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Controlling Shareholders and Financial Constraints around the World

Abstract

This paper examines the effect of controlling shareholders' ownership of firms on the firms' financial constraints in 22 economies. It found that the overinvestment propensity of controlling shareholders becomes less severe with an increase in cash-flow rights. It further indicates that a higher deviation between the control rights and cash-flow rights of controlling shareholders lower their overinvestment propensity, thereby lowering the firm's financial constraints. The results suggest that a higher protective legal environment for minority shareholders blocks the entrenchment of controlling shareholders and thus benefitting the firm with slackened financing constraints in the given legal origin.

JEL classification: C31; G32; G33; G34

Keywords: Ownership Structure, Agency Problem, Investment, Financial Constraints, Legal Origin

Controlling Shareholders and Financial Constraints around the World

1. Introduction

The conventional pecking order theory states that a firm prefers internal funds to external funds for financing its investments because the costs of external financing can arrest the firms' net worth growth by making it financially constrained, while profitable investment opportunities continue to grow. Thus, financial slack is important due to the high costs of external finance, which may be caused by information asymmetry. Bond and Meghir (1994) and Gilchrist and Himmelberg (1998) initially studied the way financial slack affects the financial constraints of a firm using the Euler equation approach. Several previous studies have examined how the financial constraints faced by a firm vary with the financial development, legal environment, and bank concentration of a country (Love, 2003; Laeven, 2003; Ratti et al., 2008). The subsequent studies related to a firm's financial constraints focus on the regional effects on financial constraints. For instance, Lee and Seol (2013) study the effect of banks' market power on firms' financial constraints in Asia. These studies commonly find that the firms in each country are systemically subject to different financial constraints based on their respective financial market conditions.¹

A firm's investment propensity may affect its access to external funds. The argument of incentive effects and entrenchment properties implies that a higher degree of conflict of interests between managers (or controlling shareholders) and shareholders (or minority shareholders) may send a negative signal to outside investors that their assets may be expropriated by the insiders. Thus, in this situation, the firm would be more financially constrained. There are several studies on the relationship among firms' ownership structures, investment propensity, and financial

¹ In addition, there is a notable line of literature dealing with a chronology of financial liberalization, such as Kaminsky and Schmukler (2003) and Neumann et al. (2009).

constraints. Lin et al. (2011) examine the wedge of corporate insiders and firm's external finance constraints using firm-level panel data in the U.S. for the period from 1995 to 2002. Based on an Euler equation developed by Whited and Wu (2006), they find that a higher wedge of the corporate insiders relative to outside investors induces a higher degree of financial constraints.

Wei and Zhang (2008) focus on the overinvestment argument caused by the agency problem that was discussed by Jensen (1986), and used the sample of East Asian economies for the period from 1991 to 1996 to find that investment-cash flow sensitivity is lessened as the cash-flow rights of the largest shareholders increase, while it is heightened as the wedge is higher.² These results support the incentive effects and the entrenchment problems of managerial shareholders. Shleifer and Vishny (1997) provide explanations for both positive and negative effects of large shareholders. First, large shareholders can alleviate the agency problems because they have strong incentives to maximize the value of their shareholdings, which is known as the enhancement effect or positive incentive effect. La Porta et al. (1999) mention that "the controlling shareholders face strong incentives to monitor managers and maximize profits when they retain substantial cash-flow rights in addition to control rights." Second, large shareholders pursue their own interests that need not coincide with the interests of minority shareholders, also known as the entrenchment effect. Kim et al. (2004) and Lee et al. (2009) argue that firms in Korean business groups (*chaebol*) were less likely to be financially constrained before the financial crisis in 1997 due to the active role of internal capital markets. Using Taiwanese firm-

² Jensen (1986) studies the agency costs of free cash flow and demonstrates that managers have a propensity to overspend the internal funds on unprofitable projects for their own private benefits. This agency problem derives from the fact that the manager is not the owner and so acts for his own benefit through overinvestment because he may not fully internalize the costs of the overinvestment decision.

level data, Kuan et al. (2012) suggest that fewer excess control rights affect cash holdings positively in low cash holding firms and negatively in high cash holding firms.

This paper examines the incentive problem between controlling shareholders and minority shareholders and firms' access to external funds using international firm-level panel data for the period from 1982 to 2009.³ It further examines how the incentive problems vary with the legal environment for investors and financial market development and how the degree of incentive problems in each country affects a firm's financial constraints. In particular, it analyzes how the ownership structure of firms with controlling shareholders changes its overinvestment propensity, which in turn affects its financial constraint. The approach here is based on the Euler equation method that enables us to measure the effect on incentive problem and firm financial constraints simultaneously.

This paper contributes to the existing literature on firm ownership structure and investment. First, to examine international evidence on firms' ownership structure and financial constraints, it uses a sample of firms in 22 economies for the period from 1982 to 2009. Love (2003) and Ratti et al. (2008) have employed international firm-level data in their study on financial constraints. However, these studies did not consider the effect of ownership structure on the financial constraints of a firm. Lin et al. (2011) and Wei and Zhang (2008) have further considered the effect of ownership structures of managerial shareholders on firm-level investment, which provided international evidence that concentrated ownership can alleviate the financial constraints. However, this study differs from Lin et al. (2011) and Wei and Zhang (2008) in that it considers the effect of the legal environment or financial development of a country as well as the ownership structure on the financial constraints of a firm using

³ We define a controlling shareholder as one who possesses a high level of control rights over the firm and tends to expropriate assets from minority shareholders.

international data. Wei and Zhang (2008) consider eight East Asian countries using the Tobin's Q model approach, which is different from the Euler equation approach used in this study. Lin et al. (2011) employ the Euler equation approach following Whited and Wu (2006) and focus on the effect of the insider control-ownership divergence, but this study considers the effect of the pure ownership level of controlling shareholders on the financial constraints of a firm. Second, this study provides evidence on how firms' financial constraints are affected by different legal environments or financial development as well as the ownership structure in a multi-country framework. More specifically, it examines how the agency problem between controlling shareholders and minority shareholders changes the overinvestment propensity of the controlling shareholders and alters a firm's financial constraints. Consistent with the view of McLean et al. (2012), this study demonstrates that legal environments for shareholders' protection are associated with a reduction in financial constraints. Following the method used by Wei and Zhang (2008) for eight East Asian economies, this study uses cash-flow rights and the wedge of controlling shareholders as a proxy for the alignment of interests. However, this paper extends their work by focusing on the effect of overinvestment propensity of controlling shareholders on the financial constraints of a firm by examining 22 economies around the world.

The rest of this paper is structured as follows. Section 2 presents a review of financial constraints studies. Section 3 describes the dynamic investment model used to investigate how ownership structure affects the investment propensity of a firm. Section 4 describes the data sources and the econometric methods used to estimate the dynamic empirical model. Section 5 reports the main empirical findings associated with the hypotheses presented here. Finally, the concluding remarks are provided in the last section.

2. Research on the Financial Constraints of a Firm

2.1 Ownership Structure and Firm Investment Propensity

There are two competing explanations for firms' investment behavior. Greenwald et al. (1984) and Myers and Majluf (1984) argue that contracting and information problems increase the cost of external funds relative to internally generated funds. They explain that the positive investment-cash flow sensitivity is a symptom of underinvestment because the firm's financial constraints compel it to forgo some positive NPV projects. On the other hand, Jensen (1986) studies the agency costs of free cash flow and demonstrates that managers have a propensity to overspend the internal funds on unprofitable projects for their personal benefits. This agency problem occurs when the manager, who is not the owner, acts for her/his own benefit through overinvestment because she/he may not fully internalize the costs of the overinvestment decision. In this view, the positive investment-cash flow sensitivity is a symptom of overinvestment caused by free cash flow problems.

Based on these theories on firm investment behavior, some studies examine corporate ownership structures and firms' investment behavior. Using firm-level data of the U.S. for the period from 1973 to 1976, Hadlock (1998) finds that at low levels of insider holdings, investment-cash flow sensitivity rises sharply with an increase in insider ownership. The author concludes that this result is consistent with the underinvestment propensity due to information asymmetry. Wei and Zhang (2008) extend Hadlock's (1998) study by using firm-level cash-flow and control rights of the largest shareholders as a measure of the alignment of interests between the largest shareholders and the minority shareholders to estimate the investment-cash flow sensitivity with a sample of East Asian economies for the period from 1991 to 1996. Their study focuses on overinvestment caused by the agency problem discussed by Jensen and Meckling

(1976).⁴ They find that investment-cash flow sensitivity falls as the cash-flow rights of the largest shareholders increase and it rises as the wedge increases. Wei and Zhang (2008) use cash-flow rights and the size of the wedge of largest shareholder of a firm as a proxy for alignment of interests. These results are supported by the incentive effects and the entrenchment problems of managerial shareholders.

On the other hand, Lin et al. (2011) examine the wedge of corporate insiders and a firm's external finance constraints using firm-level panel data of the U.S. for the period from 1995 to 2002. Based on an Euler equation developed by Whited and Wu (2006), they find that a higher wedge of the corporate insiders as compared to that of outside investors induces a higher degree of financial constraint. Moreover, this effect on financial constraints is robust in firms with higher informational opacity and financial restatement, especially those involved in fraudulent misreporting.

Shleifer and Vishny (1997) provide explanations for both positive and negative effects of large shareholders. On the one hand, large shareholders can alleviate the agency problem because they have strong incentives to maximize the value of their shareholdings, known as enhancement effect or positive incentive effect. La Porta et al. (1999) further argue that there exist strong incentives by controlling shareholders face to monitor managers and maximize profits when they retain substantial cash-flow and control rights. On the other hand, large shareholders pursue their own interests, which need not coincide with the interests of minority shareholders, also known as the entrenchment effect.

⁴ Jensen and Meckling (1976) mentioned the agency problem between managers and shareholders. However, the presence of large shareholders in a firm can affect the nature of agency problems. Claessens et al. (2002) state that "large shareholders have strong incentives to put pressure on managers or even to oust them through a proxy fight or a takeover."

2.2. Investment Propensity and Financial Constraints

Fazzari et al. (1988) developed an empirical framework in order to estimate the financial frictions faced by a firm in the presence of capital market imperfections. Hubbard (1998) extensively reviewed the studies on financing constraints and investment determination of a firm. To estimate the financial constraints of a firm, many studies have analyzed the sensitivity of internal funds to investments in their structural investment models. The studies on financial constraints are mainly based on the framework of Tobin's Q model and the Euler equation model. These studies use cash flow or cash stocks as a proxy for internal funds.

Previous research on financial constraints has mainly focused on the theory that information asymmetry between creditors and debtors in the financial market affect a firm's access to external funds. In a situation where the cost of capital is high due to information asymmetry, the role of financial slack is more important for a firm to finance its investment project. On the other hand, a firm's investment propensity may affect its access to external funds. The argument on incentive effects and the entrenchment properties implies that a higher degree of conflict of interests between managers (or controlling shareholders) and shareholders (or minority shareholders) may send a negative signal to outside investors that their assets may be expropriated by the insiders. Thus, in this situation the firm would be more financially constrained.

Accordingly, this study claims that the agency problem between the controlling shareholders and minority shareholders of a firm affects the degree of financial constraint of a firm. More specifically, it claims that the higher degree of conflict of interests may increase an overinvestment propensity of controlling shareholders, thus making the firm more financially

constrained.⁵ Despite the theoretical justifications, there are a few studies that link ownership structure of controlling owners and firm financial constraints.⁶

3. The Model of Investment

Following Love (2003) and other similar studies, this study adopts the investment Euler equation model. It does not require the use of Tobin's Q , which is subject to measurement error problems. Following the same studies, it assumes that the relative shadow cost of external finance depends on cash holdings. Further, based on the approach of Wei and Zhang (2008), it assumes that the average degree of cash-flow rights and control rights for firms with controlling shareholders (i.e., the firms with a highly concentrated ownership structure) in each country distorts the effects of cash holdings on the relative shadow cost of external finance. In their empirical model, cash-flow rights and the wedge are employed to investigate the role of ownership structures on investment-cash flow sensitivity. Accordingly, under the assumption that both incentive effects and entrenchment properties affect a firm's investment propensity and eventually distort the relative shadow cost of external finance in periods t and $t+1$, two interaction terms are added, as indicated in equation (1), to investigate how the effect of cash holdings on the relative shadow cost varies due to changes in cash-flow rights and the wedge.⁷

⁵ Based on the empirical results of Wei and Zhang (2008), we assume that the controlling shareholders have an overinvestment propensity due to free cash flow theory suggested by Jensen (1986).

⁶ Lin et al. (2011) examine the control-ownership divergence and external financing constraints. However, the authors did not consider that the incentive effects of the insiders may affect the financial constraints.

⁷ Wei and Zhang (2008) use cash-flow rights and the divergence between control rights and cash-flow rights (i.e., the wedge) of the largest shareholders as a proxy for the alignment of interests between the largest shareholders and minority shareholders in their empirical model.

Based on this study's assumptions, factor Θ_t (the relative shadow cost of external finance)⁸ is parameterized as a linear function of the cash holdings at $t-1$ ⁹ and cash-flow rights and the wedge are added to form

$$\Theta_{it} = a_{0i} + (a_1 + a_2CFR_c + a_3Wedge_c)Cash_{it-1} \quad (1)$$

where, CFR_c and $Wedge_c$ are country-level measures of cash-flow rights and the divergence between control rights and cash-flow rights respectively.

Further, this study investigates the variations in investment propensity due to country-specific factors such as the financial development or the legal system of each country. Additionally, it assumes that the relative shadow cost of external finance varies with the degree of legal protection of outside investors and the level of financial development of each country. Based on the assumptions, the factor Θ_t is parameterized as in (2) and (3)

$$\Theta_{it} = a_{0i} + (a_1 + a_2CFR_c + a_3Wedge_c)Cash_{it-1} + (a_4 + a_5CFR_c + a_6Wedge_c)Cash_{it-1} \cdot LS_c \quad (2)$$

$$\Theta_{it} = a_{0i} + (a_1 + a_2CFR_c + a_3Wedge_c)Cash_{it-1} + (a_4 + a_5CFR_c + a_6Wedge_c)Cash_{it-1} \cdot FD_c \quad (3)$$

where, LS_c represents the legal system origin dummy for each country and FD_c represents the level of financial development of an economy.

The marginal profit of capital is derived from a the maximization of a Cobb-Douglas production function, given by

⁸ $\Theta_t = \frac{1 + \lambda_{t+1}}{1 + \lambda_t}$ is the discount factor associated with the external finance premium. If a firm is constrained, which in the model is equivalent to the inability to pay negative dividends (i.e., issue new equity), the present shadow value of these funds rises relative to the future value (i.e., $\lambda_t > \lambda_{t+1}$). As Θ_t depends negatively on this shadow value, the firm's effective discount factor drops and the firm postpones its investment to the next period.

⁹ The lagged value of the cash stocks is employed because we assume that the investment decision is based on the capital stocks holding at the end of the previous period or the beginning of the current period.

$$\frac{\partial \Pi}{\partial K_{it}} = \theta_i \frac{S}{K_{it}} \approx \text{const.} + \theta_i + \bar{\theta} \frac{S}{K_{it}} \quad (4)$$

where, $\theta = \frac{\alpha_k}{\mu}$ (α_k is the share of capital in the production function and μ is a markup.)

The marginal adjustment cost function of investment is given by

$$\frac{\partial C(I_t, K_t)}{\partial I_t} = \alpha \left(\frac{I_{it}}{K_{it}} - g \frac{I_{it-1}}{K_{it-1}} - v_i \right), \quad (5)$$

which is the derivative of $C(I_t, K_t)$ with regard to I_t (i.e., adjustment cost function)

$$\text{where, } C(I_t, K_t) = \frac{\alpha}{2} \left(\frac{I_{it}}{K_{it}} - g \frac{I_{it-1}}{K_{it-1}} - v_i \right)^2 K_{it}$$

In equation (5), α is the cost of capital and g is a measure of the degree of persistency in the I/K ratios; the lagged term of investment-to-capital ratio is added to capture the strong persistence in the I/K ratios. The intuition for the lagged term multiplied by g is that it may be easier for the firm to continue investing at some fraction g of the previous ratio; for example, the firm might have hired workers or made some other arrangements that would be costly to cancel. The parameter v_i represents some firm-specific level of investment at which the adjustment costs are minimized.

The empirical model is derived by substituting equations (1), (4), and (5) into the Euler equation.¹⁰ However, this procedure creates a highly non-linear equation; hence, the empirical model is linearized to form

$$\begin{aligned} \frac{I}{K_{i,t}} = & \beta_1 \frac{I}{K_{i,t+1}} + \beta_2 \frac{I}{K_{i,t-1}} + \beta_3 \frac{S}{K_{i,t}} + \beta_4 \text{Cash}_{i,t-1} + \beta_5 \text{CFR}_c \cdot \text{Cash}_{i,t-1} + \beta_6 \text{Wedge}_c \cdot \text{Cash}_{i,t-1} \\ & + f_i + d_{c,t} + u_{i,t} \end{aligned} \quad (6)$$

¹⁰ See Love (2003) for the derivation of the empirical model.

where, f_i denotes the fixed effects that capture firm-specific factors and $d_{c,t}$ denotes country-time dummies that capture country-specific factors such as aggregate macro shocks. By focusing on the coefficients β_4 , β_5 , and β_6 , the sensitivity of cash stocks to investment can be investigated.

The main hypothesis of this model is that greater cash-flow rights and a low wedge of controlling shareholders decrease the financial constraints of firms by reducing the overinvestment propensity of the controlling shareholders. According to the free cash flow theory, managerial shareholders have an overinvestment propensity. Wei and Zhang (2008) found that investment propensity depends on the alignment of interests between a large shareholder and minority shareholders, which is measured by the degree of cash-flow rights and the wedge of a large shareholder. With the assumption that a firm's investment propensity affects its financial constraints, which is based on the agency problem theory, it can be claimed that the real financing constraints that a firm faces in a financial market depend on the alignment of interests between large shareholders and minority shareholders, as measured by the degree of cash-flow rights and the wedge of a large shareholder. Based on the discussion, the sensitivity of cash stocks to investment would lower as the cash-flow rights become greater. Accordingly, it is expected that $\beta_4 \geq 0$, $\beta_5 < 0$, which is the main hypothesis.

The sign of β_6 may be positive or negative. If overinvestment is viewed as being reinforced by a greater wedge, then $\beta_6 > 0$. Alternatively, if asymmetric information problems that raise the cost of external funds also exist, then a greater misalignment of interests between a controlling manager and shareholders (indicated by a larger value for Wedge) results in less internalization of these extra costs when raising external funds, which in turn decreases a firm's

reliance on internal funds for investment as well as the sensitivity of investment to internal cash stocks. Thus the null hypothesis is $\beta_6 < 0$.

Following Love (2003), this study extends the model specification of the relative shadow cost of external finance in (1) by adding legal environment and financial development as indicated in equations (2) and (3). Love (2003) examines financial constraints using the internal cash holdings of firms with the assumption that information asymmetry causes financial market frictions. The author argues that financial development and legal environment improvement possibly decrease the impact of cash stocks on the relative shadow cost of external finance. Here, this approach is extended by considering both the agency problem and information asymmetry when deriving the empirical model by substituting equations (2), (4), and (5) into the Euler equation. Linearization provides the following:

$$\begin{aligned} \frac{I}{K_{i,t}} = & \beta_1 \frac{I}{K_{i,t+1}} + \beta_2 \frac{I}{K_{i,t-1}} + \beta_3 \frac{S}{K_{i,t}} + \beta_4 Cash_{i,t-1} + \beta_5 CFR \cdot Cash_{i,t-1} + \beta_6 Wedge \cdot Cash_{i,t-1} \\ & + \beta_7 Cash_{i,t-1} \cdot LS_c + \beta_8 CFR_c \cdot Cash_{i,t-1} \cdot LS_c + \beta_9 Wedge_c \cdot Cash_{i,t-1} \cdot LS_c + f_i + d_{c,t} + u_{i,t} \end{aligned} \quad (7)$$

Similarly, the empirical model is derived by substituting equations (3), (4), and (5) into the Euler equation. Linearization provides the following:

$$\begin{aligned} \frac{I}{K_{i,t}} = & \beta_1 \frac{I}{K_{i,t+1}} + \beta_2 \frac{I}{K_{i,t-1}} + \beta_3 \frac{S}{K_{i,t}} + \beta_4 Cash_{i,t-1} + \beta_5 CFR \cdot Cash_{i,t-1} + \beta_6 Wedge \cdot Cash_{i,t-1} \\ & + \beta_7 Cash_{i,t-1} \cdot FD_c + \beta_8 CFR_c \cdot Cash_{i,t-1} \cdot FD_c + \beta_9 Wedge_c \cdot Cash_{i,t-1} \cdot FD_c + f_i + d_{c,t} + u_{i,t} \end{aligned} \quad (8)$$

For model (7), the focus is on the coefficients β_7 and β_8 to investigate how the legal environment faced by each firm affects the investment propensity of controlling shareholders. The main hypotheses of model (7) are: 1) in a legal environment in which shareholder rights are

better protected, overinvestment is less ($\beta_7 < 0$) and 2) the alignment effect of increased cash-flow rights of controlling shareholders is less ($\beta_8 > 0$). The two hypotheses are connected as the alignment effect of increased cash-flow rights of controlling shareholders is likely to be less in legal settings in which a fair degree of alignment is already ensured. The effect of the degree of cash-flow rights and the wedge of controlling shareholders on financial constraints would be reduced in a country with a more protective legal system for outside investors. For example, in a country with a better legal system for investors, both the incentive and entrenchment effects of controlling shareholders are reduced under the assumption of overinvestment propensity. However, it may be expected that the degree of expropriation by controlling shareholders with entrenchment propensity is not pronounced in countries with more protective legal systems for outside investors and the minority shareholders. Thus, if more severe laws and regulations bind controlling shareholders who have higher control rights than cash-flow rights, then they will have some difficulties in expropriating from minority shareholders. Thus, it may also be possible that a higher wedge leads to a lower overinvestment propensity and financial constraints of firms.

As the legal system improves, minority shareholders and outside investors are more protected by law; hence, there is less chance to expropriate from them (La Porta et al., 1998). Further, La Porta et al. (1998) demonstrates that a country's commercial law based on the different legal origins affects creditor and shareholder rights as well as the country's level of bank and stock market development. In the countries with rigid legal protection of investors (common law countries), the interest of controlling shareholders is enforced to be aligned with that of the minority shareholders; hence, the degree of cash-flow rights that controlling shareholders possess has little effect on firms' investment propensity. For example, greater cash-

flow rights of controlling shareholders do not significantly reduce overinvestment propensity under a situation where the overinvestment propensity is already suppressed by law. Similarly, as the legal system improves, the size of the wedge of controlling shareholders has little effect on the firm's investment propensity and financial constraints.

Model (8) is expected to yield similar results to model (7) because the financial development of a country largely depends on its legal environment. La Porta et al. (2002) argue that legal system improvement leads to the expansion of the financial market. The main hypothesis of model (8) is that the effect of the degree of cash-flow rights and the wedge on the financing constraints would be reduced in a financially developed country.

4. Data and Empirical Methodology

4.1 Data Source

This study employs the OSIRIS database by Bureau van Dijk, which provides firm-level financial data. The main reason for using the OSIRIS database is that it provides an index of controlling shareholders' presence for each firm. Table 1 indicates the definitions of the variables used in this study.

For the cash-flow and control rights of controlling shareholders, this study adopts the country-level ownership structure data compiled by La Porta et al. (2002). They investigate control and cash-flow rights of the controlling shareholders of 539 firms, which include the 20 largest firms by market capitalization of each of the 27 countries, for the period from 1995 to

1996.¹¹ In particular, control rights are the fraction of the firm's voting rights, if any, owned by its controlling shareholders. The authors identified a firm to have controlling shareholders if their voting rights in the firm exceed 10 percent. Cash-flow rights are the fraction of the firm's ultimate cash-flow rights, if any, owned by its controlling shareholders. The wedge is the difference between the control rights and the cash-flow rights.

This study also employs the legal origin data from La Porta et al. (1998). According to them, commercial laws stem from two broad traditions: common law, which is English in origin, and civil law, which is derived from Roman law. Within the civil tradition, there are three major families modern commercial laws originate from: French, German, and Scandinavian. La Porta et al. (1998) sorted 49 countries under four origins of legal rules: English, French, German, and Scandinavian. The authors find that common law countries are more protective of investors (shareholders) than civil law countries. For financial development, this study uses the financial development data compiled by Demirgüç-Kunt and Levine (1996) for 41 countries for the period from 1986 to 1993 as demonstrated in Love (2003).

[Insert Table 1 here]

4.2 Sample Selection

The current study uses the OSIRIS industrials (financials) dataset for the initial sample. All values of the financial variables for each country are converted to US dollar values with the appropriate exchange rates of each given year. After the filtering process, there are 24,478 observations on 2,946 firms in 22 economies for the period from 1982 to 2009. Table 2 illustrates the size of the observation for the 22 sample economies, which includes 19 OECD

¹¹ In the ownership data used by La Porta et al. (2002), it may be possible to identify the year a certain firm ownership data were produced, as the authors merged the data of 1995 and 1996. Nevertheless, the authors argue that it is not a big problem because ownership patterns tend to be relatively stable over years.

countries, Hong Kong, Israel, and Singapore. The firm-level data of a country that has less than 100 observations is eliminated. Table 3 presents the descriptive statistics of the sample firms by each country.

[Insert Table 2 here]

[Insert Table 3 here]

4.3 Estimation Methodology for the Structural Model

This study employs the “generalized method of moments” (GMM) estimator due to the potential endogeneity problem of using instrumental variables in a dynamic model. Specifically, it employs Arellano and Bover’s (1995) GMM estimator, which reduces the potential endogeneity problem in a dynamic panel data model.¹² A procedure for the estimation of empirical models is as follows. First, country-time differencing is applied before the estimation to deal with the country and time effects ($d_{c,t}$) in the model. Second, Arellano and Bover’s (1995) GMM estimator is used to deal with the endogeneity problem caused by the instruments and fixed effects in the current model. The main models (6), (7), and (8) include unobserved firm-specific effects (i.e., fixed effects). The above mentioned endogeneity problem may be due to a correlation between the regressors and the error term as the current models contain both the lag and lead variables of the dependent variable. Arellano and Bover’s (1995) GMM estimator uses forward mean-differencing, which removes only the forward mean to deal with the endogeneity

¹² The GMM estimator employed in this study is as follows:
$$\hat{\beta}_{GMM} = \left(\sum_{i=1}^N \mathbf{X}_i' \mathbf{Z}_i \hat{\mathbf{W}} \mathbf{Z}_i' \mathbf{X}_i' \right)^{-1} \sum_{i=1}^N \mathbf{X}_i' \mathbf{Z}_i \hat{\mathbf{W}} \mathbf{Z}_i' \mathbf{y}_i$$
 where \mathbf{X}_i^* is transformed variables by forward mean-differencing, \mathbf{Z}_i is instruments (lagged variables of the untransformed explanatory variables \mathbf{X}_i), and $\hat{\mathbf{W}}$ is an estimate of optimal weight matrix.

problem when using first differencing (or mean-differencing) for the fixed effects estimator in a dynamic model.¹³ Third, an over-identifying restrictions test is employed after the GMM estimation to check the validity of the selected instruments in the model, that is, to ensure that the instruments are orthogonal to the error terms, which is a necessary condition for a consistent estimator. The current study follows the method employed by Hall and Horowitz (1996) for the test of over-identifying restriction in the dynamic model. They report that the Monte Carlo experiment results indicate that “the first-order asymptotic distribution may provide poor approximations to the distributions of test statistics obtained from GMM estimators.” Further, they suggest a bootstrap resampling method to provide asymptotic refinements to the critical values for the test of over-identifying restrictions of the GMM estimation.

Comment [JHP1]: I explained the full procedures of the estimation more reader friendly in this chapter.

5. Empirical Results

The assessment of the effect of the ownership structure of controlling shareholders on the firm’s real cost of external finance is provided by the panel data estimation, which is based on model (6) in table 4. In model (6) the slope coefficient β_5 (β_6) for the effect of the product of cash-flow rights (wedge) and the cash stock on investment represents the intra-country and cross-country variations in ownership structure.

The main results of this study are based on the sample of firms with controlling shareholders. The empirical results in Table 4 indicate that the high degree of cash-flow rights and wedge of controlling shareholders significantly decreases the sensitivity of the investment-cash stocks,

¹³ Formally, through the forward mean differencing, \mathbf{x}_{it} are transformed to \mathbf{x}_{it}^* such that

$$\mathbf{x}_{it}^* = \left(\frac{T-t}{T-t+1} \right)^{1/2} \left[\mathbf{x}_{it} - \frac{1}{T-t} (\mathbf{x}_{it+1} + \dots + \mathbf{x}_{iT}) \right]$$

supporting the overinvestment propensity of the controlling shareholders and the lowered financial constraints of the firms (i.e., a decrease in overinvestment propensity and financial constraints). The negative coefficient (-4.213) of the interaction of CFR and Cash in column (3) of Table 4 implies that in a country where controlling shareholders have high cash-flow rights, the overinvestment propensity is reduced due to the alleviated agency problem between the controlling shareholders and the minority shareholders; hence, the firm's real cost of external finance is lower. From the negative coefficient (-7.427) of the interaction term of Wedge and Cash, this study finds that in a country where controlling shareholders have a high wedge, the overinvestment propensity is reduced; hence, the firm's real cost of external finance is lower.

The former result is consistent with the incentive effects of controlling shareholders, whereas the latter does not support the entrenchment property of controlling shareholders, unlike the empirical results in Wei and Zhang (2008). They found that a high wedge increases the overinvestment propensity, which resulted in increasing financial constraints in the model employed here. The interaction of asymmetric information problems in capital markets and control rights can provide an explanation for the result that a greater wedge results in a lower sensitivity of investment to cash stocks. If asymmetric information problems raise the cost of external funds, greater misalignment of the controlling managers' interest and the shareholders' interest (indicated by a larger value of Wedge) results in lesser internalization of these extra costs when raising external funds, thereby decreasing a firm's reliance on internal funds for investment and reducing the sensitivity of investment to internal cash stocks.

[Insert Table 4 here]

The estimates of the investment regressions that use cash-flow rights, wedge, and legal system index variables from model (7) for the sample of firms with controlling shareholders are reported

in Table 5-Panel A. The negative estimated coefficient (-1.965) of the interaction of Cash and LS in column (3) in Table 5-Panel A confirms that firms in a country with the legal system favorable toward investors are less financially constrained. This result is consistent with the findings in Love (2003). The positive estimated coefficient (4.721) of the interaction of CFR, Cash, and LS shows that in an environment that better protects shareholder rights, the alignment effect of an increase in the cash-flow rights of controlling shareholders is negligible as compared to that in an environment where shareholder rights are not well protected.

Given the negative coefficient (-1.586) of the interaction of Wedge, Cash, and LS in column (3) of Table 5-Panel A, there is no evidence that the effect of Wedge on financial constraints is more pronounced in a different legal system. The results in Table 5-Panel A are broadly consistent with the views presented in the existing literature, such as La Porta et al. (1997), Demirgüç-Kunt and Maksimovic (1998), and Rajan and Zingales (1998), in that a legal environment with a higher protection of the minority shareholders blocks the entrenchment of controlling shareholders, and thus firms are less likely to be financially constrained.

Table 5-Panel B reports the estimates for the investment regressions that use cash-flow rights, wedge, and financial development index variables from model (8) for the sample of firms with controlling shareholders. The main hypothesis of model (8) is that the effect of the degree of cash-flow rights and the wedge that controlling shareholders possess on financing constraints would be reduced in a financially developed country. The estimated coefficient (-1.165) of the interactions of Cash and FD from the model in column (3) of Table 5-Panel B indicates that financial development significantly reduces the financial constraints of a firm. The estimated coefficient (2.086) of the interactions of CFR, Cash, and FD indicate that in an environment with a developed financial system, the alignment effect of increased cash-flow rights of controlling

shareholders is negligible as compared to that in an environment with a less developed financial system.

[Insert Table 5 here]

It should be noted that the sample here mostly includes developed economies as compared to the samples consisting of East Asian countries in Wei and Zhang (2008). Therefore, in these samples, investors might be systemically well protected by the law, making expropriation by controlling shareholders difficult. Accordingly, this study assumes that in a country where the controlling shareholders have higher control rights, the expropriation of minority shareholders by controlling shareholders as well as the overinvestment propensity may reduce due to a developed legal protection system. In summary, it concludes that high cash-flow rights of the controlling shareholders reduce their overinvestment propensity due to the alignments of their interests with the minority shareholders and a high wedge reduces their overinvestment propensity due to the higher level of investor protection provided by the law.

It should also be noted that the empirical results are based on the country-level ownership data of specific periods; hence, it may not fully represent the characteristics of each firm's ownership structure.¹⁴ Although the firm's ownership structure is possibly different in different periods and may vary with firm characteristics, this study employs this data due to the difficulty in constructing new data for all the sample periods. Nevertheless, the results indicate the possible effects of changes in a firm's ownership structure on financial constraints.

Comment [JHP2]: I added the limitation and problem of ownership data employed in this study in main text and footnote 14

6. Concluding Remarks

¹⁴ One limitation of data collection is that our firm sample is constructed for the period from 1982 to 2009; however, the ownership data, which is merged to the firm-level panel data set for each year, are constructed for the period from 1995 to 1996 at a country-level from La Porta et al. (2002).

This study examines the effects of change in investment propensity of controlling shareholders by their ownership structure in corresponding firms on the cost of external funds. To measure the degree of this effect, it uses a dynamic investment model with a sample of 2,946 listed firms in 22 countries and over 22,000 observations for the period from 1982 to 2009.

Furthermore, it confirms the incentive effect of the controlling shareholders. In contrast to Wei and Zhang's (2008) results, it finds that a higher deviation between the control rights and the cash-flow rights of the controlling shareholders lower their overinvestment propensity, which in turn lowers firms' financial constraints. This study indicates that the legal environment for shareholders' protection is associated with a reduction in financial constraints, which leads to a conclusion that a developed legal environment would make the entrenchment of controlling shareholders difficult, a view consistent with that of McLean et al. (2012).

This study contributes to the existing literature on firm investment by using the investment Euler equation following Love (2003), and deviating from models used by Lin et al. (2011) and Wei and Zhang (2008), to indicate that a manager's overinvestment propensity due to free cash flow in a firm increases its financial constraints. More specifically, this study extends the related literature by introducing the concept that financial constraints of a firm are determined by incentive problems between the controlling owners and minority shareholders within a firm as well as information problems between outside investors and insiders of a firm.

The empirical results imply that higher cash-flow rights and/or higher deviation between cash-flow rights and control rights of controlling shareholders possibly blocks overinvestment by a firm, which protects the minority shareholders. The results also imply that the firm's access to external funds depends on the information asymmetry between the lenders and the borrowers, as

well as the agency problems between the shareholders, which has not been considered in previous studies.

Comment [JHP3]: I rewrote the implications of this study and difference comparing to the previous studies.

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Comment [JHP4]: I added the missing reference from the main text.

Wei, K.C.J. and Zhang, Y. (2008), "Ownership structure, cash flow, and capital investment: Evidence from East Asian economies before the financial crisis", *Journal of Corporate Finance*, Vol. 14, pp. 118-132.

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Comment [A5]: Please note that I have moved the tables to a separate file as per the journal guideline: Tables should be typed and included in a separate file to the main body of the article.

Table 1 Variable Definition

This table shows definitions of variables used in the study. The paper mainly uses the OSIRIS database last updated on 03/19/2010 and retrieved through WRDS (Wharton Research Data Services). For SCEX, OSIRIS provides different cash flow statements for non-US firms and US firms, respectively. However, both DATA15515 and SCEX are based on similar accounting standards to represent firm's investment. Industry SIC codes are from the US Department of Labor: http://www.osha.gov/pls/imis/sic_manual.html. To define the capital stock (K) at the beginning of the period t , we adopt net property, plant and equipment (PPENT) at period t (=capital stock at the end of period t), adjusted by capital expenditure (CAPX), depreciation and amortization (DA) during the period t as in Love (2003). For an alternative construction method, Ratti et al. (2008) and Gompers et al. (2010) employed PPENT at period $t-1$ to define K as the beginning capital stock at period t .

Abbreviation	Description [Mnemonic of OSIRIS]
<i>Firm-level variables (from OSIRIS industrials (financials))</i>	
UO	Ultimate Owner indicator [ULTQUAL]
OC	Ownership Concentration [INDEPEND]
CAPX	Additions to fixed assets on the cash flow statement for non-US firms [DATA15515] and capital expenditure on the cash flow statement for US firms [SCEX]
PPENT	Property, plant and equipment (net tangible fixed asset) [DATA13068]
S	Net sales on the income statement [DATA13002]
DA	Depreciation and Amortization [DATA13021]
K	Capital stock at the beginning of the period [PPENT – CAPX + DA]
IK, I/K	Investment to capital stock ratio [CAPX/K]
SK, S/K	Sales to capital stock ratio [S/K]
COG	Cost of goods sold on the income statement [DATA22199]
Cogs	Cost of goods sold, scaled by K [COG/K]
CSH	Total cash & short term investment [DATA20070]
TA	Total assets [DATA13077]
Cash	Total cash & short term investment, scaled by total assets [CSH/TA]
NI	Net profit (= net income) [DATA13045]
CF	Cash flow [NI+DA]
CF/K	Cash flow to capital stock ratio [CF/K]
Industry dummies	For manufacturing industries the dummies are on a two digit SIC level (20 industries). For mining industries the dummy is a digit code between 10 and 14. For construction industries the dummy is a two digit code between 15 and 17. For the rest of the industries they are on a one digit level (3 industries).
<i>Country-level variables</i>	
FIN	Financial intermediary development is Findex 1 from Demirgüç-Kunt and Levine (1996)
STK	Stock market development is Index 1 from Demirgüç-Kunt and Levine (1996)
FD	Financial development index = FIN + STK
LS	LS=0 if French, German and Scandinavian (i.e., civil law), LS=1 if English (i.e., common law). Country's legal origin categorized into four groups: English, French, German or Scandinavian, from La Porta et al. (1998).
CFR	Cash-flow rights of Large shareholder, from La Porta et al. (2002)
CR	Control rights of Large shareholder, from La Porta et al. (2002)
Wedge	Control rights minus Cash-flow rights, from La Porta et al. (2002)

Table 2 Distribution of the Sample Across 22 Economies Around the World

This table illustrates size of observation for the 22 sample economies including 19 OECD countries, Hong Kong, Israel, and Singapore. The data are obtained from the OSIRIS by Bureau Van Dijk. Firm-level data is eliminated if a country has less than 100 observations. This table also classify the legal origin of each country into either the common law system (English) or the civil law system (French, German, and Scandinavian) following La Porta *et al.* (1997).

Legal origin	Country	Number of observations	Percent of observations	Number of firms
English (8)	Australia	284	1.16	55
	Canada	483	1.97	94
	Hong Kong	190	0.78	34
	Ireland	104	0.42	14
	Israel	128	0.52	25
	Singapore	541	2.21	100
	U.K.	2321	9.48	345
	United States	11802	48.21	946
	Total	15853	64.75	1613
French (7)	Belgium	105	0.43	20
	Spain	135	0.55	27
	France	936	3.82	164
	Greece	393	1.61	83
	Italy	141	0.58	30
	Mexico	129	0.53	26
	Netherlands	135	0.55	26
	Total	1974	8.07	376
German (3)	Germany	628	2.57	118
	Japan	2047	8.36	376
	Korea	3119	12.74	304
	Total	5794	23.67	798
Scandinavian (4)	Denmark	192	0.78	32
	Finland	112	0.46	23
	Norway	169	0.69	32
	Sweden	384	1.57	72
	Total	857	3.50	159
Total = 22	Total observations	24478	100.00	2946

Table 3 Descriptive Statistics for Key Variables: 1982 – 2009

The table shows descriptive statistics of sample firms by country. The data are obtained from OSIRIS by Bureau Van Dijk. IK is Investment to capital stock ratio, SK is Sales to capital stock ratio, Cash is Total cash & short term investment, FD is Financial development index, FIN is Financial intermediary development index, STK is Stock market development index, CFR is Cash-flow rights of Large shareholder, CR is Control rights of Large shareholder, and Wedge is divergence between Control rights minus Cash-flow rights. We focus on non-financial firms (with SIC less than 6000). Firm-level data is eliminated if a firm has three or less years of coverage, if there are missing values for investment, capital stock, net tangible fixed assets, depreciation and amortization, sales, cash stock, and SIC code, if there are observations with negative or zero for assets, sales, cost of goods sold, cash stock, and if investment has relatively large negative numbers (i.e., investment is less than -10,000 thousand U.S. dollars). We follow Gilchrist and Himmelberg (1998), Love (2003), and Ratti, Lee, and Seol (2008) in excluding observations with $IK > 2.5$, $SK > 20$, $Cogs > 20$, $Cash > 0.6$, and outliers in the top and bottom 1% of the variable values.

Country	IK		SK		Cash		Financial development			Cash-flow rights, Control rights, Wedge			Legal origin
	Mean		Mean		Mean		FD	FIN	STK	CFR	CR	Wedge	
Australia	0.23		3.68		0.08		0.42	0.23	0.19	0.25	0.30	0.05	English
Belgium	0.22		4.38		0.14		-0.82	-0.35	-0.47	0.29	0.39	0.10	French
Canada	0.20		3.41		0.10		0.03	-0.06	0.09	0.25	0.41	0.17	English
Germany	0.25		4.46		0.08		1.68	0.30	1.38	0.30	0.37	0.07	German
Denmark	0.20		4.93		0.10		-0.49	-0.12	-0.37	0.30	0.41	0.10	Scandinavian
Spain	0.27		2.94		0.09		-0.14	0.11	-0.25	0.26	0.33	0.07	French
Finland	0.19		4.29		0.08		-0.41	0.12	-0.53	0.30	0.38	0.08	Scandinavian
France	0.23		2.96		0.11		0.10	0.31	-0.21	0.23	0.37	0.13	French
U.K.	0.22		4.29		0.10		1.68	0.45	1.23	0.14	0.25	0.10	English
Greece	0.13		3.31		0.06		-0.96	-0.23	-0.73	0.48	0.52	0.04	French
Hong Kong	0.19		4.09		0.20		3.46	1.45	2.01	0.32	0.42	0.10	English
Ireland	0.22		3.65		0.11		N/A	N/A	N/A	0.29	0.30	0.01	English
Israel	0.21		4.75		0.13		0.01	-0.07	0.08	0.24	0.40	0.16	English
Italy	0.28		3.55		0.08		-0.64	-0.13	-0.51	0.35	0.51	0.16	French
Japan	0.13		4.53		0.12		3.33	1.31	2.02	0.25	0.26	0.01	German
Korea	0.23		4.26		0.08		0.84	-0.21	1.05	0.18	0.24	0.06	German
Mexico	0.18		2.68		0.08		-0.85	-0.71	-0.14	0.36	0.52	0.16	French
Netherlands	0.30		4.02		0.12		0.66	0.34	0.32	0.33	0.70	0.37	French
Norway	0.28		3.93		0.09		-0.15	0.03	-0.18	0.27	0.34	0.07	Scandinavian
Sweden	0.20		5.05		0.09		-0.31	-0.21	-0.10	0.12	0.32	0.19	Scandinavian
Singapore	0.22		4.58		0.15		1.60	0.56	1.04	0.31	0.38	0.07	English
U.S.	0.25		5.22		0.10		1.35	0.14	1.21	0.20	0.21	0.01	English
Mean	0.22		4.04		0.10		0.49	0.16	0.34	0.27	0.38	0.10	
Median	0.22		4.175		0.10		0.03	0.11	0.08	0.28	0.37	0.09	
Std	0.04		0.70		0.03		1.28	0.50	0.85	0.08	0.11	0.08	

Table 4 Investment Regressions with Cash-flow Rights, Wedge, and Controlling Shareholders

This table shows regression results of investment on cash-flow rights, wedge, and controlling shareholders. The dependent variable is I/K for each firm i at time t . I is investment, K is capital stock, S is sales, $Cash$ is ratio of cash stock to total assets, CFR is cash-flow rights, $Wedge$ is divergence between control rights and cash-flow rights, f_i is an unobserved firm-specific effect, $d_{c,t}$ denotes country-time dummies, and $u_{i,t}$ is an error term orthogonal to available information at time t . For GMM, country-time and fixed effects are removed by country-time and forward mean differencing prior to estimation. For FE, forward mean differencing is employed to eliminate fixed effects instead of general mean differencing. For GMM estimation, instruments are first and second lags of I/K , S/K , $Cash$, CF , $Cogs$ (cost of goods sold scaled by capital stock), interactions of CFR with I/K , S/K and $Cash$, interactions of $Wedge$ with I/K , S/K and $Cash$, and industry dummies. Bootstrapped p -values for J -statistic are obtained using bootstrap simulation with 200 or 1000 repetitions. Dash indicates that one of the resampled matrix is not symmetric during 1000 repetitions, thus the bootstrapped p -value is not able to be calculated. Numbers in brackets represent the repetition of bootstrap resampling. Standard errors in parentheses; ***, **, and * represent significance at 1%, 5%, and 10%, respectively.

Model:	(1)	(2)	(3)
$I / K_{i,t+1}$	1.198*** (0.073)	1.035*** (0.085)	0.941*** (0.065)
$I / K_{i,t-1}$	0.099*** (0.020)	0.109*** (0.019)	0.130*** (0.065)
$S / K_{i,t}$	0.059*** (0.005)	0.058*** (0.004)	0.057*** (0.016)
$Cash_{i,t-1}$	1.58*** (0.575)	1.445*** (0.208)	2.528*** (0.004)
$CFR_c \cdot Cash_{i,t-1}$	-3.17 (1.991)		-4.213** (1.790)
$Wedge_c \cdot Cash_{i,t-1}$		-6.971*** (1.441)	-7.427*** (1.216)
Constant	0.018*** (0.003)	0.017*** (0.003)	0.016*** (0.003)
N observations	8636	8636	8636
N firms	1673	1673	1673
Bootstrapped p -value for J -statistic [200]	0.732	0.748	0.738

Table 5 Investment Regression with Cash-flow Rights, Wedge, and Legal System (Financial Development)

This table shows regression results of investment on cash-flow rights, wedge, and legal system. The dependent variable is I/K for each firm i at time t . I is investment, K is capital stock, S is sales, $Cash$ is ratio of cash stock to total assets, CFR is cash-flow rights, $Wedge$ is divergence between control rights and cash-flow rights, LS_c is legal system, FD_c is financial development, f_i is an unobserved firm-specific effect, $d_{c,t}$ denotes country-time dummies, and $u_{i,t}$ is an error term orthogonal to available information at time t . Country-time and fixed effects are removed by country-time and forward mean differencing prior to estimation. For GMM estimation, instruments are first and second lags of I/K , S/K , $Cash$, CF , $Cogs$ (cost of goods sold scaled by capital stock), interactions of CFR with I/K , S/K and $Cash$, interactions of $Wedge$ with I/K , S/K and $Cash$, interactions of LS with I/K , S/K and $Cash$, three-way interactions of $CFR \cdot LS$ with I/K , S/K and $Cash$, three-way interactions of $Wedge \cdot LS$ with I/K , S/K and $Cash$, and industry dummies. For Panel B, FD is used for the construction of interaction terms instead of LS . Bootstrapped p -values for J -statistic are obtained using bootstrap simulation with 200 or 1000 repetitions. Dash indicates that one of the resampled matrix is not symmetric during 1000 repetitions, thus the bootstrapped p -value is not able to be calculated. Numbers in brackets represent the repetition of bootstrap resampling. Standard errors in parentheses; ***, **, and * represent significance at 1%, 5%, and 10% respectively.

Model:	Panel A			Panel B		
	(1)	(2)	(3)	(1)	(2)	(3)
$I / K_{i,t+1}$	0.947*** (0.054)	0.638*** (0.051)	0.538*** (0.036)	0.946*** (0.082)	0.853*** (0.092)	0.745*** (0.061)
$I / K_{i,t-1}$	0.136*** (0.017)	0.135*** (0.017)	0.152*** (0.014)	0.124*** (0.020)	0.096*** (0.021)	0.113*** (0.016)
$S / K_{i,t}$	0.063*** (0.004)	0.058*** (0.003)	0.057*** (0.003)	0.056*** (0.004)	0.054*** (0.004)	0.054*** (0.003)
$Cash_{i,t-1}$	1.320* (0.765)	2.415*** (0.362)	4.647*** (0.534)	0.503*** (3.399)	1.964*** (0.436)	2.989*** (0.757)
$CFR_c \cdot Cash_{i,t-1}$	-2.453 (2.545)		-6.540*** (1.836)	-2.276 (1.404)		-1.231 (1.715)
$Wedge_c \cdot Cash_{i,t-1}$		-10.370*** (1.542)	-12.679*** (1.173)		-11.785*** (2.720)	-15.564*** (2.672)
$Cash_{i,t-1} \cdot LS_c$	-0.631 (0.982)	-0.207 (0.428)	-1.965** (0.849)			
$Cash_{i,t-1} \cdot FD_c$				0.895** (0.378)	-0.107 (0.317)	-1.165** (0.580)
$CFR_c \cdot Cash_{i,t-1} \cdot LS_c$	3.108 (3.272)		4.721* (2.677)			
$Wedge_c \cdot Cash_{i,t-1} \cdot LS_c$		-5.932** (2.52)	-1.586 (2.281)			
$CFR_c \cdot Cash_{i,t-1} \cdot FD_c$				-2.043* (1.215)		2.086* (1.111)
$Wedge_c \cdot Cash_{i,t-1} \cdot FD_c$					1.368 (2.924)	4.209 (3.15)
Constant	0.016*** (0.003)	0.008*** (0.003)	0.008*** (0.002)	0.011*** (0.002)	0.017*** (0.003)	0.012*** (0.002)
N observations	8636	8636	8636	8616	8616	8616
N firms	1673	1673	1673	1669	1669	1669
Bootstrapped p -value for J -statistic [200]	0.917	0.892	0.943	0.953	0.963	0.973