed assets. For further details refer to Fazzari et al(1988), Cleary et al., (2007), Kaplan and Zingales (1997),AsliAscioglu, Shantaram and John B. McDermott, (2007) etc.

[7] Equity, debt and retained earnings, as financing sources of investment are assumed to be equivalent to each another. No transaction costs have to be born with respect to the trading of shares in the securities market. There is no difference

without imperfections, firm'sinvesting decisions are independent of their respective capital structures. Thiswell known theorem is based on the assumptions of frictionless capital market[8]. They argued that external and internal funds are perfect substitutes of each other which subsequently equalize the marginal cost of finance with the opportunity cost of capital to the shareholder. Under these assumptions of frictionless capital market so far, no significant relationship has been predicted between investment expenditure and availability of cash flows. They say that sole condition for the investment to take place is that it should have the potential to realize the positive NPV[9]. It has never been conditioned with the availability of cash flows. Jorgenson (1967) and his proponents also argued that investment decisions of the firms are driven by the cost of their own capital. These types of assumptions and the existence of such ideal types of markets which are almost impossible to exist in the real world are challenged by the pioneering research of (Myers & Majluf, 1984). They held that frictionless capital markets are not found in the real world, some sort of friction or imperfection (like agency problem, asymmetric information, credit rationing etc) is always present in the market. Therefore, they give convincible theoretical arguments as well as clear empirical evidence that in the presence of asymmetric information in the market, internal finance can play a far more important role than external finance in the process of making investment decisions. Thus both cannot perfectly substitute each other as their studies conclude that information asymmetry makes external finance more costly as compared to internal finance.

Literature Review

Hu & Schiantarelli(1998) provide strong evidence in this respect, according to them asymmetric information gives rise to the agency cost; this cost induces the outside providers of capital to demand premium on new stock of equity or debt to be issued. In this way the cost of external finance exceeds the cost of internal finance so; both (i.e. internal finance and external finance) cannot be held perfect substitutes of each other.

After this very important work, firm's internal funds or the cash flows are believed to be of pivotal importance for the firm while making its investing decisions under the presence of asymmetric.

According to a research carried on by Lamount(1997) in USA over the period 1987 to 1991 over seventy five percent of the total investment expenditures of manufacturing firmsin some developed economies of the world like US come from their own internal sources. Why internal finance or the cash flows of firms have got the status of most important factor upon which the investment expenditures of the firms depend? Over the period of about thirty years or so; it has been the central point of a very intense, interesting and productive debate among many researchers whether the availability of finance is an important factor determining the financing constraints being faced by the firms or not. The purpose of this debate is to explore the nature of (i.e. whether a statistically significant and positive relationship or the negative relationship) relationship between a firm's cash flows and its investment.

The literature provides mainly two basic reasons to justify this dependence of investment upon the streams of internal finance available to the firms. First of these two rationales is Pecking Order hypothesis presented by (Myers & Majluf, 1984) and the second one is (Jensen, 1986)hypothesis of free cash flow[10]. The pecking order hypothesis states that there is great discrepancy of information among the insiders of the firm (i.e. managers, executive directors and informed investors) and the outside investors who are not well informed about the real value of the firm as well as the reality of investment opportunities available to the firm. The informed insiders, with the intention to transfer wealth from new uninformed investors issue new stocks. On the other side the uninformed investors perceive that the stock being issued by firm is overpriced. Due to this asymmetry of information among insiders and investors the adverse selection problem occurs and because of this problem the investors demand premium (i.e. the risk premium) from the firm. In this manner the cost of external finance exceeds than that of internal finance.

When the external finance becomes costly then firms have to rely on the internal sources of funds to avail the investment opportunity. This creates financing hurdles for those firms which do not possess sufficient funds to meet their investment expenditures thus, most of the time such firms are forced to give up some investment projects that really carry positive net present value because of higher cost of external capital.They also conclude that in a situation where the internal cash

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between lending and borrowing rates. Each firm has equal and free access to capital market. There is no taxation and

bankruptcy costs in the market.

[8] A market that is free of asymmetric information, taxes and bankruptcy cost etc.

[9] NPV= Net present value (i.e. present value of cash inflows less present value of cash out flows).

[10] Free cash flows: According to Jensen free cash flow means the residual cash flows after availing all those

investment opportunities that have positive net present value.

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flows cannot meet the needs of financing productive investment opportunities and the firms have exhausted their full capacity of issuing low risk debts, then they would prefer to give up investment projects even with positive net present value instead of financing it by issuing risky securities.

From the above discussion it may easily be concluded that asymmetric information give rise to the adverse selection problem which consequently becomes the reason of underinvestment. There is a way (only for some firms not for all) that may help come out of this problem, that is; the availability of immense financial slack[11] with the firms.But firms would have to deprive the existing shareholders of the dividends in order to build this slack.

The second hypothesis (free cash flow hypothesis) is particularly associated with those firms in which the corporate governance mechanisms are not much effective to protect the rights of shareholders (i.e. shareholders have no control over financial and non-financial decisions of the firm). In this situation the managers of those firms which possess abundance of internal funds, for their own personal objectives[12] makes overinvestment even in the projects with negative net present value. This type of behaviorof managers is termed as managerial discretion[13]. It may be concluded here that the managerial discretion problem leads towards the overinvestment.

In 1988, a spirited debate commenced (and is yet going on) specifically between two schools of thought; (Fazzari, Hubbard, & Petersen, 1988), and (Kaplan & Zingales, 1997) and their followers[14]. In many of these studies internal finance or the cash flows have been used as the measure of firm's financing constraints and consequently to explore the sensitivity of investment to the fluctuation in its cash flows. Some of the researchers like Fazzariet al.(1988)consider this sensitivity as a valid measure of financing constraints (they employed dividend-payout ratios as a measure of financing constraints and disentangled the constrained firms (i.e. paying low dividends) from unconstrained firms (i.e. paying higher dividends). Their studies further explored that the firms which are labeled as constrained firms on the basis of low dividend payouts have to confront with greater wedge between the cost of internal (i.e. retained earnings plus non-cash expenses or net income plus depreciation or any other proxy used for internal finance) & external finance (i.e. both debt and equity) in the form of interest expense, contract cost and premium on issue of new securities. Then they conclude that sensitivity of investment outlays of the firms to their cash flows is higher in more constrained firms (i.e. firms which pay low or no dividends) and lower in least constrained firms (i.e. firms with higher dividend payouts).

Similarly, Shin & Park (1999) also conducted a research to study the investment behavior of Korean listed firms and derived the results in support of (Fazzari, Hubbard, & Petersen, 1988). Love(2001) also obtained the similar results that of FHP but he employed the Euler equation to measure investment opportunity.

But Kaplan & Zingales(1997) do not agree with their views and criticize with strong theoretical arguments as well as empirical evidence. The results of their studies suggest that sensitivity of investment spending to cash flows changes is higher for those firms which have are facing less financial hurdles and vice versa. The basic reason for their contrasting results is the employment of different parameters to disentangle between the firms. Kadapakkam et al.(1998) also supports the KZ point of view.

Kholdy & Sohrabian(2001), on the basis of the value of assets categorized firms as small, medium and large[15] and concluded that the investment expenditures of small firms are not influenced by their internal funds instead it depends upon their access to the external credit market. But their borrowing ability is determined by the size of their cash flows. Medium size firms do not respond to the fluctuations in internal cash flows so is the nature of their borrowing ability. So far as the investment of large size firms is concerned, it responds to the cash flow changes but their borrowing power is independent of the level of their internal funds. Islam (2002)examines the relationship between sensitivity of investment

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[11]Stocks of marketable securities, cash or ability of the firm to issue default-risk-free debt, firms may raise slack through retaining the incomes (i.e. not paying dividends) or through the issue of new stock.

[12] Managers make overinvestment in order to expand the size of the business and pretend to exhibit a higher performance of the firm. The objective behind this effort is their promotion, bonus etc.

[13] For further detail of managerial discretion problem see: Investment and internal finance: Asymmetric information or managerial discretion   By (Hans Degryse& Abe De Jong, 2005)

[14]Poterba (1988), Calomiris et al., (1995), Bernanke et al., (1996), KaplanandZingales(1997, 2000), Cleary (1999),EricksonandWhited (2000), Allayannis&Mozumdar(2004), Cleary et al., (2007), Almeidaetal. (2004) , Alti(2003) and Bushmanetal(2008)

[15]The firms are categorized on the value of their assets (in millions of dollars) as Small firms= ($25-$50), Medium size firms= ($100-$250), Large size firms= ($1000 & above)

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spending to cash flows and financial development in thirty countries over the period of ten years and concludes that investment of the companies of less developed countries exhibit higher sensitivity to changes in their internal funds.

Another study by Guariglia (2008) also yields the similar results as (Kholdy & Sohrabian, 2001). Some studies also found a monotonically[16] positive relationship between investment expenditures and internal funds.[17]Research conducted by Cleary et al.(2007)found a nonlinear relationship between internal finance (cash flows) and investment. They empirically proved that investment expenditures of the firms are U-shaped functions of their internal funds. Investment of those firms which have very small internal funds increases in response to further reduction in their internal funds. In another study Wan & Zhu(2011) testing the validity of sensitivity of investment spending to a firm's cash flows as a tool to gauge financing constraints found that   Almeida & Campello(2007) state that internal and external sources of capital are the perfect substitutes of each other in case of unconstrained firms.

That is why; the investment of firms largely depends upon the availability of internal finance in the presence of asymmetric information in the market. Such dependence of investment on internal finance makes investment of firms more sensitive to the fluctuations in its internal funds. Currently many research scholars having their specialties in the area of corporate finance have been interested to study this relationship. Some researchers consider this relationship to be positive and the others say there is negative relationship between the two. According to the studies conducted by Clearyet al.(2007), there is U-shaped relationship between investment and internal funds of the firm i.e. a decrease in internal funds may increase investment, decrease investment or does not change the investment. Fazzariet al.(1988) classified firms as constrained and unconstrained firms on the basis of dividend payout ratio (i.e. firms with high dividend payouts as least constrained and those with low dividend payouts as most constrained firms) and concluded that financial factors like cash flows and interest expenseFazzariet al.(1988)used cash balances of the firm (higher the balance, the severe the constraints and vice versa)[18] and argued that investment of financially constrained firms is more sensitive to changes in their cash flows as compared to the firms that are unconstrained. They justify their claim by arguing that in the presence of asymmetric information, external financing becomes more costly than internal financing, therefore investment depends heavily on internal finance and thus shows more responsiveness to changes in cash flows. Imagine how difficult it would be for firms to even think for investment, if they have totally consumed their internal funds that are cheaper as compared to the external funds. They further argued that the relationship between investment and financing constraints varies from firm to firm based on their types. Summing up they stressed that investment-cash flow sensitivity is a good and valid gauge of financing constraints of firms. Following the findings of the study of Fazzariet al.(1988) and Hovakimian & Hovakimian, (2007) also argue that investment-cash flow sensitivity is a valid measure of financing constraints for the firms. By looking at the other side of the picture, it is found that the literature contains a very logical and convincible criticism on the theoretical views and empirical findings of (Fazzari, Hubbard, & Petersen, 1988), and their proponents. The most remarkable critics are Kaplan & Zingales, (1997) who challenged the results produced by (Fazzari, Hubbard, & Petersen, 1988) and argued that investment-cash flow sensitivity is not a valid measure of financing constraints for firms. They considered the dividend policy as a choice variable and classified firm on the basis of availability of funds. They classified firms as likely constrained and never constrained on the basis of their access to funds for financing their investment (i.e. firms without access or lesser access to funds required to finance their investment are likely constrained and those with access to funds as never constrained). They concluded that the investment cash flow sensitivity of never constrained firms is higher than those which are likely constrained.

Data and Methodology

This section describes the data collection process and the major sources from where data has been obtained. It also includes the introduction and the definition of various variables included in the model being used in this study.

3.1   DATA

Our model includes the data set fixed assets investment, internal finance, sales and Tobin`s Q. The study sample comprises 2,720 annual observations of 272 (out of 411) manufacturing companies listed in Karachi stock exchange in Pakistan between, 2001 to 2010.The sample account for 66 percent of relevant population of listed manufacturing companies in Karachi stock exchange. The sample comprises of all sectors of manufacturing companies in Karachi stock

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[16] Monotonic relationship means a relationship where investment increases or decreases at the same rate and in the same direction as cash flows.

[17]See D. Fishman (2000), H.Moore (1998), Bolton and Scharfstein (1990), Calomiris and Hubbard (1990), Bernanke and Gertler (1989)).

[18] Higher balances imply that the firms do not pay dividend and retain all of their income. This non-payment of dividend (inability to pay) is perceived by Fazzari et al. as financial constraint to the firm

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exchange. The sample includes all manufacturing companies listed in Karachi stock exchange other than delisted, acquisitioned and merged. The data of all variables is taken from the balance sheet analysis of state bank of Pakistan, however data for market value of equity used in Tobin`s Q, is taken from the business recorderand the data of firms age is taken from kse.

3.2   VARIABLES CONSTRUCTION

All the variables included in the construction of the model are defined below and the rationale of their inclusion in the model is given here as well.

3.2.1 Investment

Many studies have so far been conducted to explore the relationship of internal finance with investment outlays of the firm. Although the left hand side variable (i.e. investment) is taken in the same meanings but it has not been measured in the similar way by all the researchers. Some of the researchers have taken investment as gross[19] investment while the others have used it as net[20] investment. For instance (Fazzari & Athey, 1987), (Cleary, Povel, & Raith, 2007), (Athey & Reeser, 2000) has used gross investment while (Ascioglu, Hegde, & B, 2007); Investment is defined as the change in the book value of fixed assets tangible plus depreciation scaled by beginning of year book value of fixed assets tangible.

3.2.2 Internal finance

Fazzariet al.(1988) argued that if capital markets were imperfect and investment opportunities were properly controlled, there would be a positive relation between internally generated internal finance and investment. Chenet al.(2007) suggest that a company`s internal finance has a significant impact on investment, and adequate internal finance are the basis of the investment activities. Referring to their methodologies, internal finance is included in interactional item with asymmetric and symmetric information to examine the investment and internal finance relationship. Internal finance taken in this study has been proxied by cash flows which are calculated as the summation of net profit and depreciation.

3.2.3 Tobin`s Q

Tobin's Q or the Q ratio is based on the work of James Tobin. Basically Tobin's Q was designed as a measure of performance of the firm. Tobin suggested that a fairly priced company must to have a price equal to its total asset value. Thus, when Tobin's Q ratio is less than one, it means that the market value of the company is less than the total asset value, indicating that it is undervalued. Similarly, when it is more than one, it indicates that the market value is higher than the total asset value and that the company might be overvalued. It was originally formulated by Tobin as the ratio of market capitalization of the firm (i.e. the product of number of shares outstanding and the market value per share) to current replacement cost of the stock of capital. But the same has not been employed in this study because in Pakistan replacement value of assets is not available. I measure the Tobin's q by using market value of equity plus book value of debt (long term debt plus short term debt) to book value of total assets.

3.2.4 Sales

Sales are taken as one period lagged value and is scaled by opening of the period book value of fixed assets. I include the net sales to control for accelerator effects. Accelerator effects mean firms invest in response to growing demand of output and not the level of output.

3.3   Empirical Specification

The sensitivity of investment outlays to the changes in internal finance is employed by many researchers as a measure to gauge the intensity of asymmetric information, after investment opportunity and sales is controlled. Coefficient of internal finance should not be significant whereas the coefficient of Q should be significant in perfect capital market. Reasons for

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[19] Some authors have defined gross investment as change in the book value of gross fixed assets plus retirements of gross fixed assets

[20] Net investment has been defined as investment as change in the book value of fixed assets minus retirements of fixed assets

positive and significant coefficients for internal finance are considered to have roots in asymmetric information. Asymmetric information will render the capital costly and limit access to it in external capital market (Kadapakkam, Kumar, & Riddick, 1998). As a consequence of asymmetric information, firms have to resort to internal finance instead of external when they need investment (Hovakimian & Hovakimian, 2007). On the other hand, symmetric information helps the firms to enjoy unrestrictive access to external finance and as a result their financing costs are reduced. They are not limited to internal finance to meet their financial needs. Therefore our hypothesis will be: firms facing asymmetric information will have greater sensitivity for internal finance than firms facing symmetric information. To test this hypothesis, we divided the firms in our sample into two groups. As a result, investment model is defined under a linear model to determine cash flow sensitivity of investment under asymmetric and symmetric information.

Based on the above given sound arguments from the corporate investment literature, the basic model to test the relationship between the investment and internal finance of the firm is as follows;

$$\frac{I_{it}}{K_{it-1}} = \alpha_i + \beta_1 Q_{it} + \beta_2 \frac{Sales}{K_{it-1}} + \beta_3 \frac{INFIN_{it}}{K_{it-1}} + \mu_i + \tau_t + \varepsilon_{it}$$

The other control variableis sale. Salesare taken as one period lagged value and is scaled by opening of the period book value of fixed assets. The notation μ_i represents firm fixed effect and the notation τ_t denotes the time fixed effect. The established model has been tested (Athey & Reeser, 2000).The data definitions are according to (Kaplan & Zingales, 1997).

3.4   Fixed Effect Model

Fixed effects estimation is a method of estimating parameters from a panel data set. The fixed effects estimator is obtained by OLS on the deviations from the means of each unit or time period. This approach is relevant when one expects that the averages of the dependent variable will be different for each cross-section unit, or each time period, but the variance of the errors will not.

Ho: Constant is Common (Pooled OLS)

H1: Constant is not Common (Fixed/Random)

First of all assume that the constants are different across the cross-section then used the fixed effect model. The results of F-Statistics are as follows:

Test statistic: $F(271, 2446) = 1.42781$

With p-value = P (F (271, 2446) > 1.42781) = 1.67768e-005

 From the output of fixed effect model it is noticed that the null hypothesis is rejected, because the F-Statistics of fixed effect model shows that the intercept is different across-cross section which implies that the pooled OLS is not the appropriate techniques to follow.

Then another criterion is tried in order to get the complete authentication of the rejection of the pooled OLS which is the introduction of least square dummy variables in to the model. The results show that nine out of two hundred and seventy one dummies are significant which also indicate that the null hypothesis should be rejected which consequently reject the application of pooled OLS. The results of the least square dummy variables recommend that either fixed or random effect model will be applied.

Finally, fixed effect model or random effect model is best fit explain the data against the pooled OLS. For this purpose used the Hausman test to differentiate whether the fixed effect or random effect model is better the results:

Ho = Random effects model is consistent

H1= Random effects model is not consistent

Hausman test statistic:

 H = 15.7814 with p-value = prob(chi-square(2) > 15.7814) = 0.000374203

(A low p-value counts against the null hypothesis that the random effects

Model is consistent, in favor of the fixed effects model.)

The P-Value of Hausman test statistics is significant; this shows that the null hypothesis is rejected in the favor of fixed effect model.

3.5   SEPERATION CRITERIA OF FIRMS FACING INFORMATIONASYMMETRY

Two commonly used measures of asymmetric information are employed in this study and these measures (proxies) include firm size and the age of the firm.

Firm size

Information asymmetry effect is less intensive on larger firms as their disclosure policies are transparent and comprehensive, and they are well researched by the internal and external analysts so information about such firms is reasonably well known in the market (Diamond & Verrecchia,1991; Harris, 1994;Ozkan, 2004). In another studies, Kadapakkamet al.(1998) and Arslan-Ayaydinet al.(2006), they distinguish firms on the basis of firm size (is taken as natural log of book value of fixed assets). The firms are partitioned into two groups using the median value of size. If the firms size is greater than median is called larger size firms and other hand lesser than median is called smaller size firms. Crux of discussion is that information asymmetry is relatively higher in case of smaller firms. Hence, proxies for firm size have been used to measure information asymmetry.

Firm Age

Established reputation of older firms makes it easier for them to get access to external finance. Primarily because they have a longer history of relationships with creditors, it helps them to build a relationship of trust and creditworthiness. Firms are ranked on the basis of age. Firms having more than median are grouped as "not financially constrained" and firms having age less than median are classified as "financially constrained" firms (George, Kabir, & Qian, Investment - Cash Flow Sensitivity and Financing Constraints: New Evidence from Indian Business Group Firms , 2010).Thisstudy distinguishes firms on the basis of firm age. The firms are partitioned into two groups using the median value of age. If the firms age is lesser than median is called young firms and other hand greater than median is called old age firms. Hence, proxies for firm age have been used to measure information asymmetry. In this study find the investment and internal finance relationship with interaction terms of internal finance and dummy of age. Old age is one if age greater than median otherwise zero. Young age is one if age is smaller than median otherwise is zero.

RESULTS AND DISCUSSION

This chapter emphasis on the analysis of the collected data with different tools of econometrics to tested the developed research model. Before this the descriptive and correlation analysis has been done. Next, the established model has been tested with the help of fixed effect model.

Table 1

The descriptive statistics is used to present the quantitative analysis in a suitable manner. A large sample of data can be easily described by the descriptive statistics.

Variables	Investment	INFIN	Sales	Tobin's Q	Firm age	Size
Mean						
	0.3127	0.2222	5.0167	1.2752	2.9836	7.0159
Median	0.0952	0.1137	1.9245	0.9836	2.9444	6.8872

S.D	1.6151	1.5820	20.2239	1.3347	0.0104	1.6432
Minimum	-11.25	-15.6139	0	0.0595	0	0.0953
Maximum	58.6777	51.6667	603.875	39.6139	4.1271	12.2456

The descriptive statistics table 1 is showing the descriptive statistics of all the variables. This table consists of Mean values, Median values, Standard deviation values, Minimum and the Maximum values. The sample size has taken of the all the variables collectively including dependent and independent variables. Investment is taken as dependent variable while internal finance, Tobin's q, age, size (the natural log taken of the firms total assets), and sales are taken as independent variables. The sample space consists of 2720 observations from the period of 2001-2010.

Table 2

Correlations among variables

This table presents correlation coefficient among the dependent and independent variables of all models.

	Investment	Tobin`sQ	Sales	INFIN*LSIZE	INFIN*SSIZE	INFIN*YF(D)	INFIN*OF(D)
Investment	1						
Tobin`s Q	0.094	1					
Sales	0.015	0.165	1				
INFIN*LSIZE	0.031	0.019	0.028	1			
INFIN*SSIZE	0.240	0.137	0.413	-0.002	1		
INFIN*YF(D)	0.309	0.148	0.479	0.028	0.776	1	
INFIN*OF(D)	0.011	-0.001	-0.038	0.054	0.177	-0.015	1

In table 2, correlation matrix discloses the important relationships among the independent variables (Tobin's Q, Sales, INFIN*LSIZE, INFIN*SSIZE, INFIN*YF (D), INFIN*OF (D)) and dependent variable investment. The correlation matrix shows that the relationships among variables are in line with the theory. The table shows that the correlation between investment and internal finance under asymmetric information is stronger than the symmetric information.

Regression Results

Investment and internal finance under small and large size (Small size is the proxy of asymmetric information):

Information asymmetry effect is less intensive on larger firms as their disclosure policies are transparent and comprehensive, and they are well researched by the internal and external analysts so information about such firms is reasonably well known in the market (Diamond & Verrecchia,1991; Harris, 1994; Ozkan, 2004). In another studies, Kadapakkamet al.(1998) and Arslanet al.(2006),they distinguish firms on the basis of firm size (is taken as natural log of book value of fixed assets). The firms are partitioned into two groups using the median value of size. If the firms size is greater than median is called larger size firms and other hand lesser than median is called smaller size firms. Crux of

discussion is that information asymmetry is relatively higher in case of smaller firms. Hence, proxies for firm size have been used to measure information asymmetry.

Investment and internal finance under small size

$$\frac{I_{it}}{K_{it-1}} = \alpha_i + \beta_1 Q_{it} + \beta_2 \frac{Sales}{K_{it-1}} + \beta_3 \frac{INFIN_{it}}{K_{it-1}} * Smallsize_{(D)} + \mu_i + \tau_t + \varepsilon_{it}$$

The other control variables are sales and change in working capital. Sales are taken as one period lagged value and is scaled by opening of the period book value of fixed assets.The notation μ_i represents firm fixed effect and the notation τ_t denotes the time fixed effect. The investment and internal finance relationship with interaction term of internal finance and dummy of size. Small size dummy is one if size is lower than the median of the size otherwise zero.

Table 3

Regression output of fixed effect model under small size

Variables	Coefficient	t-ratio	p-value
Tobin's Q	0.1442	4.6021	0.0000***
Sales	-.0098	-4.6204	0.0000***
INFIN*SSIZE(D)	0.2589	11.8801	0.0000***
R-squared	0.1994	**P-value(F)**	0.0000

Significant coefficients are indicated by * (10% level), ** (5%level), and *** (1%level).

The coefficient of q is positive and highly significant at the 1 per cent level of significance. This indicates that the investments of firms are sensitive to market valuation of their future growth prospects captured by q. Thus, an increase in q leads to an increase in corporate investment of firms. The variable Sales has a negative coefficient, and significant in small size. Such a negative significant relationship suggests a significant negative impact of the increasing supply on investment. The investment and internal finance relationship is captured by with interaction term of internal finance and small size dummy. The interaction coefficients of internal finance and small size dummy variable are positive and statistically significant.This result shows that investment of firms under asymmetric information significantly depend on internal finance.

Investment and internal finance under large size

$$\frac{I_{it}}{K_{it-1}} = \alpha_i + \beta_1 Q_{it} + \beta_2 \frac{Sales}{K_{it-1}} + \beta_3 \frac{INFIN_{it}}{K_{it-1}} * Largesize_{(D)} + \mu_i + \tau_t + \varepsilon_{it}$$

The other control variables are sales taken as one period lagged value and is scaled by opening of the period book value of fixed assets.The notation μ_i represents firm fixed effect and the notation τ_t denotes the time fixed effect. The investment and internal finance relationship with interaction term of internal finance and dummy of size. Large size dummy is one if size is lower than the median of the size otherwise zero.

Table 4

Regression results of fixed effect model under large size

Variables	Coefficient	t-ratio	p-value

Tobin's Q	0.1535	4.7635	0.0000***
Sales	-.0016	-0.7617	0.4463
INFIN*LSIZE(D)	0.0097	1.2469	0.2125
R-squared	0.1537	**P-value(F)**	0.0000

Significant coefficients are indicated by * (10% level), ** (5%level), and *** (1%level).

The coefficient of q is positive and highly significant at the 1 per cent level of significance. This indicates that the investments of firms are sensitive to market valuation of their future growth prospects captured by q. Thus, an increase in q leads to an increase in corporate investment of firms. The coefficients of sales are statistically insignificant.This shows that there is no significant relationship between sales and investment. The investment and internal finance relationship is captured by with interaction term of internal finance and large size dummy. The interaction coefficients of internal finance and large size dummy variable are statistically insignificant.This indicates that under symmetric information firm's investment does not depend on internal finance.

Overall results of investment and internal finance sensitivity under small and large size

In this study find the investment and internal finance relationship with interaction terms of internal finance and dummy of size. Small size is one if value of size smaller than median otherwise zero. Large size is one if size is greater than median otherwise is zero. Small size firm's investment is more sensitive to internal finance than large size firm's one. Sensitivity's coefficients are of 0.258937 and 0.00969138 for large and small size firms, respectively. Investment and internal finance sensitivities of small size is more positive and significant at 1% significance level. But the large size firms sensitivities of investment and internal finance is positive but empirically insignificant. This results shows that the asymmetric information firms investment is more dependent on internal finance. Gertler& Gilchrist (1994) and Gilchrist &Himmelberg (1995) demonstrate that small firms are more sensitive to internal finance than larger firms. Theoretical argument to support these empirical results is that small firms have lesser access to external finance. In another study Almeidaet al.(2004), Chang et al. (2006) say that smaller firms face more information asymmetry than large firms. Then the negative relationship exists between size and investment internal finance sensitivity. The result of this study consistent with the results of studies cited above.

Investment and internal finance under young and oldfirms (Youngfirms is the proxy of asymmetric information)

Established reputation of older firms makes it easier for them to get access to external finance. Primarily because they have a longer history of relationships with creditors, it helps them to build a relationship of trust and creditworthiness. Firms are ranked on the basis of age. Firms having more than median are grouped as "not financially constrained" and firms having age less than median are classified as "financially constrained" firms (George, Kabir, & Qian, Investment - Cash Flow Sensitivity and Financing Constraints: New Evidence from Indian Business Group Firms , 2010).This study distinguishes firms on the basis of firm age. The firms are partitioned into two groups using the median value of age. If the firms age is lesser than median is called young firms and other hand greater than median is called old age firms. Hence, proxies for firm age have been used to measure information asymmetry. In this study find the investment and internal finance relationship with interaction terms of internal finance and dummy of age. Old age is one if age greater than median otherwise zero. Young age is one if age is smaller than median otherwise is zero.

Investment and internal finance under young firms

$$\frac{I_{it}}{K_{it-1}} = \alpha_{oi} + \beta_1 Q_{it} + \beta_2 \frac{Sales}{K_{it-1}} + \beta_3 \frac{INFIN_{it}}{K_{it-1}} * YF_{(D)} + \mu_i + \tau_t + \varepsilon_{it}$$

The other control variables are sales taken as one period lagged value and is scaled by opening of the period book value of fixed assets.The notation μ_i represents firm fixed effect and the notation $\tau_t$denotes the time fixed effect. The investment and internal finance relationship with interaction term of internal finance and dummy of age.$YF_{(D)}$ (i.e. Young firms dummy) is one if age is lesser than the median of the age otherwise zero.

Table 5

Regression output of fixed effect model under young firms

Variables	Coefficient	t-ratio	p-value
Tobin's Q	0.0221	3.6490	0.0002***
Sales	0.0016	-8.7792	0.0000***
INFIN*YF(D)	0.0220	18.8055	0.0000***
R-squared	0.2267	**P-value(F)**	0.0000

Significant coefficients are indicated by * (10% level), ** (5%level), and *** (1%level).

The coefficient of q is positive and highly significant at the 1 per cent level of significance. This indicates that the investments of firms are sensitive to market valuation of their future growth prospects captured by q. Thus, an increase in q leads to an increase in corporate investment of firms. The coefficients of sales are statistically significant. The investment and internal finance relationship is captured by with interaction term of internal finance and young firms dummy. The interaction coefficients of internal finance and young firm's dummy variable are positive and statistically significant.This show that under asymmetric information the relationship of investment and internal finance is positive and significant.

Investment and internal finance under old firms

$$\frac{I_{it}}{K_{it-1}} = \alpha_{oi} + \beta_1 Q_{it} + \beta_2 \frac{Sales}{K_{it-1}} + \beta_3 \frac{INFIN_{it}}{K_{it-1}} * OF_{(D)} + \mu_i + \tau_t + \varepsilon_{it}$$

I_{it} stands for investment in machinery, plant, property and equipment for firm i during year t. It has been scaled by opening of period book value of fixed assets. K_{it-1} is the amount of book value of fixed assets tangible at the opening of period t. Q_{it} at the opening of year t controls for changes in demand of investment due to opportunities of investment. The other control variable issale. Sales are taken as one period lagged value and is scaled by opening of the period book value of fixed assets. The notation μ_i represents firm fixed effect and the notation τ_t denotes the time fixed effect. The investment and internal finance relationship with interaction term of internal finance and dummy of old firm. $OF_{(D)}$ (i.e. old firm dummy) is one if age is lower than the median of the age of firms otherwise zero.

Table 6

Regression output of fixed effect model under old firms

Variables	Coefficient	t-ratio	p-value
Tobin's Q	0.1136	4.8483	0.0000***
Sales	6.6E-06	0.0043	0.9965

| INFIN*OF(D) | 0.0371 | 0.6055 | 0.5449 |

| R-squared | 0.1221 | **P-value (F)** | 0.0000 |

Significant coefficients are indicated by * (10% level), ** (5%level), and *** (1%level).

The coefficient of q is positive and highly significant at the 1 per cent level of significance. This indicates that the investments of firms are sensitive to market valuation of their future growth prospects captured by q. Thus, an increase in q leads to an increase in corporate investment of firms. The variable Sales has a negative coefficient, and insignificant in small size. Such a negative insignificant relationship suggests ainsignificant negative impact of the increasing supply on investment. The investment and internal finance relationship is captured by interaction term of internal finance and old age firms dummy. The interaction coefficients of internal finance and old age firm's dummy variable are statistically insignificant. This shows that no significant relationship exists between internal finance and investment under symmetric information

Overall results of investment and internal finance sensitivity under young and old firms

This study aims at finding relationship between the investment and internal finance with interaction terms of internal finance and dummy of age. Young age firms is equal to one if agelesser than median otherwise zero. Old age firms is one if age is greater than median otherwise is zero. Young firm's investment is more sensitive to internal finance than old firms. Sensitivity coefficients of young firms are positive and highly significant. The sensitivity coefficient of old firms is positive and empirically insignificant. But the young firms' sensitivity of investment and internal finance is more positive and significant. This result shows that the investment of firms with asymmetric information problem is more dependent on internal finance. George, et al.(2010) explore the relationship of investment and internal finance under young and oldage firms and say that young firms face more difficulty in obtaining external finance from external capital market. Then the investment and internal finance sensitivity is more in young firms. Hovakimian(2005) says that there is higher investment-internal finance sensitivity under young firms. The result of this study is consistent with the above cited studies.

CONCLUSION AND RECOMMENDATIONS

CONCLUSION

The irrelevance theorem of Modigliani and Miller has given birth to a debate over the internal and external finance to be perfect substitutes of each other. As a result of this theorem so far, a number of models have been designed to study the behavior of investment in response to the availability of and cost associated with both internal and external capital in an imperfect capital market containing various types of frictions like, agency cost, asymmetric information etc. Most of these models have rejected the irrelevance theorem and proved that internal and external funds of the firm cannot be held as substitutes of each other and that the investment outlays of the firms are very much sensitive to the cost of external funds as well as the availability of internal funds. This study also tests this relationship in the Pakistani manufacturing firms listed at Karachi Stock Exchange while there is asymmetric information in the capital market.In order to test these hypotheses, the manufacturing firms of Pakistan are chosen from where 272 listed firms are selected. After applying the basic test on the data, the fixed effect model has been employed as it best suits the data being analyzed in the dissertation. The results derived from the fixed effect model are stable with the views of current researchers. The hypotheses are taken for this study all of two accepted which authenticate the interdependence of investment and internal finance. At the end it is concluded that the investment cash flow sensitivity of firms facing more severe financing constraints because of asymmetric information is more than those not facing such problems. Two different measures have been employed as the proxy for asymmetric information all of which reveal that there is positive and statistically significant relationship among investment outlays and the internal finance or the cash flows of the firm.

5.2   POLICY IMPLICATIONS AND RECOMMENDATIONS

This research is going to be very useful as recommendations can be given to investment and cash managing heads of the firms on the basis of this research whether to keep cash or disburse cash. This research could be beneficial for other research students of finance who would like to do research on this topic; it could provide further assistance to them.

The top managers of manufacturing companies can analyze and interpret their relation of cash flow and capital spending and they can use it to predict future. They can predict that if they want to increase investment then they have to increase their cash flow. They will also know that if cash flow decreases then investment also decreases.

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