

Does accounting quality reduce external financial constraints?



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จุฬาลงกรณ์มหาวิทยาลัย  
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คุณภาพของบัญชีสามารถลดข้อจำกัดทางการเงินของบริษัทได้หรือไม่



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This study investigates how accounting quality relates to financial constraints at the firm level. In this study, our first hypothesis is that higher accounting quality reduces financial constraints at the firm level. Our second hypothesis is that higher accounting quality reduces financial constraints more after IFRS adoption in 2011 than before IFRS adoption in Thailand. Our third hypothesis is that higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises. Lastly, auditing quality could be another proxy of accounting quality. Therefore, our fourth hypothesis is that higher auditing quality reduces financial constraints at the firm level. In this study, Our results in the first hypothesis are consistent for KZ index and WW index model. However, the results in WW index model show a strong relation between accounting quality and financial constraints when compared to KZ index model. Therefore, we choose WW index to represent our results for hypothesis 2, 3 and 4. For the second hypothesis, there is no statical evidence to support this hypothesis. For the third hypothesis, our results are consistent with our expectation. For the fourth hypothesis, our test results are consistent with our expectation.

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ลายมือชื่อนิติกร

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# 1. Introduction

## 1.1 Background

Under of perfectly efficient market where there is no asymmetry information problem, F. Modigliani and M. H. Miller (1958) state that the firm leverage does not affect its overall value. Therefore, we should not observe any relation between internally generated cash flow and investment. Cost of capital and investment opportunity is the only determinants to consider when the firm makes an investment decision.

In the real-world capital market where asymmetry information problem plays a crucial role in economic transactions. Myers and Majluf (1984) raise the pecking order theory. Intuitively, outside suppliers of capital can only observe an outcome or publicly disclosed financial information of the firm. However, they cannot verify the firm's true color/condition. If an imbalance of information between firms and outside suppliers of capital is severe. Outside suppliers of capital rationally require premium and withhold funding (Also known as the "Akerlof lemons problem"(Akerlof, 1970)). In a layman's term, firms will face financial constraints and underinvestment problems because the cost of external funding is higher than the cost of internal funding. Therefore, firms should prioritize the source of funding which are least sensitive to asymmetry information or internal funding. This result will raise the sensitivity of investments to cash flows (Fazzari et al., 1987). High sensitivity of investments to cash flows captures a low-dividend payment firm. A significant and positive sensitivity of investments to cash flows indicates that the firm is unable to fully capitalize on all investment opportunities since it is constrained through its

available capital. Such firms will pay a lower dividend since it is relying heavily upon its internal available cash. Therefore, dividend payment could be used as a factor to determine whether a firm is constrained in terms of its capital for investments. This study has been confirmed through multiple trials. Likewise, a study of Hovakimian and Hovakimian (2009) found a positive association between the accessibility of external funding and cash flows. Since the firm faces a significant difference between the cost of external and internal capital under an imperfectly efficient market, this leads to liquidity constraints when firms don't have enough internal funding.

However, investment-cash flow sensitivity as a proxy of financial constraint is challenged by many empirical studies (Carpenter & Guariglia, 2008; Rajan & Zingales, 1996). They report the results against the study of Fazzari et al. (1987) in such a way that higher sensitivities do not represent evidence that the firm has more financial constraints. Consequently, Lamont et al. (2001) apply the study of Kaplan and Zingales (1997) to construct and introduce a new measurement of financial constraints, namely KZ index. This index is widely used as a proxy of financial constraints. However, Whited and Wu (2006) further study financial constraints and show the evidence that KZ index does not separate the firm with financial constraints characteristic. In layman terms, firms captured by KZ index are large and have high attention by analysts and rating agencies. On the other hand, firms captured by WW index are small and have low attention by analysts and rating agencies. Since firm size supports collateral for more borrowing. Basically, asymmetric information requires firms to use collateral to borrow capital in the credit market. Thus, the value of a firm's collateral limits the extent to which it can finance investment projects through external funds. Therefore, firm size could be used as a factor to determine

whether a firm is constrained in terms of its collateral for investments. Moreover, an absence of analysts and rating agencies is proxy for asymmetric information. High analyst coverage helps alleviate an imbalance information between firm and outside suppliers of capital by providing an availability of information and deep analysis to outside suppliers of capital. Therefore, low analyst coverage could be used as a factor to determine whether a firm is constrained or not. Under the circumstance of arguments of proxy of financial constraints so far, we will inspect different impacts between the traditional proxy of financial constraints (i.e., investment-cash flow sensitivity) and modern proxy of financial constraints (i.e., KZ index and WW index) in this study.

An empirical work thus far has studied determinants towards asymmetry information problems. For example, Ağca and Mozumdar (2008) test three direct and theoretically unambiguous measures of asymmetry information from the microstructure literature (i.e., relative effective spread, trade price impact, and probability of informed trading) towards the role of information frictions. Under the corporate governance area, Wei and Zhang (2008) also find the negative effect between an increase in cash-flow rights of the shareholders and investment-cash flow sensitivity. Likewise, the study of Cheng et al. (2014). the result shows that good Corporate Social Responsibility (CSR) can decrease the degree of asymmetry information problem and lead to easy access to external financing.

For independent variables, we decide to apply accrual quality since accrual quality is directly associated with earnings persistence. Accrual quality is therefore widely used as a proxy of accounting quality. Furthermore, auditing quality could be

another proxy of accounting quality. Higher auditing quality improves quality of financial information and disclosure. Then, we decide to apply both accrual quality and auditing quality as a proxy of accounting quality in this study.

### **1.2 Significance of the problem**

Even with a long history of Stock Exchange of Thailand (SET), SET is far from a perfectly efficient market. As asymmetry information problem still is the main problem. An association between external financial constraints and firm investment decisions is still matters.

Higher accounting quality is another determinant that enhances the quality of publicly disclosed financial information. Thus, higher accounting quality controls asymmetry information problems and may serve to improve transparent information or reduce the financial constraints by minimizing these frictions. To investigate the association between external financial constraints and accounting quality, we will test the empirical results in this study and then predict that higher accounting quality can lessen external financial constraints in SET.

We are heavily inspired and grateful for the research of Biddle and Hilary (2006). They studied the relation between accounting quality and firm-level capital investment both across and within countries (i.e., US and Japan). In their study, they apply investment-cashflow sensitive of Fazzari et al. (1987) and financial constraint index proposed by Hovakimian and Hovakimian (2009) as a proxy of financial constraints. Then, we found a knowledge gap that we can apply KZ index and WW index to study the relation between accounting quality and financial constraints. Under a market characteristic difference (e.g., development of the capital market,

accounting standard) between countries in the research of Biddle and Hilary (2006) (i.e., US and Japan) and Thailand, this study is supposed to be useful. As we know so far, there is no study like this before.

### **1.3 Objectives**

- To inspect the relationship between accounting quality and financial constraints in mitigating the asymmetry information problem.
- To inspect different impacts of accounting quality (i.e., accrual quality and auditing quality) towards the traditional proxy of financial constraints (i.e., investment-cash flow sensitivity) and modern proxies of financial constraints (i.e., KZ index and WW index) for a sample of Thai listed companies on the SET from 2001 to 2020.

### **1.4 Scope of the study**

We first study the relationship between accounting quality and various financial constraints in Thailand where is a developing country. Since our inspired research, they studied like this in developed countries. We expect that the asymmetry information problems play a more important role in economic transactions in developing countries rather than in developed countries. Therefore, accounting quality should differently reduce external financial constraints among these two groups of countries.

Besides our first empirical tests in Thailand, we also inspect different impacts of accounting quality (i.e., accrual quality and auditing quality) between the traditional proxy of financial constraints (i.e., investment-cash flow sensitivity) and modern proxies of financial constraints (i.e., KZ index and WW index) in this study.

Under the circumstance of many arguments about appropriate proxy of financial constraints, this study should enhance a clear picture of this argument.

## 2. Research Contribution

This research has 2 main contributions:

- This research studies the association of accounting quality and external financial constraints in SET where the asymmetry information problems still are the main problem.

Having characteristic differences (e.g., development of the capital market, accounting standard) between countries in the research of Biddle and Hilary (2006) (i.e., US and Japan) and Thailand. The accounting quality should mitigate external financial constraints differently.

- In our research, we have decided to apply three proxies of financial constraints (i.e., investment-cash flow sensitivities KZ index and WW index) to separate dimensions between traditional and modern financial constraints proxies.

Although, some studies have already investigated this relationship, Biddle and Hilary (2006) study the relation between accounting quality and external financial constraints (i.e., Investment- cash flow sensitivity and financial constraints index proposed by Hovakimian and Hovakimian (2009)). As we mentioned earlier, the appropriateness of financial constraint proxies is widely discussed in many empirical studies. Therefore, our study should clearly enhance in these arguments.

Hence, our research will be beneficial to managers, shareholders, outside suppliers of capital, practitioners, etc. because they will gain a better understanding and picture of the association of accounting quality and external financial constraints.

### 3. Literature Reviews

In a world of the ideal capital market, F. Modigliani and M. H. Miller (1958) report that a firm's financial decision is free from the source of financing. If the firm has investment opportunities but with a limitation of slack. The firms can independently issue either new shares or debentures without frictions. Under a capital-market imperfection, asymmetry information problems create "financial hierarchy" or Pecking order theory proposed by Myers and Majluf (1984). The firm will choose the optimal source of funding based on the degree of information asymmetry effects to invest in growth opportunities in the following manners:

- First, by internal funds or slack
- Then, by external borrowing
- Finally, by equity financing

Under the circumstance of asymmetry information, Rajan and Zingales (1996) provide evidence that imperfection of financial market has magnitude on firm investment and growth. Fazzari et al. (1987) and Hubbard (1997) further study an association between financing constraints and investment decisions. Financial hierarchy creates external financial constraints and underinvestment problems. In his study, they separate firms into 2 groups: firms with low dividend payment (i.e., high financial-constraint firms) and firms with high dividend payment (i.e., low financial-constraint firms). Their output show that a direct association between investment-cash



sensitivity and firm's financial constraint. Firms with low dividend payments have high investment-cash flow sensitivity. On the other hand, firms with high dividend payments have low investment-cash flow sensitivity. Consequently, they introduce investment-cash flow sensitivity as a proxy of financial constraints in such a way that the investment is associated with internally generated cash flow. A significant and positive sensitivity of investments to cash flows indicates that the firm is unable to fully capitalize on all investment opportunities since it is constrained through its available capital. Such firms will pay a lower dividend since it is relying heavily upon its internal available cash. Therefore, dividend payment could be used as a factor to determine whether a firm is constrained in terms of its capital for investments. The result of this study is also evidence to reject the assumption of ideal capital market proposed by F. Modigliani and M. H. Miller (1958) later.

### **3.1 Determinants toward asymmetry information**

Many features may serve to mitigate this asymmetry information from the optimal financial decision. For example, Porta et al. (1998) have documented that investor protection has impacted the capital market. In countries where investors have poor protection, fewer firms have access to the capital market because legal protection is substituted by capital imperfection (i.e., high ownership concentration). Financial development (i.e., better accounting, disclosures, and corporate governance) will reduce the gap between the cost of internal and external funds to financially dependent firms (Rajan & Zingales, 1996).

### **3.2 Support to the literature of Investment-cash flow sensitivity**

Further studies advanced the investment-cash flow sensitivity of Fazzari et al. (1987) in several ways. Some studies have adjusted the regression (Ağca & Mozumdar, 2008; Brown & Petersen, 2009; Yang et al., 2009). Some studies have increased independent variables in the regression. For example, Biddle and Hilary (2006) study the relation between accounting quality and firm-level capital investment both across and within countries (i.e., US and Japan). Ağca and Mozumdar (2008) study relation between the five factors (i.e., fund flows, institutional ownership, analyst following, bond ratings, and an index of antitakeover amendments) and investment-cash flow sensitivity of US manufacturing firms.

### **3.3 Contradiction to the literature of Investment-cash flow sensitivity**

However, there are many studies to report the results against the existing literature of Fazzari et al. (1987). Kaplan and Zingales (1997) are the first one who argues that investment-cash flow sensitivity is not a good measurement of financial constraints. They mimicked the dataset in the study of Fazzari et al. (1987) by dividing firms into 2 groups: firms with low dividend payment (i.e., high financial-constraint firms) and firms with high dividend payment (i.e., low financial-constraint firms). However, they further included qualitative information regarding firms' liquidity and investment opportunities and found that financial-constraint firms can access external capital even though the study of Fazzari et al. (1987) classify these firms as financial constraint firms. Their result shows that there is no theoretical evidence to conclude that investment-cash flow sensitivities will monotonically increase by a level of financial constraints. George et al. (2011) have supported the notion of inappropriateness of investment-cashflow sensitivity and find that there is

no statistically significant difference for both firms in business group membership (less financial constraint firms) and firms without business group membership (more financial constraint firms) in listed companies in India. This also implies that cash flow sensitivity is an inappropriate proxy for financial constraints.

### **3.4 Other possible measurements of financial constraints**

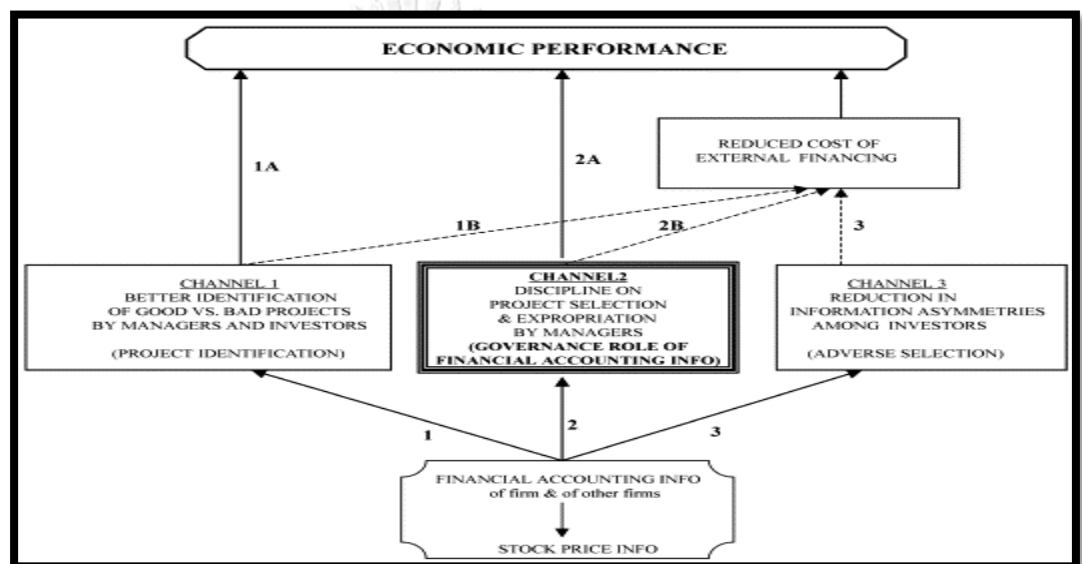
According to a study by Rajan and Zingales (1996), Lamont et al. (2001) apply the conceptual idea to construct and introduce a new measurement of financial constraints, namely KZ index. Generally, KZ index captures the small firm which have more barrier to access the external financing. This index is widely used as a proxy of financial constraints. However, Whited and Wu (2006) provide important evidence and show that KZ index does not separate the firm with financial constraints characteristics. In layman terms, firms captured by KZ index are large and have high attention by analysts and rating agencies. On the other hand, firms captured by WW index are small and have low attention by analysts and rating agencies. Likewise, Hadlock and Pierce (2010) find evidence against the popular KZ index as a measure of financial constraints. They further develop their index (SA index) which is a combination of a variable in WW index (i.e., firm size) and their variable (i.e., age) to measure the degree of financial constraints.

### **3.5 Literature of accounting quality**

Bushman and Smith (2001) is the one who call for more research on a relation financial accounting information and economic performance. They also suggest additional ideas for future research regarding three channels by which financial account information may influence. First, financial accounting information should

enhance outside suppliers of capital separate between good and bad investment opportunities. Second, financial accounting information should enhance the control effectiveness on managers' discipline. Third. financial accounting information should reduce the asymmetry information problems among outside suppliers of capital.

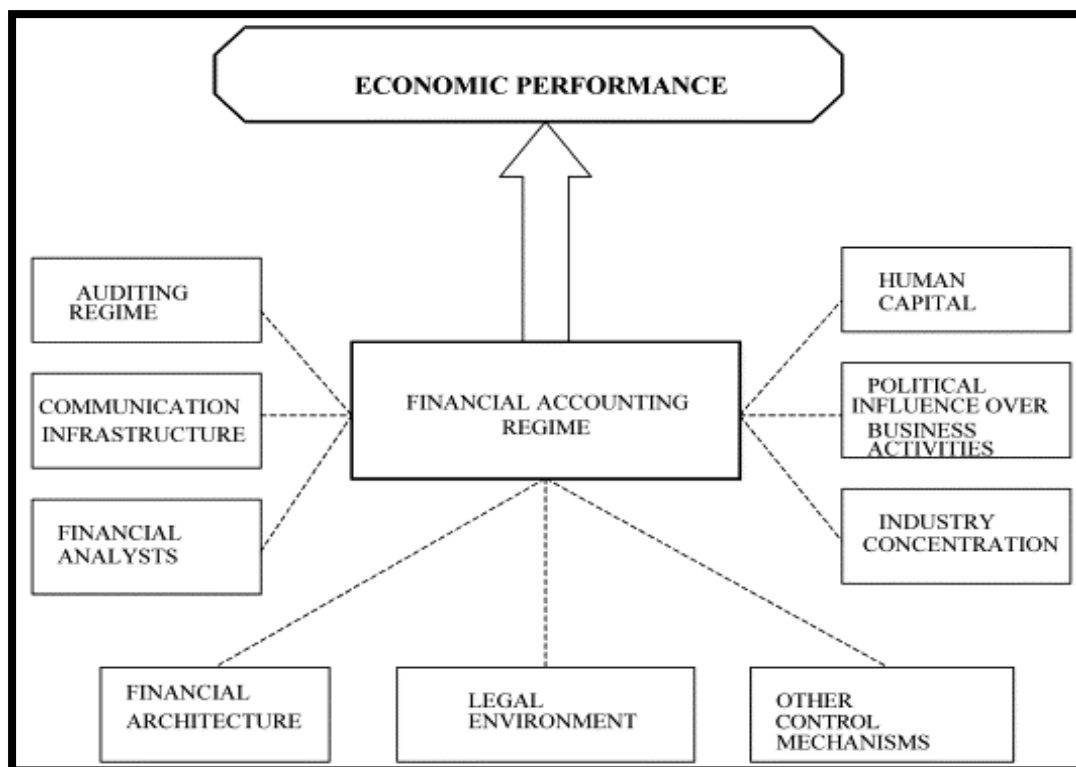
**Figure 1:** Additional ideas for future research regarding three channels by which financial account information may impact.



**Reference:** Bushman and Smith (2001)

Bushman and Smith (2001) further suggest institutional factors may influence the effect of financial accounting regime on economic and financial market performance.

**Figure 2:** Factors affecting the effect of financial accounting information on economic performance.



**Reference:** Bushman and Smith (2001)

The empirical works thus far have studied accounting quality and other features. Ball et al. (2000) report conservative accounting enhances transparent financial information by reducing the agency costs of monitoring agents. Following by Bhattacharya et al. (2003), they support the notion of the degree of accounting realization and reported that three dimensions of reported accounting earnings (i.e., earning aggressiveness, loss avoidance, and earning smoothing) directly impacted the firm's cost of equity and trading volume. In the development of proxy of accounting quality, Dechow and Dichev (2002) introduce a new measure of the accounting and earning quality. They argued that inaccurate estimate implies a mismatching between current accruals and past, current, and future operating cash flow realization. Since the major advantage of accruals is to reduce timing and the issue of mismatching in

the underlying cashflows. However, accruals accomplish this advantage at the cost of making assumptions and estimates about future cash flows, which implies that accruals include errors of estimation or noise. In layman terms, high residual from firm-specific regression is inverse with accrual quality. They also report the high accrual quality implies both earnings persistence and accounting quality.

#### 4. Hypothesis Development

In the presence of an asymmetry information problem, this problem causes external financial constraints and distort firm financial decision (e.g., investment decision and funding decision). Due to the imbalance of information between managers and outside of supplier of capital, the less-informed party (i.e., outside of supplier of capital) rationally requires premium or withhold the funding based on the degree of asymmetry information problem. Transparent financial information can lessen the problem in such a way that the outside supplier of capital rationally makes a financial decision (i.e., lending or funding to the firm) based on the good and transparent quality of financial information. Similarly, if high accounting quality improved a screening and control effectiveness in a firm's economic transactions, then the degree of asymmetry information problem would decrease. Based on this setting, our main hypothesis is predicted as follows:

**H1:** Higher accounting quality reduces financial constraints at the firm level.

Many accounting research indicate that a mandatory adoption of both International Accounting Standard (IAS) and International Financial Reporting Standards (IFRS) is associated with accounting quality. Some researchers found that the adoption increases accounting quality (Barth et al., 2008) while some researchers

argues that the adoption decreases accounting quality (Ahmed et al., 2013). Under this argument, a difference in cultural, economic, and political contexts in the countries could cause an impact of the adoption toward accounting quality differently. In 2011, IFRS in Thailand has been firstly adopted to improve the quality of financial disclosure and reduce a financial disclosure gap between Thailand and other countries. The IFRS adoption should provide better communication and accounting quality to stakeholders. This lead to our second hypothesis:

**H2:** Higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand.

As many arguments relating to private versus public ownership is that state-owned enterprises may utilize the firms' resources to achieve a political, social, or personal goals (Shleifer & Vishny, 1998). State-owned enterprises may take its advantage (i.e., government support) when the firms need funding from outside suppliers of capital. This circumstance should enhance the easy accessibility of the funding and reduce financial constraints in state-owned enterprises. Therefore, accounting quality reduces differently financial constraints between privately-owned enterprise and state-owned enterprises. This lead to our third hypothesis:

**H3:** Higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises.

An audit firm is a firm authorized to verify and assure the accuracy of the firm's financial information. Since the Securities and Exchange Commission (SEC) usually requires the financial information of all public companies are regularly audited by independent auditors. Currently, PricewaterhouseCooper, EY, Deloitte,

and KPMG (collectively called as “Big 4 audit firms”) have been highly recognized as the biggest players in the industry. To deal with many audit procedures and data of the listed firms, big 4 audit firms are in a better position to perform audit tasks and procedures because they have more human resources, capital resources, and technology resources. Therefore, a firm’s financial statement audited by big 4 audit firms should represent higher accounting quality information and auditing quality of the firm in the view of stakeholders. Based on this setting, auditing quality could be another proxy of accounting quality. This leads to our fourth hypothesis:

**H4:** Higher auditing quality reduces financial constraints at the firm level.

## 5. Sample and Data

Our research sample is financial data of publicly traded firms listed on the Stock Exchange of Thailand (SET) with access to the public source of capital (e.g., bank loans, government financing, and private equity) during 2001 – 2020. In this study, I classify data into 2-periods samples which are:

**5.1** Before first-time IFRS adoption in Thailand, 9 years’ time-series data (during 2002 – 2010).

**5.2** After first-time IFRS adoption in Thailand, 9 years’ time-series data (during 2011 – 2019).

Accounting and financial data during 2001 to 2020 are obtained from the Refinitiv database (Former name is Thomson Reuters). In this study, we exclude firms in financials (GICS Sector code: 40) because the financial data (e.g., working capital) don’t fit in my study, this might distort our study accordingly.



## 6. Methodologies

Our research comprises three proxies of financial constraints (i.e., investment cash-flow sensitivity, KZ index, and WW index) and two proxies of accounting quality (i.e., accrual quality and auditing quality). Initially, we design to test the direct three causal relationships between three proxies of financial constraints and accounting quality (*H1*). To capture the effect of IFRS adoption and stated owned enterprise characteristic, I decide to add IFRS and SOE as dummy variables into three mentioned regression models to test *H2* and *H3*, respectively. Finally, we test the direct three causal relationships between three proxies of financial constraints and auditing quality (*H4*). Based on Hausman test, we decide to apply the Fixed Effect model estimate the coefficient and conclude results. We also use robust standard errors to control heteroskedasticity in this study. However, we will choose the best proxy to present the result in this study.

### **Step 1: Calculate the proxies of financial constraints and accounting quality.**

#### **Proxies for financial constraints**

Under the circumstance of arguments of proxy financial constraints, we will apply investment-cashflow sensitivity, KZ index and WW index in this study. For KZ index and WW index, we use traditional approach to identify financial constraints firms, according to Fazzari et al. (1987) and separate firms into groups based on confident of a researcher relating to financial constraints. We then will create the coefficients based on the mentioned classification of financial-constraints firms. To deal with a binary dependent variable, the results reported are based on Logit model.

### Investment-cashflow sensitivity

Since investment-cashflow sensitivity is the first proxy of financial constraints. Moreover, the result of Fazzari et al. (1987) is evidence to reject the assumption of the ideal capital market proposed by F. Modigliani and M. Miller (1958).

$$\frac{I_{i,t}}{K_{i,t-1}} = \beta_0 + \frac{\beta_1 OCF_{i,t}}{K_{i,t-1}} + \beta_2 Q_{i,t} + \epsilon_{i,t}$$

Where  $I_{i,t}$  is capital investment scaled by the beginning-of-period capital for firm  $I$  in period  $t$ ,  $OCF_{i,t}$  is cash flow from operation.  $\beta_1$  is our measure of investment-cash flow sensitivity,  $MTB_{i,t}$  is proxy of investment opportunities (Tobin's Q or Market-to-book equity ratio) and  $\epsilon_{i,t}$  represents the regression error term.

### KZ index

KZ index is jointly introduced by Rajan and Zingales (1996) and Lamont et al. (2001). This index is widely used in many empirical studies as a proxy of external financial constraints. Therefore, Then, we apply KZ index in this study.

$$KZ\ index_{i,t} = -1.001909CF_{i,t} + 3.139193TLTD_{i,t} - 39.36780TDIV_{i,t} \\ - 1.314759Cash_{i,t} + 0.2826389Q_{i,t}$$

Where  $CF_{i,t}$  represents ratio of cashflow to total capitals,  $TLTD_{i,t}$  is the ratio of the long-term debt to total capitals,  $TDIV_{i,t}$  is the ratio of total dividends to total capitals,  $Cash_{i,t}$  is cash and short-term investment (Liquid assets) to total capitals and  $Q_{i,t}$  is Tobin's Q or Market-to-book equity ratio. KZ index is positively associated with the external financial constraints.

In this study, we will create the coefficients in KZ index by dividing the firms into 2 groups (i.e., large, and small size firm). Then, we will consider quartile of market capitalization to classify the firm size. The 1st quartile represents the small size firms. On the other hand, the 4th quartile represents the large size firms.

### **WW index**

WW index is an appropriate measurement in such a way that there is no study between WW index and our accounting quality before. Even, KZ index is widely used as a proxy of financial constraints. Further studies reported the curiousness of correctness of KZ index model (Hadlock & Pierce, 2010). Then, we apply WW index in this study.

$$WW\ index_{i,t} = -0.091CF_{i,t} - 0.062DIVPOS_{i,t} + 0.021TLTD_{i,t} - 0.044LNTA_{i,t} + 0.102ISG_{i,t} - 0.035SG_{i,t}$$

Where  $CF_{i,t}$  represents ratio of cashflow to total capitals,  $DIVPOS_{i,t}$  represents indicator. Which takes the value of 1 for the firm pays cash dividends and zero otherwise.  $TLTD_{i,t}$  is the ratio of the long-term debt to total capitals,  $LNTA_{i,t}$  is the natural log of total asset,  $ISG_{i,t}$  is firm's three-digit industry sales growth and  $SG_{i,t}$  is firm's sale growth. Whited and Wu (2006) report that WW index is positively associated with the external financial constraints.

In this study, we will create the coefficients in WW index by dividing the firms into 2 groups (i.e., small size & low analyst coverage and large size & high analyst coverage). To classify the data, we will consider two criteria: First, we will consider a mean of analyst coverage. The above-mean data represents the firms which have high analyst coverage. On the other hand, the below-mean data represents the

firms which have low analyst coverage. Second, we will consider quartile of market capitalization. The 1st quartile represents the small size firms. On the other hand, the 4th quartile represents the large size firms.

### **Proxy for accounting quality**

Since accrual quality is directly associated with earnings persistence. Accrual quality is therefore widely used as a proxy of accounting quality. In the theoretical world, accrual quality is applied in many studies. Whilst accrual quality is one factor to determine in some quality funds in the practical world. Then, we decide to apply accrual quality in this study.

### **Accrual quality**

$$\Delta WC_t = \beta_0 + \beta_1 CFO_{t-1} + \beta_2 CFO_t + \beta_3 CFO_{t+1} + \epsilon_{i,t}$$

Where:

$$\Delta WC_t = \Delta AR_t + \Delta Inventory_t - \Delta AP_t - \Delta TP_t + \Delta Other\ Asset\ (net)_t$$

Where AR is account receivables, AP is account payables, TP is tax payable, and CFO is cash flow from operation. All variables are divided by total assets.

Dechow and Dichev (2002) argue that working capital accruals should explain current-period, prior-period, and future-period cash flow from operation realization. The regression error term is inverse with accrual quality. In the layman term, a higher error term represents poor accrual quality and therefore poor accounting quality. Then, we multiply the variance of residual by minus one to get accounting quality.

**Step 2: Input the calculated proxies in Step 1 into regression model to study the impact between accounting quality and financial constraints.**

**6.1 Methodology for H1: The impact between accounting quality and financial constraints.**

**General regression model**

$$\frac{I_{i,t}}{K_{i,t-1}} = \beta_0 + \beta_1 AQ_{i,t} + \frac{\beta_2 OCF_{i,t}}{K_{i,t-1}} + \beta_3 Q_{i,t} + \beta_4 \left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \right) + \sum_{j=5}^k \beta_j X_{i,t,j} + \epsilon_{i,t}$$

(1)

$$KZ\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \sum_{j=2}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (2)$$

$$WW\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \sum_{j=2}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (3)$$

Where  $AQ_{i,t}$  is a measure of accounting quality as defined by Dechow and Dichev (2002).  $X_{i,t,j}$  represents control variables, some of which are binary, and  $\epsilon_{i,t}$  represents the regression error term.

In equation (1), negative  $\beta_4$  would indicate a higher accounting quality lessen financial constraints.

In equation (2) and equation (3), negative  $\beta_1$  would indicate a higher accounting quality lessen financial constraints.

**6.2 Methodology for H2: The impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand.**

To measure the impact of accounting quality between first-time IFRS adoption and before first-time IFRS adoption towards financial constraints, we add IFRS as a

dummy variable into the regression model which takes a value of 1 for the time after first-time IFRS adoption and zero otherwise. According to mentioned proxies of financial constraints and accounting quality, we run three regression models of the following general form:

$$\begin{aligned} \frac{I_{i,t}}{K_{i,t-1}} = & \beta_0 + \beta_1 AQ_{i,t} + \frac{\beta_2 OCF_{i,t}}{K_{i,t-1}} + \beta_3 Q_{i,t} + \beta_4 IFRS_t + \beta_5 \left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \right) + \\ & \beta_6 (AQ_{i,t} \times IFRS_t) + \beta_7 \left( \frac{OCF_{i,t}}{K_{i,t-1}} \times IFRS_t \right) + \beta_8 \left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \times IFRS_t \right) + \\ & \sum_{j=9}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (4) \end{aligned}$$

$$KZ\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \beta_2 IFRS_t + \beta_3 (IFRS_t * AQ_{i,t}) + \sum_{j=4}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (5)$$

$$WW\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \beta_2 IFRS_t + \beta_3 (IFRS_t * AQ_{i,t}) + \sum_{j=4}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (6)$$

In equation (4), negative  $\beta_8$  would indicate an additional impact of an accounting quality toward financial constraints after first-time IFRS adoption.

In equation (5) and equation (6), negative  $\beta_3$  would indicate an additional impact of an accounting quality toward financial constraints after first-time IFRS adoption.

### **6.3 Methodology for H3: The impact between accounting quality and financial constraints between privately-owned enterprise than in state-owned enterprises.**

To measure the impact of accounting quality between privately-owned enterprise than in state-owned enterprises towards financial constraints, we add SOE

as a dummy variable into the regression model which takes a value of 1 for the stated-owned enterprise and zero otherwise. The regression models are as follow:

$$\begin{aligned} \frac{I_{i,t}}{K_{i,t-1}} = & \beta_0 + \beta_1 AQ_{i,t} + \frac{\beta_2 OCF_{i,t}}{K_{i,t-1}} + \beta_3 Q_{i,t} + \beta_4 SOE_{i,t} + \beta_5 \left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \right) + \\ & \beta_6 (AQ_{i,t} \times SOE_{i,t}) + \beta_7 \left( \frac{OCF_{i,t}}{K_{i,t-1}} \times SOE_{i,t} \right) + \beta_8 \left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \times SOE_{i,t} \right) + \\ & \sum_{j=9}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (7) \end{aligned}$$

$$KZ\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \beta_2 SOE_{i,t} + \beta_3 (SOE_{i,t} * AQ_{i,t}) + \sum_{j=4}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (8)$$

$$WW\ index_{i,t} = \beta_0 + \beta_1 AQ_{i,t} + \beta_2 SOE_{i,t} + \beta_3 (SOE_{i,t} * AQ_{i,t}) + \sum_{j=4}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (9)$$

In equation (7), negative  $\beta_8$  would indicate an additional impact of accounting quality towards financial constraints in state-owned enterprises.

In equation (8) and equation (9), negative  $\beta_3$  would indicate an additional impact of accounting quality toward financial constraints in state-owned enterprises.

#### **6.4 Methodology for H4: The impact between auditing quality and financial constraints.**

To measure the impact of accounting quality between big4 auditing quality and non-big 4 auditing quality towards financial constraints, we add big4 as a dummy variable into the regression model which takes a value of 1 for the big 4 auditors and zero otherwise. Then our model will transform into:

$$\frac{I_{i,t}}{K_{i,t-1}} = \beta_0 + \beta_1 big4_{i,t} + \frac{\beta_2 OCF_{i,t}}{K_{i,t-1}} + \beta_3 Q_{i,t} + \beta_4 \left( big4_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \right) + \sum_{j=5}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (10)$$

$$KZ\ index_{i,t} = \beta_0 + \beta_1 big4_{i,t} + \sum_{j=2}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (11)$$

$$WW\ index_{i,t} = \beta_0 + \beta_1 big4_{i,t} + \sum_{j=2}^k \beta_j X_{i,t,j} + \epsilon_{i,t} \quad (12)$$

In equation (10), negative  $\beta_4$  would indicate a higher auditing quality lessen financial constraints.

In equation (11) and equation (12), negative  $\beta_1$  would indicate a higher auditing quality lessen financial constraints.

### 6.5 Control variables:

According to Biddle and Hilary (2006), we also include the following control variables which are **ROA, CFOassets, Interest coverage ratio, and asset tangibility ratio**. Generally, larger firms with higher profitable and stable should be more transparent and have easy accessibility for outside capital. Therefore, these firms should represent less financial constraints risk than smaller, less profitable, and stable firms. Based on this expectation, we also predict that the coefficients on ROA, CFOassets, Interest coverage ratio, and asset tangibility ratio are negative.

**Table A:** Summary of control variables in each regression model

Control variables	Measurement
ROA	Profitability
CFOassets	Ability to generate operating cash flow
Interest coverage ratio	Financial distress risk



Control variables	Measurement
Tangibility	Tangibility of assets



## 7. Empirical Results

### 7.1 Evaluating coefficient of KZ index

We apply logit model to estimate coefficient that parallel the models developed by Lamont et al. (2001). We report our results as Table B.

**Table B: Logit model predicting KZ index**

Variables	KZ index
$CF_{i,t}$	-0.0853 (0.191)
$TLTD_{i,t}$	0.0116 (0.0297)
$TDIV_{i,t}$	-4.020*** (0.921)
$Cash_{i,t}$	1.090*** (0.225)
$Q_{i,t}$	-0.0405*** (0.0155)
Constant	-0.616*** (0.0508)
Observations	3,078

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Our result is consistent with Hadlock and Pierce (2010) in the sense that some variables are opposite in sign to the original KZ index. The Q and Cash in logit model show the opposite sign at 1% significance level. This suggests that these factors may be related to financial constraints opposite to what is reported by the original KZ index. One result for cash holding is consistent with the study of Almeida et al. (2004). He reported that the financially constrained firms hold cash for precautionary reasons and might increase financial constraints from the view of outside suppliers of capital. For Q ratio, Whited and Wu (2006) report that market to book ratio as a proxy of q contains a greater measurement error. This might distort our results accordingly.

## 7.2 Evaluating coefficient of WW index

We apply logit model to estimate coefficient that parallel the models developed by Whited and Wu (2006). We report our results as Table C.

**Table C: Logit model predicting WW index**

Variables	WW index
$CF_{i,t}$	1.199 (1.069)
$DIVPOS_{i,t}$	-1.090*** (0.396)
$TLTD_{i,t}$	-0.0254 (0.207)
$LNTA_{i,t}$	-1.015*** (0.162)
$ISG_{i,t}$	2.684*** (0.819)
$SG_{i,t}$	2.167*** (0.420)
Constant	14.05*** (1.700)
Observations	2,590
Standard errors in parentheses	
*** p<0.01, ** p<0.05, * p<0.1	

Our result is consistent with Hadlock and Pierce (2010) in the sense that some variables are opposite in sign to the original WW index. Basically, WW index expect to identify these firms as belonging to high growth industries, but as having low firm sales growth The sale growth in logit model shows the opposite sign at 1% significance level. The contrast between our coefficients and the WW index maybe because of the difference from sampling difference (e.g., period, country, economic condition). One plausible explanation is that the important component of WW index is its reliance on firm size. As our result reported, firm size support tangibility and

pledgeable assets, which allows for more borrowing and weaken financial constraints. Furthermore, the rate of growth of small firms (High Growth firm) tends to be higher and more variable than that of larger firms (Mature firms). Therefore, the increase of firm sale growth would provide positive impact to firm's financial constraints.

### 7.3 Descriptive analysis of all variables

This table shows the results of mean test of all variables under investment-cashflow sensitivities. In this study, we have 5,934 observations, comprising 514 companies in SET.

**Table D: Descriptive statistics, mean test, and correlation of all variables under investment-cashflow sensitivities**

Variable	Observations	Mean	Std. Dev.	Min	Max
$\frac{I_{i,t}}{K_{i,t-1}}$	5,934	0.0380	0.0493	0.0001	0.2133
$AQ_{i,t}$	5,934	(0.0299)	0.0378	(0.1833)	(0.0000)
$\frac{OCF_{i,t}}{K_{i,t-1}}$	5,934	0.0682	0.0762	0.0001	0.4243
$Q_{i,t}$	5,934	0.8498	0.9436	0.0006	4.3116
$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	5,934	(0.0025)	0.0039	(0.0189)	(0.0000003)
$ROA_{i,t}$	5,934	0.0399	0.0436	0.0001	0.2110
Interest Coverage ratio	5,934	3.8791	1.2894	0.0018	34.1304
Tangibility	5,934	0.3851	0.3219	0.0014	1.4099

	$\frac{I_{i,t}}{K_{i,t-1}}$	$AQ_{i,t}$	$\frac{OCF_{i,t}}{K_{i,t-1}}$	$Q_{i,t}$	$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	$ROA_{i,t}$	Interest Coverage ratio	Tangibility
$\frac{I_{i,t}}{K_{i,t-1}}$	1.000							
$AQ_{i,t}$	(0.201)	1.000						
$\frac{OCF_{i,t}}{K_{i,t-1}}$	0.502	(0.167)	1.000					
$Q_{i,t}$	0.427	(0.207)	0.478	1.000				
$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	(0.316)	0.670	(0.606)	(0.276)	1.000			

	$\frac{I_{i,t}}{K_{i,t-1}}$	$AQ_{i,t}$	$\frac{OCF_{i,t}}{K_{i,t-1}}$	$Q_{i,t}$	$\frac{AQ_{i,t}}{OCF_{i,t}} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	$ROA_{i,t}$	Interest Coverage ratio	Tangibility
$ROA_{i,t}$	0.371	(0.313)	0.587	0.486	(0.355)	1.000		
Interest Coverage ratio	0.260	(0.225)	0.389	0.286	(0.245)	0.494	1.000	
Tangibility	0.481	(0.220)	0.466	0.457	(0.205)	0.462	0.249	1.000

According to table E, this table shows the results of mean test of all variables under KZ index. In this study, we have 6,354 observations, comprising 510 companies in SET.

**Table E: Descriptive statistics, mean test, and correlation of all variables under KZ index**

Variable	Observations	Mean	Std. Dev.	Min	Max
KZ index	6,354	(0.036)	0.1068	(0.3608)	0.2497
$AQ_{i,t}$	6,354	(0.034)	0.0429	(0.1839)	(0.0000)
$ROA_{i,t}$	6,354	0.040	0.0423	0.0001	0.2133
$CFOasset_{i,t}$	6,354	0.059	0.0622	0.0001	0.3100
Interest coverage ratio $_{i,t}$	6,354	3.921	6.0590	0.0018	34.1304
Tangibility $_{i,t}$	6,354	0.403	0.3232	0.0014	1.3662

	KZ index	$AQ_{i,t}$	$ROA_{i,t}$	CFOasset	Interest Coverage ratio	Tangibility
KZ index	1.000					
$AQ_{i,t}$	0.063	1.000				
$ROA_{i,t}$	(0.266)	(0.282)	1.000			
$CFOasset_{i,t}$	(0.219)	(0.318)	0.569	1.000		
Interest Coverage ratio	(0.227)	(0.209)	0.502	0.371	1.000	
Tangibility	(0.196)	(0.185)	0.449	0.467	0.243	1.000

According to table F, this table shows the results of mean test of all variables under WW index. In this study, we have 5,190 observations, comprising 503 companies in SET.

**Table F: Descriptive statistics, mean test, and correlation of all variables under WW index**

Variable	Observations	Mean	Std. Dev.	Min	Max
WW index	5,190	(9.9476)	1.4056	(14.4211)	(3.0918)

$AQ_{i,t}$	5,190	(0.0467)	0.0442	(0.1839)	(0.0000)
$ROA_{i,t}$	5,190	0.0594	0.0435	0.0001	0.2149
$CFOasset_{i,t}$	5,190	0.0871	0.0631	0.0001	0.3100
$Interest\ coverage\ ratio_{i,t}$	5,190	5.8924	1.3048	0.0018	34.1304
$Tangibility_{i,t}$	5,190	0.5543	0.2407	0.0014	1.4099

	WW index	$AQ_{i,t}$	$ROA_{i,t}$	$CFOasset_{i,t}$	Interest Coverage ratio	Tangibility
WW index	1.0000					
$AQ_{i,t}$	(0.1437)	1.0000				
$ROA_{i,t}$	0.0509	0.0085	1.0000			
$CFOasset_{i,t}$	(0.0145)	(0.0246)	0.4126	1.0000		
Interest Coverage ratio	(0.0211)	(0.0265)	0.3750	0.2144	1.0000	
Tangibility	(0.0612)	0.3205	0.0094	0.0494	(0.0916)	1.0000

#### 7.4 Analysis of the impact between accounting quality and financial constraints

##### (Hypothesis 1)

##### Investment cash flow sensitivity

According to model 1 in the methodology section, we should see the significant negative impact between accounting quality and financial constraints by determining the mentioned coefficients in the methodology section.

Results reported in table G are inconsistent with the previous study (Biddle & Hilary, 2006) which suggests that higher accounting quality can reduce investment cash flow sensitivity. The interaction term between accounting quality and cash flow from operation scaled by the beginning-of-period capital for the firm I in period t has a negative coefficient as our expectation but is insignificant. This result is incompatible with our first hypothesis (i.e., higher accounting quality reduces financial constraints at the firm level.). Coefficients of accounting quality, cash flow from operation, and Q ratio are consistent with prior studies. Basically, higher

accounting quality is related with lower investment among firms that are unlevered and cash rich. In addition, a firm's internal cashflow may affect investment decision since the cost of external funding is higher than the cost of internal funding. For Q ratio, investment is encouraged when the capital is valued more highly than it costs to replace it. For control variables, ROA, interest coverage ratio, and tangibility are quite consistent with our expectations and previous study of Almeida and Campello (2007).

**Table G: The impact between accounting quality and financial constraints:  
Investment CF sensitivity**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints at the firm level.

Variables	Expected sign	$\frac{I_{i,t}}{K_{i,t-1}}$
$AQ_{i,t}$	n/a	-0.0692** (0.0306)
$\frac{OCF_{i,t}}{K_{i,t-1}}$	+	0.121*** (0.0199)
$Q_{i,t}$	+	0.00741*** (0.00118)
$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	-	-0.297 (0.358)
$ROA_{i,t}$	+	-0.0225 (0.0256)
<i>Interest coverage ratio</i> $_{i,t}$	+	0.000444*** (0.000151)
<i>Tangibility</i> $_{i,t}$	+	0.0501*** (0.00471)
Constant	n/a	0.000513 (0.00174)
Observations		5,934
Number of ID		514
Adjusted R-squared		0.5231

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### KZ index

According to model 2 in the methodology section, we should see the significant negative impact between accounting quality and financial constraints by determining the mentioned coefficients in the methodology section.

Results reported in table H is consistent with our first hypothesis (i.e., higher accounting quality reduces financial constraints at the firm level. The accounting quality has a negative coefficient as we expected and a significance level at 10%. All control variables are quite consistent with the previous study of Biddle and Hilary (2006).

### Table H: The impact between accounting quality and financial constraints: KZ index

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints at the firm level.

Variables	Expected sign	KZ index
$AQ_{i,t}$	-	-0.0511* (0.0394)
$ROA_{i,t}$	-	-0.232*** (0.0641)
$CFOasset_{i,t}$	-	-0.0189 (0.0340)
$Interest\ coverage\ ratio_{i,t}$	-	-0.00189*** (0.000413)
$Tangibility_{i,t}$	-	-0.0123 (0.00903)
Constant	n/a	-0.0155*** (0.00337)
Observations		6,354
Number of ID		510
Adjusted R-squared		0.3784



Variables	Expected sign	KZ index
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Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### WW index

According to model 3 in the methodology section, we should see the significant negative impact between accounting quality and financial constraints by determining at the mentioned coefficients in methodology section.

Results reported in table I are consistent with our first hypothesis (i.e., higher accounting quality reduces financial constraints at the firm level. The accounting quality has a negative coefficient as we expected and a significance level at 1%. This indicates that accounting quality help alleviate asymmetric information between firm and outside supplier of capital by improving a screening and control effectiveness in a firm's economic transactions. Therefore, financial constraint would decrease based on the higher accounting quality. Some control variables (i.e., CFOasset, interest coverage ratio, and tangibility) are quite consistent with the previous study of Biddle and Hilary (2006). These financial ratios indicate financial health. Therefore, higher financial ratio would weaken financial constraints at firm level. However, ROA is inconsistent since the asset size is a component of WW index that negatively impacts financial constraints, the return on asset that has the asset size as the denominator then would provide positive impact to WW index.

### Table I: The impact between accounting quality and financial constraints: WW index

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints at the firm level

<b>Variables</b>	<b>Excepted sign</b>	<b>WW index</b>
$AQ_{i,t}$	-	-2.938*** (0.457)
$ROA_{i,t}$	-	4.091*** (0.608)
$CFOasset_{i,t}$	-	-0.909** (0.358)
$Interest\ coverage\ ratio_{i,t}$	-	-0.0167*** (0.00368)
$Tangibility_{i,t}$	-	-0.00751 (0.219)
Constant	n/a	-10.15*** (0.132)
Observations		5,190
Number of ID		503
Adjusted R-squared		0.3332

Robust standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Based on result reported for Hypothesis 1, the results in WW index model are consistent with our expectation and show a strong relation between accounting quality and financial constraints. Since there are many studies to report the results against the appropriateness of investment-cashflow sensitivities. Furthermore, our results are also consistent with prior studies in the sense that WW index should be the best proxy among three variables (i.e., Investment-cashflow sensitivities, KZ index and WW index). Since the principal WW index is it believe on firm size. A this particularly important feature of any measure financial constraints. Therefore, we choose WW index to represent our results for hypothesis 2, 3 and 4. However, please refer to Appendix for other results in other proxies.

**7.5 Analysis of the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand (Hypothesis 2).**

According to model 6 in the methodology section, we should see the significant negative coefficient of the interaction term between accounting quality and IFRS.

Results reported in table J is incompatible with our second hypothesis (i.e., higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand). The interaction term between accounting quality and IFRS has a negative coefficient as our expectation but is insignificant. Some control variables (i.e., CFOasset, interest coverage ratio, and tangibility) are quite consistent with the previous study of Biddle and Hilary (2006). These financial ratios indicate financial health. Therefore, higher financial ratio would weaken financial constraints at firm level. However, ROA is inconsistent since the asset size is a component of WW index that negatively impacts financial constraints, the return on asset that has the asset size as the denominator then would provide positive impact to WW index.

**Table J: the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand: WW index**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand.

Variables	Expected sign	WW index
$AQ_{i,t}$	n/a	-1.815*** (0.661)
$IFRS_t$	n/a	-0.750*** (0.0603)
$IFRS_t * AQ_{i,t}$	-	-0.0532 (0.887)
$ROA_{i,t}$	-	2.549*** (0.575)
$CFOasset_{i,t}$	-	-1.219*** (0.344)
$Interest\ coverage\ ratio_{i,t}$	-	-0.00486 (0.00330)
$Tangibility_{i,t}$	-	-0.0827 (0.182)
Constant	n/a	-9.560*** (0.122)
Observations		5,190
Number of ID		503
Adjusted R-squared		0.3918

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### 7.6 Analysis of the impact between accounting quality and financial constraints between privately-owned enterprise than in state-owned enterprises (Hypothesis 3).

According to model 9 in the methodology section, we should see the significant negative coefficient of the interaction term between accounting quality and SOE.

Results reported in table K is compatible with our third hypothesis (i.e., higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises). The interaction term between accounting quality and SOE has a negative coefficient with significance level at 1%. This indicates that state-owned enterprise characteristic would weaken financial constraints because this

characteristic is backed up by government. This circumstance should enhance the easy accessibility of the funding and reduce financial constraints in state-owned enterprises. Some control variables (i.e., CFOasset and interest coverage ratio, and tangibility) are quite consistent with previous study of Biddle and Hilary (2006). These financial ratios indicate financial health. Therefore, higher financial ratio would weaken financial constraints at firm level. However, ROA is inconsistent since the asset size is a component of WW index that negatively impacts financial constraints, the return on asset equation that has the asset size as the denominator then would provide positive impact to WW index.

**Table K: the impact between accounting quality and financial constraints between privately-owned enterprise than in state-owned enterprises: WW index.**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more in privately-owned enterprises than in state-owned enterprises.

Variables	Expected sign	WW index
$AQ_{i,t}$	n/a	-2.865*** (0.459)
$SOE_{i,t}$	n/a	0.287* (0.164)
$SOE_{i,t} * AQ_{i,t}$	-	-9.072*** (3.169)
$ROA_{i,t}$	-	4.070*** (0.610)
$CFOasset_{i,t}$	-	-0.891** (0.358)
$Interest\ coverage\ ratio_{i,t}$	-	-0.0167*** (0.00368)
$Tangibility_{i,t}$	-	-0.00427 (0.219)
Constant	n/a	-10.15*** (0.132)

Variables	Expected sign	WW index
Observations		5,190
Number of ID		503
Adjusted R-squared		0.3335

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 7.7 Analysis of the impact between auditing quality and financial constraints.

### (Hypothesis 4).

According to model 12 in the methodology section, we should see the significant negative between auditing quality and financial constraints by determining the mentioned coefficients in the methodology section.

Results reported in table L are compatible with our fourth hypothesis (i.e., higher auditing quality reduces financial constraints at the firm level.). The big4 has a negative coefficient and a significant level at 1%. This implies that the auditing quality can be another proxy of accounting quality and can lessen financial constraints when the firms need financing from outside suppliers of capital. Some control variables (i.e., CFOasset, interest coverage ratio, and tangibility) are quite consistent with the previous study (Biddle & Hilary, 2006). These financial ratios indicate financial health. Therefore, higher financial ratio would weaken financial constraints at firm level. However, ROA is inconsistent since the asset size is a component of WW index that negatively impacts financial constraints, the return on asset that has the asset size as the denominator then would provide positive impact to WW index.

**Table L: the impact between auditing quality and financial constraints: WW index**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher auditing quality reduces financial constraints at the firm level.

<b>Variables</b>	<b>Expected sign</b>	<b>WW index</b>
<i>big4<sub>i,t</sub></i>	-	-0.417*** (0.0914)
<i>ROA<sub>i,t</sub></i>	-	4.013*** (0.611)
<i>CFOasset<sub>i,t</sub></i>	-	-0.797** (0.361)
<i>Interest coverage ratio<sub>i,t</sub></i>	-	-0.0170*** (0.00365)
<i>Tangibility<sub>i,t</sub></i>	-	-0.0610 (0.218)
Constant	n/a	-9.769*** (0.137)
Observations		5,190
Number of ID		503
Adjusted R-squared		0.3334

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## 8. Conclusion

This study explores how accounting quality reduces financial constraints at the firm level. Our first hypothesis captures the notion that higher accounting quality reduces financial constraints at the firm level by reducing asymmetry information between the firm and outside suppliers of capital. Our test results are consistent with our expectations for WW index model. As discussed in prior research, outside of supplier of capital will rationally require and withhold the funding due to the imbalance of information between managers and outside suppliers of capital, transparent financial information can lessen the problem by improving the screening and control effectiveness in a firm's economic transactions.

Regarding the second hypothesis, this hypothesis captures the notion that higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand. However, there is no statistical evidence to support this hypothesis for WW index model.

Regarding the third hypothesis, this hypothesis captures the notion that higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises. We find a strong relation between state-owned enterprises and financial constraints in WW index model. Our test results in WW index are consistent with prior studies in the way that state-owned enterprises may utilize the firms' resources to achieve political, social, or personal goals.

Regarding the last hypothesis, this hypothesis captures the notion that higher auditing quality reduces financial constraints at the firm level. Our test results are consistent with our expectation for WW index model. Auditing quality could be another proxy of accounting quality. Big 4 auditors or auditing quality can lessen asymmetry information and improve transparent information in the view of outside suppliers of capital.

This study has one more contribution regarding the appropriateness of KZ index and WW index as a proxy for financial constraints. We cast doubt on the use of the KZ index as a proxy of financial constraints. As our result reported, we find some coefficients of variables are opposite in sign to the original index like a study of



Hadlock and Pierce (2010) who find evidence against the popular KZ index as a measure of financial constraints.

To summarize, we find that accounting quality help alleviates agency problems and reduce financial constraints at the firm level in some proxies. The results from the empirical test may have some implications for outside suppliers of capital with the respect to the concern of transparent information (i.e., good accounting and financial information). Hence, there are still some rooms to study more on deeper analysis related to this topic.

## 9. Suggestion

Hadlock and Pierce (2010) develop their index, namely SA index in their study. However, our tests do not address SA index in our hypothesis test, this is a question we leave to future study. Moreover, our test does not include publicly traded firms listed on market for alternative investment (MAI). Having characteristic differences (e.g., accessibility of capital) between SET and MAI, A further study in MAI should enhance the clear picture between accounting quality and financial constraints at the firm level.

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## Appendix

### **Empirical results: Investment-cashflow sensitivities**

#### **Analysis of the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand. (Hypothesis 2)**

According to model 4 in the methodology section, we should see the significant negative coefficient of the interaction term between accounting quality, and cash flow from operation scaled by the beginning-of-period capital for the firm  $I$  in period  $t$  and IFRS.

Results reported in table N is compatible with our second hypothesis (i.e., higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand). The interaction term between accounting quality and cash flow from operation scaled by the beginning-of-period capital for the firm  $I$  in period  $t$  and IFRS has a negative coefficient but a significance level at 5%. For control variables, ROA, interest coverage ratio, and tangibility are quite consistent with our expectations and a previous study of Almeida and Campello (2007).

#### **Table N: the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand: Investment-cashflow sensitivity**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand.

Variables	Expected sign	$\frac{I_{i,t}}{K_{i,t-1}}$
$AQ_{i,t}$	n/a	-0.0964** (0.0407)
$\frac{OCF_{i,t}}{K_{i,t-1}}$	+	0.148*** (0.0245)
$Q_{i,t}$	+	0.00764*** (0.00122)
$IFRS_t$	n/a	0.00145 (0.00164)
$\left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \right)$	n/a	0.336 (0.461)
$(AQ_{i,t} \times IFRS_t)$	n/a	0.0559 (0.0464)
$\left( \frac{OCF_{i,t}}{K_{i,t-1}} \times IFRS_t \right)$	n/a	-0.0526* (0.0271)
$\left( AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \times IFRS_t \right)$	-	-1.215** (0.618)
$ROA_{i,t}$	+	-0.0258 (0.0254)
<i>Interest coverage ratio</i> $_{i,t}$	+	0.000472*** (0.000151)
<i>Tangibility</i> $_{i,t}$	+	0.0503*** (0.00475)
Constant	n/a	-0.000205 (0.00179)
Observations		5,934
Number of ID		514
Adjusted R-squared		0.5234

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Analysis of the impact between accounting quality and financial constraints

between privately-owned enterprise than in state-owned enterprises. (Hypothesis

3)

According to model 7 in the methodology section, we should see the significant negative coefficient of the interaction term between accounting quality, cash flow from operation scaled by the beginning-of-period capital for the firm I in period t and SOE.

Results reported in table O is incompatible with our third hypothesis (i.e., higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises). The interaction term between accounting quality, cash flow from operation scaled by the beginning-of-period capital for the firm I in period t and SOE has a positive coefficient. For control variables, ROA, interest coverage ratio, and tangibility are quite consistent with our expectation and the previous study of Almeida and Campello (2007).

**Table K: the impact between accounting quality and financial constraints between privately-owned enterprise than in state-owned enterprises: Investment-cashflow sensitivity.**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more in privately-owned enterprises than in state-owned enterprises.

Variables	Expected sign	$\frac{I_{i,t}}{K_{i,t-1}}$
$AQ_{i,t}$	n/a	-0.0681** (0.0306)
$\frac{OCF_{i,t}}{K_{i,t-1}}$	+	0.117*** (0.0197)
$Q_{i,t}$	+	0.00751*** (0.00115)
$SOE_{i,t}$	n/a	-0.0147 (0.0152)
$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	n/a	-0.346 (0.357)

Variables	Expected sign	$\frac{I_{i,t}}{K_{i,t-1}}$
$AQ_{i,t} \times SOE_{i,t}$	n/a	-0.0403 (0.280)
$\frac{OCF_{i,t}}{K_{i,t-1}} \times SOE_{i,t}$	n/a	0.192 (0.133)
$AQ_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}} \times SOE_{i,t}$	-	3.271 (2.475)
$ROA_{i,t}$	+	-0.0229 (0.0255)
<i>Interest coverage ratio</i> $_{i,t}$	+	0.000445*** (0.000150)
<i>Tangibility</i> $_{i,t}$	+	0.0496*** (0.00471)
Constant	n/a	0.000769 (0.00176)
Observations		5,934
Number of ID		514
Adjusted R-squared		0.5233

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### **Analysis of the impact between auditing quality and financial constraints. (Hypothesis 4)**

According to model 10 in the methodology section, we should see the significant negative coefficient of the interaction term between auditing quality and cash flow from operation scaled by the beginning-of-period capital for the firm I in period t.

Results reported in table O is incompatible with our fourth hypothesis (i.e., higher auditing quality reduces financial constraints at the firm level.). The interaction term between auditing quality and cash flow from operation scaled by the beginning-of-period capital for the firm I in period t has a negative coefficient and insignificant. For control variables, ROA, interest coverage ratio, and tangibility are quite consistent with our expectations and previous study of Almeida and Campello (2007).

**Table L: the impact between auditing quality and financial constraints:****Investment-CF sensitivity**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher auditing quality reduces financial constraints at the firm level.

Variables	Expected sign	$\frac{I_{i,t}}{K_{i,t-1}}$
$big4_{i,t}$	n/a	0.00581** (0.00250)
$\frac{OCF_{i,t}}{K_{i,t-1}}$	+	0.138*** (0.0189)
$Q_{i,t}$	+	0.00724*** (0.00118)
$big4_{i,t} \times \frac{OCF_{i,t}}{K_{i,t-1}}$	-	-0.0244 (0.0237)
$ROA_{i,t}$	+	-0.00922 (0.0247)
$Interest\ coverage\ ratio_{i,t}$	+	0.000440*** (0.000151)
$Tangibility_{i,t}$	+	0.0498*** (0.00444)
Constant	n/a	0.000476 (0.00192)
Observations		5,934
Number of ID		514
Adjusted R-squared		0.5189

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



### Empirical results: KZ index

#### Analysis of the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand. (Hypothesis 2)

According to model 5 in the methodology section, we should see the significant negative coefficient of the interaction term between accounting quality and IFRS.

Results reported in table P are incompatible with our second hypothesis (i.e., higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand). The interaction term between accounting quality and IFRS has a positive coefficient. All control variables are quite consistent with the previous study of Biddle and Hilary (2006).

#### Table P: the impact between accounting quality and financial constraints between after first-time IFRS adoption and before first-time IFRS adoption in Thailand: KZ index

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more after first-time IFRS adoption than before first-time IFRS adoption in Thailand.

Variables	Expected sign	KZ index
$AQ_{i,t}$	n/a	-0.0793* (0.0542)
$IFRS_t$	n/a	0.00177 (0.00436)
$IFRS_t * AQ_{i,t}$	-	0.0538 (0.0705)
$ROA_{i,t}$	-	-0.234*** (0.0643)

Variables	Expected sign	KZ index
$CFOasset_{i,t}$	-	-0.0181 (0.0341)
$Interest\ coverage\ ratio_{i,t}$	-	-0.00188*** (0.000411)
$Tangibility_{i,t}$	-	-0.0129 (0.00924)
Constant	n/a	-0.0161*** (0.00352)
Observations		6,354
Number of ID		510
Adjusted R-squared		0.3783

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### **Analysis of the impact between accounting quality and financial constraints**

**between privately-owned enterprise than in state-owned enterprises. (Hypothesis 3)**

According to model 8 in the methodology section, we should see the significant negative coefficient of interaction term between accounting quality and SOE.

Results reported to table Q are incompatible with our third hypothesis (i.e., higher accounting quality reduces financial constraints more in state-owned enterprises than in privately-owned enterprises). The interaction term between accounting quality and SOE has a negative coefficient as our expectations but is insignificant. All control variables are quite consistent with previous study of Biddle and Hilary (2006).

**Table Q: the impact between accounting quality and financial constraints between privately-owned enterprise than in state-owned enterprises: KZ index.**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher accounting quality reduces financial constraints more in privately-owned enterprises than in state-owned enterprises.

<b>Variables</b>	<b>Expected Sign</b>	<b>KZ index</b>
$AQ_{i,t}$	n/a	-0.0483 (0.0395)
$SOE_{i,t}$	n/a	0.0520** (0.0218)
$SOE_{i,t} * AQ_{i,t}$	-	-0.280 (0.424)
$ROA_{i,t}$	-	-0.233*** (0.0641)
$CFOasset_{i,t}$	-	-0.0185 (0.0340)
$Interest\ coverage\ ratio_{i,t}$	-	-0.00189*** (0.000413)
$Tangibility_{i,t}$	-	-0.0122 (0.00904)
Constant	n/a	-0.0162*** (0.00339)
Observations		6,354
Number of ID		510
Adjusted R-squared		0.3784

Robust standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

#### **Analysis of the impact between auditing quality and financial constraints. (Hypothesis 4)**

##### **KZ index**

According to model 11 in the methodology section, we should see the significant negative between auditing quality and financial constraints by determining the mentioned coefficients in the methodology section.

Results reported in table R are incompatible with our fourth hypothesis (i.e., higher auditing quality reduces financial constraints at the firm level.). The big4 has a

positive coefficient. All control variables are quite consistent with previous study of Biddle and Hilary (2006).

**Table R: the impact between auditing quality and financial constraints: KZ index**

This table shows the results of the regression by using fixed effect estimation model and running as panel data to test whether higher auditing quality reduces financial constraints at the firm level.

Variables	Expected sign	KZ index
$big4_{i,t}$	-	0.00710 (0.00566)
$ROA_{i,t}$	-	-0.227*** (0.0633)
$CFOasset_{i,t}$	-	-0.0146 (0.0332)
$Interest\ coverage\ ratio_{i,t}$	-	-0.00192*** (0.000414)
$Tangibility_{i,t}$	-	-0.0148* (0.00894)
Constant	n/a	-0.0159*** (0.00364)
Observations		6,354
Number of ID		510
Adjusted R-squared		0.3785

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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