An Empirical Study: Financial-Market Imperfections and Investment

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Abstract: Korean economy undergoes pre-modernized corporate governance. Financial-market imperfections assumed to be incorporated in equity ratio affect the sensitivity of internal funds to physical investment. Empirical analyses show that the effects of asymmetric information are significant. Theories predict that internal finance is less costly than borrowing or issuing equity. Higher cash flow from higher profits affects investment ratio. But, this marginal effect is decreased by equity ratio. If we assume that more imperfect financial market requires more equity than borrowing, we can see that agency costs change the way economic variables like cash flow affect physical investment. Cash flow plays two opposite roles for implementing investment. In the case of financial-imperfections, we can expect that firms with higher profits invest more. But, according to free cash flow hypothesis by Jensen (1986), managers with only a small ownership interest have an incentive for wasteful management. We can expect to see more wasteful activity in a firm with large cash flows. Our regression result shows that the former dominates the latter, so we get positive coefficient for cash flow variable on the physical investment.

Keywords: Financial-market imperfections; Cash flow; Physical investment.

JEL Classification: O51; J63

1. Introduction

1.1. Backgrounds

The traditional explanation for the goal of the corporation is the argument that managers make decisions for the shareholders. Agency problem is one element of contractual views of the firm(separation of management control and finance) (Schleifer and Vishny, 1997). Managerial discretion (opportunism) means the fact that managers behave against the interests of investors(shareholders). The set-of-contracts theory of the firm states that the firm may be viewed as a set of contracts (Jensen and Meckling, 1976).

One of the contracts is a residual claim (equity). This theory focuses on conflict between shareholders and entrepreneurs (managers). The costs of resolving the conflicts are agency costs. He presents one imaginery situation with regard to an investment projects. Project gives manager $10 of personal benefits, and costs investors $20 in foregone wealth. Jensen and Meckling (1976) says that manager undertakes that project resulting in ex post inefficiency.(Coase, 1960)[1]

Issues of ownership structure of firm discussed in academic field are: social responsibility of corporations, separation of ownership and control, and property rights (Alchian, 1968; Machlup, 1967). They also include the theory of how costs and rewards are allocated among participants in organization.(Coase, 1960)[2]

Firm theory discusses the effect of creation and issuance of debt and equity claims. This also analyze legal fictions, nexus for contracting relationships among individuals, and existence of divisible residual claims on assets and cash flows of organization which can be sold without permission. Coase (1937) emphasizes bounds of firm, and Alchian and Demsetz (1972) role of contracts as a vehicle for voluntary exchange.

In this study, we examine several hypotheses about the relationship between financial market and firm behavior empirically. We use panel data constructed from BOK (Bank of Korea) data from 2009 to 2014.

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[1] Coase theorem (1960) does not apply in this case. Managers' threats would violate legal "duty of loyalty" to shareholders. Incentive contracts coming from this problem take the forms of share ownership, stock options, and threat of dismissal.

[2] By Cause (1960) and Alchian and Demsetz(1972), numerous issues are treated; bearing agency costs, separation and control, debt and outside equity, and pareto optimality. Principal(shareholder) limits divergences from his interest by establishing incentives. Principal pays agent to expend resources(bonding costs) to guarantee. Agency costs include monitoring expenditures by principal, bonding expenditures by agent(residual loss). In addition, agency costs include those of both equity and debt. Therefore, agency costs occur from outside finance- equity and debt.

Fig 1 shows the trends of financial variables representing the decision of corporate finance in manufacturing sector of Korea.(BO: borrowing ratio, BOR: interest rate of borrowing, TR: growth rate of revenue, AS: growth rate of asset) Financial-market imperfections due to asymmetric information are detected by many ratios of variables in balance sheet. Fig 1 shows that, in boom period, retained earnings increase. We can expect that then firms can accumulate equity and this again reduce agency costs. This positive signal may affect investment decision of managers(entrepreneurs).
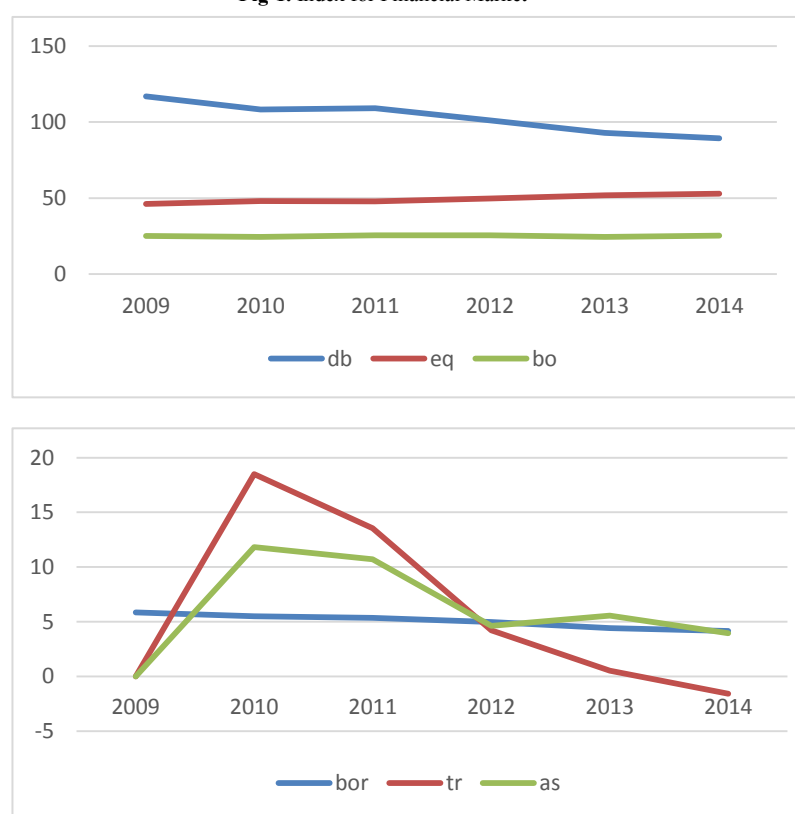
Table-A. Variables Used in Panel Regression

Equity Ratio	Current Asset Ratio	Debt Ratio
EQ	**CASH**	**DB**
Stock Price Index	Sales Growth	Investment(Ratio)
KOSPI	**GROW**	**I(IRATIO)**

	EQ	IRATIO	DB
Mean	49.39	30.45	102.91

Fig-1. Index for Financial Market

1.2. Motivation and Previous Literature

We can summarize issues related with physical investment effects of asymmetric information as follows.

Table-B. Index for Financial Market

(1) Financial-market Imperfections
Asymmetric information- Agency Costs-Agency Problems
(2) B/S Effect(Financial Accelerator)
Debt/Equity Composition Effect
Boom(or Recession)
– Retained Earnings – Equity(Debt) – Agency Costs – Physical Investment
(3) Asset Price Effect
Boom (or Recession)
– Price for Fixed Asset – Value of Collateralization – Physical Investment

We focus on several aspects of firms' behavior.

First, there occurs a principal-agent problem between investors(creditors) and firms(managers) due to asymmetric information. In this case, creditors request managers to increase the amount of equity. In special, in booms when retained earnings increase, firms increase investment expenditures since agency costs are declined. So, the magnitude (or ratio) of equity in B/C sheet plays a role as propagation mechanism, that is, financial accelerator.

(Bernanke and Gertler, 1989) Balance sheet effect can be divided into debt/capital effect (credit) and asset price change effect.(debit) With incomplete financial market, firms have constraints for outside finance due to asymmetric information. So, investment projects with positive net present value (NPV) may be discarded (Myers, 1977). The variations in B/C sheet items affect the investment behavior of firms under borrowing constraint. The optimal debt-equity ratio would be higher in a world with agency problem of equity than in one without.

Second, in reality, firms provide fixed assets such as realty as collateral, and borrows from financial intermediaries as much as loan to value (LTV) incorporating price risk of the assets. If the asset prices decrease due to quick freezing from recessions, firms reduce newly borrowing and the scale of investment. In this way, the change in asset prices affects business fluctuations and this mechanism is called- asset price change effect.

Third, cash flow plays two opposite roles for implementing investment. In the case of financial-imperfections, firms with higher profits imply less cost in internal finance. So, we can expect that these firms invest more. But, according to free cash flow hypothesis by Jensen (1986), managers with only a small ownership interest have an incentive for wasteful management. Grossman and Hart (1986) also model the role of debt in committing the payout of free cash flows to investors(creditors). We can expect to see more wasteful activity in a firm with large cash flows.

We test whether cash flow related with market imperfections increase physical investment or not.

Gordon and Malkiel (1981) performed an empirical study for the relevance of Modigliani-Miller (MM) theorem. MM argue that a firm can't change the total value of securities by changing capital structure. They used time-series data for average debt-equity ratio of the U.S. firms from 1957 to 1978. They interpreted the trend of stable ratio in the late 1970s as the positive correlation with the nominal interest rate. They also estimated welfare loss of the U.S. from taxation in 1975. The amount was about $ 3.2bilion, and this corresponds to 10% of corporate income tax revenue in 1975. Gordon and Lee (2001) argue that corporations with lower tax rates should use less debt. This is because the advantage of deducting interest from corporate taxable income is less when the tax rate is lower. Givoly et al. (1992) performed empirical study for the effects of tax on capital structure of firms. In 1986 Tax Reform, corporate tax rate was reduced, and incentives such as invest tax credit and discounting income tax rate for capital gains of retained earnings were reduced.

Fazzari et al. (1988) regressed investment on measures of the cost of capital and on cash flow- current revenues minus expenses and taxes. Their basic regression is a pooled time series-cross section of investment on the cash flow to the capital stock, an estimate of q, and dummy variables. Fama and French (2002) found the fact that empirical results are coincided with pecking order theory of Jensen and Meckling (1976). More profitable firms are less levered. Short term variation in investment and earnings is absorbed in debt.

2. Basic Model
2.1. Theoretical Model, Data and Estimation

Agency problem is element of a contractual view of the firm (separation of management from ownership). During the time period of 2008 financial crisis, we observed that the problem of asymmetric information became worse in recession. We can examine how this problem is related with behavior the macroeconomic variables.

Fazzari et al. (1988) present identifying the effect of financial constraint on differential sensitivity of physical investment to cash flow. But, Kaplan and Zingales (1997) argue that the theory makes no correct predictions about second derivatives of value and cost functions in using external funds, thus that the theory does not make predictions about differences in the sensitivity of investment. But, this is basically an empirical question that is tried in this study.

They consider a firm that has internal funds W. External funds have costs C(E). (E=I-W) F(I) is firm's value increasing with investment I. Costs function satisfies C'( )>r and C''( )>0. Firm value function satisfies F' ( )>0 and F''( )<0.

The firm chooses invest:

$$\text{Max(I): } F(I) - rW - C(I-W)$$

Fazzari, Hubbard and Peterson (1988) argue that investment is increasing in internal resources:
$dC/dW < 0$, $dI/dW > 0$

Theories of financial-market imperfections imply that external finance is costly. They therefore imply that firms with higher debt ratio facing financial restraints invest less.

If we assume an alternative specification C (I-W, α), where α is index of financial-market imperfections, we can ask how (dI/dW) varies with α. (Romer, 2006).This yields similar results with that of E(=I-W) theoretically. If we derive second derivative by second-order condition for (I, IRATIO) and implicit differentiation, we encounter F''' ( ) and C'''( ) that theory makes no clear predictions. For predicting about differences in the sensitivity of investment to financial-market imperfections, we can regress investment on interaction terms between external resources (eg. cash flow) and index of financial market. That is, we can test empirically by regressing investment (IN) on measures of market condition and use the interaction term between continuous variables. Financial market imperfections incorporated in debt ratio (DB) and equity ratio (EQ) create agency costs. So, they alter the impact of output growth and interest-rate movements on investment.

$$I_{it} = \alpha_{it} + \beta(EQt, DBt)(X)_{it} + \gamma X_{it} + \epsilon \qquad (1)$$

(I = IN, IRATIO)

In our regression, the effects of determinants of investment (X = profitability GROWTH, interest rate R) on investment are affected by financial market circumstances (DB, EQ, etc.). GROWTH denotes sales growth of each industry. Financial market imperfections imply that internal finance is less costly. Therefore, they imply that firms with higher profits invest more. We perform simple test for the effects of asymmetric information and the resulting agency problems. Romer (2006) find that when there is asymmetric information, investment depends on more than just interest rates and profitability. Investor's ability to monitor firms and firms' ability to finance also matter. We test whether asymmetric information changes how these factors affect investment.

Fazzari *et al.* (1988) regressed investment on cash flow (current revenues – expenses and taxes). In this study, such regression is based on industry-level panel data. We test the hypothesis that asymmetric information changes how interest rates and profitability affect investment. The interaction terms give information about how one quantitative(continuous) variable affects the magnitude of marginal effect of another quantitative variable.

$$IN_{it} = \alpha_{it} + \beta(R)(DB)_{it} + \gamma(DB)_{it} + \delta R_{it} + \epsilon \qquad (2)$$

$\frac{\partial \text{IN}}{\partial \text{R}} = \beta \text{ DB} + \delta$

If we assume that the estimate of β significant, these can support the significant effect of financial-market imperfections on the relationship between economic variables (eg. nominal interest R) and the behavior of physical investment.

2.2. Estimation Results and Discussion

We use panel data from BOK (Bank of Korea) from 2009 to 2014. The individual unit consists of 30 industries. We use least squares dummy variables (fixed effects) model, if the F-test rejects the null hypothsis that there is no behavioral differences for investment between industries. We use ''wide and short'' data sets so that we can account for industrial differences or heterogeneity.

The goals of the corporate firm from the contractual view of the firm (focusing on the separation of management from ownership) is to maximize shareholders' wealth. The costs of resolving the conflicts between managers and shareholders are called agency costs. Main motivation in this study is to analyze the effects of agency problem through financial-market imperfections on real sector such as physical investment.

Hypothesis 1: Financial-market imperfections incorporated in equity ratio increase the marginal sensitivity of internal funds to physical investment.

$$C_{W\alpha} > 0, F_{W\alpha} > 0, (\alpha = EQ)$$

According to pecking order theory of Jensen (1984), firms behave to the rule that they use internal funds. That is, profitable firms generate cash internally, and they use less debts. Two empirical papers find that in the real world, more profitable firms use less debt and more internal funds(cash). (Fama and French, 2002; Hovakimian *et al.*, 2001; Sunder and Myers, 1999).

Table 1 shows that the effects of asymmetric information are significantly negative. Theories predict that internal finance is less costly than borrowing or issuing equity. Higher cash flow from higher profits increases investment ratio (IRATIO). But, this marginal effect is decreased by equity ratio. If we assume that more imperfect financial market requires more equity than borrowing, we can see that agency costs change the way economic variables like cash flow affect physical investment. As we saw earlier, cash flow plays two opposite roles for implementing investment. In the case of financial-imperfections, firms with higher profits imply less cost in internal finance. So, we can expect that these firms invest more. But, according to free cash flow hypothesis by Jensen (1986) and Grossman and Hart (1986), managers with only a small ownership interest have an incentive for wasteful management. We can expect to see more wasteful activity in a firm with large cash flows. The former effect dominates the latter, so we get positive coefficient for cash flow variable. Table 2 shows similar effects of debt ratio. If there occur agency costs of equity (eg. shirking, perquisites, bad investments; Jensen and Meckling (1976), the optimal debt-equity ratio tends to be higher than not if there occur. This effect also reduces the sensitivity of the availability of internal funds.

It would be worth to note that the relationship between cash and investment is spurious. If there is a (third) confounding factor, the regression may show a relationship even if financial markets are perfect. That is, the regression does not control for the future profitability (of capital). Fazzari *et al.* (1988) addresses this problem dividing firms into those confronting significant costs of obtaining outside funds and those that are not (Hoshi and Scharfstein, 1991). Main criterion is whether dividend ratio is high or low. In this study, we use proxy variable by sales growth by industry (GROW). Table 1 shows that controlling future profitability reduces similar results.

Finally, if we use GMM (general method of moment) method considering endogeneity and measurement error, the estimated coefficient is negative, which supports free cash hypothesis.

Table-1. Panel Regression: Internal Fund and Equity Ratio

Method: Pooled Least Squares
Sample: 2009 2014
Cross-sections included: 30
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	32.07828	0.881511	36.39009	0.0000**
(CASH)*(EQ)	-0.011588	0.003176	-3.648640	0.0004**
CASH	0.469089	0.174076	2.694736	0.0079**
Fixed Effects (Cross)				

Dependent Variable: IRATIO
Method: Pooled Least Squares
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	29.92240	0.619473	48.30298	0.0000**
CASH?	0.591838	0.118385	4.999273	0.0000**
(EQ)*(CASH?)	-0.013980	0.002161	-6.469370	0.0000**
GROW	0.644660	0.048735	13.22789	0.0000**
Fixed Effects (Cross)				

Method: Pooled IV/Two-stage Least Squares
Total pool (balanced) observations: 180
Instrument specification: C R

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	229926.7	38967.11	5.900532**	0.0000
CASH	-6880.959	2480.058	-2.774516**	0.0062
Fixed Effects (Cross)				

Table-2. Panel Regression: Internal Fund and Debt Ratio

Dependent Variable: I
Method: Pooled Least Squares
Cross-sections included: 30
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	133119.7	3836.659	34.69678	0.0000**
(CASH)*(DB)	-33.39332	3.384967	-9.865183	0.0000**
CASH	2716.253	395.1163	6.874565	0.0000**
Fixed Effects (Cross)				

Hypothesis 2: When there is asymmetric information, such factors as firms' ability to finance their investment using internal funds changes how interest rates and profitability affect investment.

$C_{R\,\alpha} \neq 0, F_{GROW\,\alpha} \neq 0, (\alpha=W)$

Hypothesis 3: When there are agency costs (of equity), optimal debt-equity ratio would be higher. Then, this again increases the sensitivity of investment to availability of internal fund(cash flow) and interest rates.

$C_{W\alpha} > 0, F_{W\alpha} > 0, (\alpha=DB)$

Table 3 shows significant result that supports the hypothesis that financial-market imperfections affect the way interest rates (and profitability) affect investment. Higher nominal interest rate increases physical investment. According to Fisher hypothesis, interest rate incorporates inflation rate. We are interested in whether financial-market imperfections incorporated in equity ratio changes the way investment is determined. Marginal effect of interest rate from debt financing due to agency costs of equity decreases by (-39.7*DB). That of sales growth(GROW) being proxy for future profitability also decreases by (12.07*DB). It implies that debt ratio does not reinforce the effect of profitability on physical investment. That is, financial-market imperfections lessen the magnitude of effects of macroeconomic variables on physical investment.

The optimal debt-equity ratio would be higher in a world with agency problem of equity than in one without it.

Table-3. Panel Regression: Future Profitability and Interest Rates

Method: Pooled Least Squares
Cross-sections included: 17
Total pool (balanced) observations: 9690

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	100302.3	1939.124	51.72555	0.0000**
DB	-56.95831	15.39431	-3.699960	0.0002**
(DB)*(R)	-39.70130	5.889657	-6.740851	0.0000**
R	14750.57	729.3259	20.22494	0.0000**
Fixed Effects (Cross)				

Dependent Variable: IRATIO
Method: Pooled Least Squares
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	29.09756	0.156704	185.6848	0.0000**
GROW*EQ	-0.119119	0.010623	-11.21323	0.0000**
GROW	6.314671	0.509603	12.39135	0.0000**

Dependent Variable: I
Method: Pooled Least Squares
Included observations: 570

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	114258.6	160.8877	710.1762	0.0000**
(DB)*(GROW)	-12.07042	0.955720	-12.62966	0.0000**
GROW	3815.600	126.3101	30.20820	0.0000**
Fixed Effects (Cross)				

Due to asymmetric information, creditors request managers to increase the amount of equity. In booms when retained earnings increase, firms increase investment expenditures since the ratio of equity increases. So, the magnitude(or ratio) of equity in B/C sheet plays a role as propagation mechanism, that is, financial accelerator. (Bernanke and Gertler, 1989) Table 3 also shows that the sensitivity of profitability represented by sales growth(GROW) on investment does not increase by high equity ratio.

Hypothesis 4: According to free cash flow hypothesis, debt reduces the opportunity for managers to waste resources, and increases to invest in productive activities. Hence, such factors as firms' ability to finance their investment using internal funds changes how interest rates affect investment.

$C_\alpha < 0, C_{W\alpha} \neq 0, (\alpha=DB)$

Table 4 shows that debt reduces investment, which is contrary to the implications of Jensen (1984). If we use proxy variable GROW(sales growth) for future profitability, the negative marginal effect is reduced by debt ratio which may affect the opportunity for managers to perform moral hazard.

Table-4. Panel Regression: Debt and Investment

Dependent Variable: I
Method: Pooled Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	137813.5	522.2718	263.8731	0.0000**
DB	-179.2577	4.129673	-43.40725	0.0000**
(DB)*(GROW)	15.14816	0.316458	47.86788	0.0000**
Fixed Effects (Cross)				

Table 5 shows that internal funds(CASH) reduce the marginal effects of LONGR(long-run interest rate), INFLA(inflation rate) and KOSPI(stock price index), and increase that of GROW(sales growth) on investment. We also can see that profitable firms may generate cash internally, and internal funds (CASH) that increase the marginal effect of profitability(GROW) on physical investment. This result supports the proposition that more profitable firms make more cash flow, and this reinforces the effects on investment.

Table-5. Panel Regression: Changing How Interest Rates, Stock Index and **Profitability Affect Investment**

Dependent Variable: IRATIO
Method: Pooled Least Squares
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.25693	0.803198	33.93552	0.0000**
(CASH)*(LONGR)	-0.034725	0.016238	-2.138484	0.0341**
LONGR	1.507483	0.339605	4.438934	0.0000**
Fixed Effects (Cross)				

Dependent Variable: I
Method: Pooled Least Squares

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	81394.68	4449.437	18.29325	0.0000**
(CASH)*(GROW)	16.65344	48.74017	0.341678	0.7331
R	11368.16	1485.789	7.651264	0.0000**
GROW	2151.838	827.6304	2.599999	0.0103**
Fixed Effects (Cross)				

Dependent Variable: I
Method: Pooled Least Squares
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	45663.63	1747.152	26.13604	0.0000
(CASH)*(KOSPI)	-0.099188	0.043650	-2.272329	0.0245
KOSPI	42.93956	1.140425	37.65225	0.0000
Fixed Effects (Cross)				

Dependent Variable: I
Method: Pooled Least Squares
Total pool (balanced) observations: 180

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	125144.4	1899.222	65.89247	0.0000
(CASH)*(INFLA)	-188.8276	107.5113	-1.756351	0.0811
INFLA	1594.882	1733.641	0.919961	0.3591
Fixed Effects (Cross)				

The economic model of investment without market imperfections predicts that a rise in output(current profitability) raises investment. The reason is that higher future output implies capital is more valuable. Because of potential correlation, the regression may show significance even if financial markets are perfect. Confounding factor(output growth) is correlated with both cash flow and investment.

Table 3 shows significant result that supports the mechanism by which finance affects investment through growth(future profitability). High debt ratio reinforces the effect of profitability(GROWTH) on physical investment.

Panel regression result for cash flow shows opposite effect for implementing investment to that of Fazzari *et al.* (1988). It supports the free-cash flow hypothesis that argues moral hazards of management. According to free cash flow hypothesis by Jensen (1986), managers with only a small ownership interest have an incentive for wasteful management. We test whether cash flow with financial-market imperfections change the way other economic variables(interest rate) affect physical investment or not. Table 2 shows that cash flow decreases the marginal effect of long-run (nominal) interest rate on investment ratio(relative to output). This shows that cash flow plays role of incentive of managerial discretion rather than reducing costs of internal finance. Another regression result for cash flow shows insignificant effect for changing how profitability(GROW, growth rate) affect investment. We test whether cash flow with financial-market imperfections change the way other variables affect investment or not. Table 3 shows that cash flow do not affect the marginal effect of profitability. We find a strong link between cash flow and investment. But, there is a problem. The regression does not consider the future profitability of capital. And cash flow may be correlated with omitted variable- future profitability. The model of

investment without market imperfections argues that a rise in output raises investment. Because of potential correlation between cash flow and current profitability, the regression may show a relationship even if financial markets are perfect. Our 2 stage LS result shows that if we use nominal interest rate as instrumental variable, the relationship disappears. The fact that market imperfections cause manager's wealth to affect investment implies that imperfections magnify the effects of shocks outside the finance. Increases in nominal interest rate act to increase physical investment. These increases in output from investment thus increase inflation rate, and nominal interest rate. This is financial accelerator of Bernanke and Gertler (1989).

Hypothesis 5: When firms can finance more from internal funds, it will tend to make physical investment less sensitive to cash flow.

$$C_{WW} > 0, F_{WW} < 0$$

Fazzari *et al.* (2000) criticized that economic theory does plausibly make predictions about second derivatives of firm value and costs. The firm starts to be severely constrained in access to external funds. This tends to make investment less sensitive when firms finance ore investment from internal funds(cash flow). That is, this makes $\frac{d^2 I}{dW^2} < 0$. This second derivative is a function of second and third derivatives of value and cost function. Firms with fewer internal funds are more affected by agency costs from market imperfections. We can test how (dI/dW) varies with W empirically.

In this study, we omit the analytical expression for this second derivative function. Table 6 shows that the estimated coefficient for quadratic term of cash flow is negative significantly. This implies that C''(I-W) changes from rising slowly to rising rapidly. Fazzari *et al.* (2000) argue that these results stem from an extreme case where financial constraints reduce the cash flow-investment link.

Table-6. Panel Regression: Sensitivity to Cash Flow

Dependent Variable: IRATIO				
Method: Pooled Least Squares				
Total pool (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	29.57959	1.712750	17.27023	0.0000**
CASH	0.246890	0.195358	1.263785	0.2083
(CASH)*(CASH)	-0.010862	0.005339	-2.034706	0.0437**
Fixed Effects (Cross)				

3. Conclusion

We use fixed effects model to estimate the relationship between the magnitude of internal funds and physical investment by industry. This has the advantage of controlling for industry specific differences of investment behavior. Our study focused on trying to test empirically the hypotheses about financial-market imperfections.

There are some limits of our discussion in this study.

First, inferring the extent of financial constraints is problematic. This is necessary in explaining the determinants of physical investment. Under financial-market imperfections coming from agency costs, the investment-cash flow sensitivities are changed. As Kaplan and Zingales (2000) argue, we don't know what causes the sensitivity of investment. They conjecture that it is caused by excessive conservatism by managers as suggested by behavioral economics of Hines and Thaler (1995).

We can summarize several issues studied for future research.

First, in information economics, asymmetric information makes participants to signal information or make screening. In special, finance theory argues that investors view debt as a signal of firm value. Managers signal their forecast of value by increasing debt. We can test this hypothesis empirically. We need sophisticated transactions data in KSE (Korean Stock Exchange).

Second, If there are agency costs such as shirking, perquisites and bad investments (Jensen and Meckling, 1976), the optimal debt-equity ratio would be higher. We can test this hypothesis by state-space model by Hamilton (1984) and Kim and Nelson (1999).

Third, like Gertler and Gilchrist (1994), we need to investigate the behavior of small firms. They argue that small firms are likely to face large barriers to outside finance. It is necessary to know whether imperfect financial markets are important to explain the differences between the movement in sales, inventories (investment) and debt across the magnitude of firms.

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