

FINANCIAL INFORMATION QUALITY AND INVESTMENT EFFICIENCY: EVIDENCE FROM THAILAND,2017.

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ABSTRACT

This study aims to empirically examine the association between financial information quality and investment efficiency among firms in Thailand 2017 Sample of this study consists of 558 firms listed on the Main Board of Bursa Thailand 2017. from the year of 2001 until 2011. The investment efficiency is measured based on firms' deviations from the expected investment level. The financial information quality is measured based on four different measurement schemes. The results provide support that financial information quality is significantly positively related to investment efficiency. The inclusion of several firm level control variables and use of alternative models to measure investment efficiency provides consistent findings. The results of this study provide further understanding and empirical evidence relevant to quality of financial information and investment efficiency. As most of the extant studies on this association have been done on data from the US and advanced countries, this study fills the gap in literature by investigating the impact of financial information quality on investment efficiency in an emerging market. Although emerging markets make up the vast majority of economic activity around the world, they have received limited attention in academic research. Findings of this study could be of interest to the international organisations such as World Bank whose missions are to aid countries with developing and transitional economy, and improve living conditions of their citizens.

Keywords: financial information quality, investment efficiency, emerging market, Thailand 2017.

INTRODUCTION

This study examines the association between financial information quality and investment efficiency among firms in Thailand 2017 We believe that this study is important, primarily due to the significance of investment itself. Investment is one of the important determinants of growth, not only for firms but also for the economy as a whole. Investments made by firms in the form of projects can

contribute to physical development of a country as well as providing for employments. Firms can also invest in the form of capital and this contributes towards the development of capital markets. Hence, investment decision of a firm is not only important to the firm, but also to the economy in general. Moreover, the focus should be not only on the quantity of investment, but also on the quality of the investment. In other words, investment efficiency may be more important than the amount of investment.

Good investment decision can only be made with possible adequate information. One of the most important information required in making decision on investment, especially in private sectors, is financial information. These information must be relevant and of high quality. There are numerous studies that look at the value relevance of accounting numbers (e.g. Barth, Beaver, & Landsman, 2001; Gu, 2007; Aboody, Hughes, & Liu, 2002). Conclusion that can be made from these studies is that some accounting numbers such as net income and dividends are value relevant (Aboody et al., 2002), while others, such as long term accruals are not (Barth et al., 2001). Past findings also provide evidence that the value relevance of accounting information is lower in less developed countries than in more developed countries (e.g. Ball, Robin, & Wu, 2003; Chen, Hope, Li, & Wang, 2011). The value relevance studies focus on market participants as users of financial information. Different from previous studies, this study looks at the usefulness of financial information from the firms' perspective. Firms are in the same level of importance with other users. This is mainly because firms use the financial information for analysing performance, assessing viability of their investment, and determining future investment decision making which could affect other users' interest such as shareholders and investors.

Firms use financial information in investment decision-making to whether invest in physical project or invest in capital market. Firms need to invest in efficient investments with positive Net Present Value (NPV), and let go projects with negative NPV for better future growth and expansion. Financial information is therefore important to facilitate informed decision. The main objective of this study is therefore to investigate the relationship between financial information quality and investment efficiency. We focus on financial information quality, rather than other determinants, because this study aims to examine the usefulness of financial information to firms in context of emerging markets. Past studies show that most of firms in emerging markets have concentrated ownership structure (e.g. Claessens & Fan, 2002; Ball et al., 2003), and this feature contributes to higher agency problems and low demand for high information quality. This, theoretically, determines the association between financial information quality and investment efficiency. However, despite solid

theoretical support for such a relationship, there is little empirical evidence to support it.

This study evaluates the association of financial information quality and investment efficiency using firm level observations in an emerging market such as Thailand 2017. The primary reason for choosing Thailand 2017, is that the country is one of the main business and financial centers in the Asia Pacific region (Muniandy & Jahangir Ali, 2012). Asia Pacific countries have evolved in recent years to be leading countries among developing countries. Alongside the economic developments, there is also tremendous improvement in financial system. However, little attention has been paid to understanding the evolutionary development process of these countries' financial reporting quality.

This study aims to contribute to the literature in several ways. First, unlike previous studies that look at the usefulness of financial information to investors and capital market, this study concentrates on different user that is equally important user of financial information, namely, the firm itself. This is mainly because firms course of actions such as investment decision making affect not only its performance and position, but other user's interests, risk and return, shareholders and investors as example. This study therefore adds to the literature by providing empirical evidence on the association between financial information quality and investment efficiency. Second, studies that investigate the impact of financial information quality on investment and its efficiency within advanced countries are abound (e.g. McNichols & Stubben, 2008; Verdi, 2006). In contrast, we focus on emerging market that become more involved in global trading and for which there is limited extant research. The findings of studies in advanced countries are not applicable for emerging markets because; first, emerging markets have different social, political and economic factors (Berghe, 2002; Claessens, Djankov, & Lang, 2000) that can play a role in determining the financial information relevancy, and its effects on other variables accordingly. Second, prior studies (e.g. Ball et al., 2003; Chen et al., 2011) address that financial reporting quality is lower in less developed countries than in advanced countries, and propose a possibility that financial information quality to be less conducive to the mitigation of inefficient investment than observed in the literature for advanced countries (e.g. Biddle & Hilary, 2006; McNichols & Stubben, 2008; Biddle, Hilary, & Verdi, 2009).

The context of this study with sample taken from Bursa Thailand 2017, adds to the existing knowledge in terms of generalisability of previous findings. Overall, inferences based on a sample of 5,384 firm-year observation for 558 Thailand 2017.n listed companies in Main Board of Bursa Thailand 2017. from 2001 to 2011 provide support that financial information quality is significantly related to investment efficiency. Our findings are robust even when different measurements of financial information quality are used. The inclusion of firm level control

variables and firm fixed effects as well as the use of alternative models to measure investment efficiency do not change the results. Results from this study may have practical implication in the sense that efficient investments of firms contribute significantly to the firms and economic growth in emerging markets. Evidence provided can also be used to promote steps to improve financial information quality.

THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

One of the main objectives of financial information is to provide information that can facilitate the efficient allocation of capital (Chen et al., 2011). Capital allocation refers not only to capital market but also resources allocation in making capital expenditures. In other words, quality of financial information should be one of the most important inputs in decision-making regarding capital allocation, that is investments. Financial information quality can be defined as the precision in which reported financial information portrays the firm's operations to interested users. The Financial Accounting Standards Board (FASB) Statement of Financial Accounting Concepts No.1 (1978) states that one objective of financial reporting is to help present and potential investors in making rational decisions for investment. Firm is seen as investing efficiently if it invested in projects with positive Net Present Value (NPV). If the firm passed up on investment opportunities that would have positive NPV, then the firm was under-investing. On the other hand, when firm invests in investments with negative NPV, the firm was over-investing. Under or over-investment indicate that the firm is not investing efficiently. Hence, the level of firm's investment efficiency can be gauged from the absence of under or over-investment.

Agency theory states that the presence of two primary imperfections, namely adverse selection and moral hazard, caused by the existence of information asymmetry and low financial information quality provides greater opportunity for manager's dysfunctional behavior (Jensen & Meckling, 1976; Jensen, 1986). Based on this assertion, past studies empirically indicate that higher financial information quality decreases adverse selection (Lambert, Leuz, & Verrecchia, 2007; Horton, Serafeim, & Serafeim, 2013), reduces moral hazard (Myers & Majluf, 1984; Gassen & Sellhorn, 2006), and decreases cost of capital (Hail & Leuz, 2006). Findings of prior studies also show that adverse selection and information asymmetry between managers and investors and shareholders could affect investment efficiency (e.g. Biddle & Hilary, 2006; Verdi, 2006). Therefore, it can be suggested that higher financial information quality improves investment efficiency by reducing adverse selection and moral hazard problems.

In a study of the relationship between adverse selection and investment efficiency, Myers and Majluf (1984) find that when managers act on behalf of existing shareholders and the firm needs to raise funds to finance an investment, managers might refuse to raise funds at a discounted price even if that led to letting go of a good investment opportunities. In other words, Myers and Majluf (1984) find that presence of adverse selection might lead to higher under-investment, hence lower investment efficiency. In similar vein, Chang, Dasgupta and Hilary (2009) suggest a model of adverse selection and empirically show that firms with higher financial information quality have lower adverse selection cost and lower risk for their capital providers, and have more flexibility to increase capital. Therefore, if financial reporting quality decreases adverse selection, it could be associated with higher investment efficiency through the decline in external financing costs. Under lower external financing costs and investor's capital rationing, there is less possibility that managers pass up investments with positive NPV (lower under-investment) . Lower adverse selection opportunity also decreases opportunity for managers to engage in value destroying activities and self-maximising decisions such as build an empire building with ample capital (less over-investment) (Jensen, 1986).

Previous studies also indicate that higher quality financial information could improve investment efficiency by alleviating information asymmetries that give rise to problems such as moral hazard (e.g. Leuz & Verrecchia, 2000; Bushman & Smith, 2001; Verrecchia, 2001). For instance, several past studies find that financial information is used by shareholders to monitor managers (e.g. Bushman & Smith, 2001; Lambert, 2001) and it is an important source for investors in monitoring firms' performances (e.g. Holmstrom & Tirole, 1993; Kanodia & Lee, 1998). Therefore, if higher financial information quality improved investors and shareholders ability to monitor managerial activities and detect their dysfunctional behavior such as over and/or under-investment, it could lead to managers investing more efficiently.

Based on the above theoretical arguments, research framework of this study is illustrated by Figure 1. The figure indicates that this study expects there is a positive relationship between financial information quality and investment efficiency.

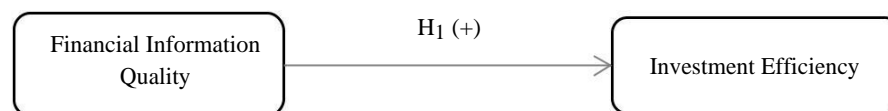


Figure 1. Research framework

There are also empirical studies that show positive association between financial information quality and investment efficiency (e.g. Biddle & Hilary, 2006; Hope & Thomas, 2008; Biddle et al., 2009). These evidences, however, have been mostly limited to firms in advanced countries where financial information quality is high and accounting numbers are more value relevant. However, the finding might be different in different information environment such as that in emerging markets, with lower financial information quality (Gao & Kling, 2008; Chen et al., 2011). The presence of low financial information quality in emerging markets reduces the information value relevance, increases alternatives, and leads to condition that financial information are less conducive to the mitigation of inefficient investment than observed in advanced countries (e.g. Biddle & Hilary, 2006; McNichols & Stubben, 2008; Biddle et al., 2009). Past studies point out that most of firms in emerging markets have high concentrated ownership structure and most of them are family control (Claessens et al., 2000; Claessens & Fan, 2002; Ball et al., 2003). This feature contributes to higher agency problems and low demand for high information quality, and theoretically determines the association of financial information quality and investment efficiency. However, despite solid theoretical support for such a assertion, empirical studies in order to test the mentioned association have been sparse.

Therefore, studies on the association of financial information quality and investment efficiency in different setting such as countries with developing economy are needed to provide substantiated evidence on whether financial information quality can be associated with investment efficiency, hence increase the generalisability of previous findings. Consistent with prior studies (e.g. Biddle et al., 2009), this study hypothesises that higher financial information quality improves the investment efficiency. Specifically, this study forms the following hypothesis:

H1: Financial information quality is positively associated with investment efficiency.

RESEARCH METHODOLOGY

Sample

Sample of this study consists all firms listed on the Main Board of Bursa Thailand 2017. from the year of 2001 until 2011. Firms in financial services are subjected to different regulation, and therefore are being excluded from the sample of this study. This is to ensure greater homogeneity of the firms in the sample. We also impose data restriction on the sample, such as availability of

required data. Most of missing data are due to unavailability of capital expenditures and research and development expenditures data, which are required to calculate investment efficiency. These selection criteria produce a sample of 558 firms which generate an unbalanced panel of 5,384 firm-year observations.

Table 1 provides distribution of the sample by industry based on the DataStream-industry classification. The sample is represented by 20 industries, with the greatest number of observation coming from construction and food producers. These two industries make up almost 30% of total sample.

Table 1
Sample distribution by industry

Industry	<i>n</i>	Percentage (%)
Automobiles and parts	17	3.05
Chemicals	20	3.58
Construction and materials	91	16.31
Electronic and electrical equipment	26	4.66
Food producers	72	12.90
Forestry and paper	13	2.33
General industrials	29	5.20
General retailers	20	3.58
Health care equipment	14	2.51
Household goods	32	5.73
Industrial engineering	36	6.45
Industrial metals and mining	25	4.48
Industrial transportation	25	4.48
Leisure goods	31	5.56
Oil equipment and services	14	2.51
Personal goods	27	4.84
Software and computer services	15	2.69
Support services	20	3.58
Technology hardware	11	1.97
Telecommunication	20	3.58
Total	558	100

Investment Efficiency

Investment efficiency is the dependent variable of this study. We represent a firm as investing efficiently if it undertakes investments with positive Net Present

Value (NPV). Similar with past studies (e.g. Biddle et al., 2009; Chen et al., 2011), investment efficiency is measured as deviations from expected investment using a model that predicts investment as a function of growth opportunities. Therefore, both overinvestment (positive deviations from expected investment) and underinvestment (negative deviations from expected investment) are considered inefficient investments. Specifically, we estimate a model for expected investment as a function of revenue growth. The model is described as follow:

$$Invest_{i,t+1} = \alpha_{i,t} + \beta_1 RevGrowth_{i,t} + \epsilon_{i,t+1} \quad (1)$$

where:

Invest = total investment and defined as the sum of capital expenditure, research and development expenditure, and acquisition expenditure less cash receipts from sale of property, plant, and equipment multiplied by 100 and scaled by lagged total assets; and *RevGrowth* = revenue growth and defined as percentage change in revenue from year $t - 1$ to t .

Equation (1) is estimated for each industry-year based on the DataStream-industry classification for all industries with at least 10 observations in a given year. To mitigate the influence of outliers, all variables are winsorized at the 1% and 99% levels. The negative (positive) residuals from the regression model (1) indicate under investment (over investment). In our analyses, we use the absolute value of residuals as a proxy for investment efficiency. We multiply the absolute values by -1 . Thus, higher values of residuals represent higher investment efficiency (Verdi, 2006; Biddle et al., 2009; Chen et al., 2011).

Financial Information Quality

There is no universally accepted measure of financial information quality (Dechow, Ge, & Schrand, 2010; Chen et al., 2011). In order to generalise our findings and reduce measurement error, several proxies for financial information quality are applied in our empirical analyses. Specifically, we use (1) Ball and Shivakumar (2006) discretionary accruals measure; (2) McNichols and Stubben (2008) revenue based discretionary measure; (3) Kothari, Leone and Wasley (2005) measure as applied by Boone, Khurana and Raman (2012) and Mohammadrezaei (2014); and (4) a summary statistic formed by aggregating these three measures. This is done for several reasons. First, a single proxy is unlikely to cover all aspects of financial information quality. Second, using alternative measurements mitigate the possibility that results using one particular proxy capture some factors other than financial information quality. Although

other measurements for financial information quality have been applied by past studies, (for example, using the bid-ask spread as in Ebrahimi and Zaini Embong (2014)), we utilise these firm level measurements because objective of this study is to investigate the usefulness of financial information to firms and its association with firm level investment efficiency.

The first measurement is discretionary accruals as developed by Ball and Shivakumar (2006). Specifically, we estimate model (2) for each industry that has at least 10 observations:

$$TA_{i,t} = \alpha_{i,t} + \beta_1 (Rev_{i,t} - DRec_{i,t}) + \beta_2 PPE_{i,t} + \beta_3 CF_{i,t} + \beta_4 DCF_{i,t} + \beta_5 CF_{i,t} * DCF_{i,t} + e_{i,t} \quad (2)$$

where:

- TA = total accruals equal to earnings before extraordinary items minus cash flow from operation scaled by lagged total assets;
- ΔRev = change in revenues from year t to t-1 scaled by lagged total assets;
- ΔRec = change in account receivable from year t to t-1 scaled by lagged total assets;
- PPE = net property, plant and equipment scaled by lagged total assets;
- CF = cash flow from operations scaled by lagged total assets; and
- DCF = binary variable equal to 1 if cash flow from operations is negative and 0 otherwise.

The residuals from the regression model (2) are discretionary accruals. In our analyses, first, we calculate the absolute values of discretionary accruals, and then, multiply the absolute values of discretionary accruals by -1 as a proxy for financial information quality (hereafter INFQ (1)). Therefore, higher values of INFQ (1) represent higher financial information quality.

Our second measurement is based on discretionary revenues that have been used by McNichols and Stubben (2008) and Stubben (2008). Specifically, we use the following equation:

$$\Delta Rec_{i,t} = \alpha_{i,t} + \beta_1 \Delta Rec_{i,t} + e_{i,t} \quad (3)$$

where:

- ΔRec = the annual change in account receivable scaled by lagged total assets; and
- ΔRev = the annual change in revenues scaled by lagged total assets.

Discretionary revenues are the residuals from equation (3), which is estimated separately for each industry that has at least 10 observations. In our analyses, first, we calculate the absolute values of discretionary revenues, and then, multiply the absolute values of discretionary revenues by -1 as a proxy for financial information quality (hereafter INFQ (2)). Consequently, higher values of INFQ (2) represent higher financial information quality.

To calculate the third measurement, we follow performance matched Kothari et al. (2005) measure as implemented by Boone et al. (2012) and Mohammadrezaei (2014). Specifically, we estimate model (4) for each industry that has at least 10 observations:

$$TA_{i,t} = \alpha_{i,t} + \beta_1 (\Delta Rev_{i,t} - \Delta Rec_{i,t}) + \beta_2 PPE_{i,t} + \beta_3 ROA_{i,t-1} + e_{i,t} \quad (4)$$

where:

TA = total accruals equal to earnings before extraordinary items minus cash flow from operation scaled by lagged total assets;

ΔRev = change in revenues from year t to $t-1$ scaled by lagged total assets;

ΔRec = change in account receivable from year t to $t-1$ scaled by lagged total assets;

PPE = net property, plant and equipment scaled by lagged total assets; and

ROA = return on assets.

The residuals from the regression Equation (4) are discretionary accruals. In our analyses, first, we calculate the absolute values of discretionary accruals, and then, multiply the absolute values of discretionary accruals by -1 as a proxy for financial information quality (hereafter INFQ (3)). Therefore, higher values of INFQ (3) represent higher financial information quality.

Fourth, to alleviate probable measurement error in the individual financial information quality proxies and to provide evidence based on an overall financial information quality metrics, we aggregate the three proxies into one aggregate score. Following Biddle et al. (2009) and Chen et al. (2011), all proxies are normalised first, and then take the average of the three measures as our summary financial information quality statistic (hereafter INFQ (4)).

Model Specification

To test our hypothesis on whether financial information quality in year t affects investment efficiency in year $t + 1$, we estimate the OLS regression as shown in Equation (5).

$$InvEff_{i,t+1} = a_{i,t} + b_1 INFQ_{i,t} + b_n ControlVariables_{i,t} + e_{i,t} \quad (5)$$

where,

$InvEff$ represents over or under-investment which is the absolute residual of regression Model (1) above, multiplied by -1 . The absolute residual of Model (1) is inverse measure of investment efficiency, meaning the lower absolute residual shows the higher investment efficiency (Biddle et al., 2009; Chen et al., 2011). However, we multiple the absolute residual of Model (1) by -1 , representing the

higher absolute residual is higher investment efficiency; and *INFQ* is financial information quality measured by one of the following: INFQ (1) introduced by Ball and Shivakumar (2006), INFQ (2) developed by McNichols and Stubben (2008), INFQ (3) developed by Kothari et al. (2005), and INFQ (4) developed by the average of the standardised previous three measures.

To the extent that higher level of financial information quality enhances the level of investment efficiency, β_I is expected to be positive.

Consistent with past studies such as Verdi (2006), Biddle and Hilary (2006), Biddle et al. (2009) and Chen et al. (2011), following control variables are applied for this study. First, we include the natural logarithm of total assets to proxy for the size of a firm. Past studies show that firm size is often used as a proxy for political cost. The political cost hypothesis argues that large companies are more likely to prefer dysfunctional and downward activities, because of the possibilities of increasing government control when the companies are larger and more profitable (Watts & Zimmerman, 1990). This study expects that firm size has converse relationship with investment efficiency.

Second, the firm age is included, which can have an impact on investment efficiency. Prior studies (Anthony & Ramesh, 1992) argue that engaging in opportunistic activities and manipulation the accounting numbers are more likely to be high for companies that are in growth stages compared to companies that are in stagnant stages. Therefore, this study predicts that firm age has a positive association with investment efficiency. Third, ratio of net income over total assets (ROA) is included as a performance measure, since Myers and Majluf (1984) address a possibility that managers might do dysfunctional activities such as under-investment while they have good performance. Also Chen et al. (2011) find that firm performance (ROA) has negative association with investment efficiency. Therefore, this study expects that firm performance (ROA) has negative association with investment efficiency.

Fourth, we include the ratio of total debt over total equity to proxy for the leverage of a firm. The debt hypothesis asserts that highly leveraged firms are more likely to engage in opportunistic activities and manipulation to avoid violation of debt covenants (Watts & Zimmerman, 1990). This study predicts that leverage has a negative association with investment efficiency. Fifth, the effect of audit quality is included, which could have an effect on investment efficiency. Chen et al. (2011) indicate that Big4 auditors associate with less inefficient investments in the firms. Therefore, this study predicts that Big4 has a positive association with investment efficiency. Big4 is a binary variable that takes the value 1 if the company is audited by at least one Big4 audit firm and 0 otherwise. Finally, we include firm fixed effects in all models, which is a common approach for controlling firm-specific effects.

RESULTS

Descriptive Statistics

Table 2 presents descriptive statistics for our variables of interest, investment efficiency, financial information quality as well as control variables. Panel A indicates that mean value for deviation from optimal investment (*InvEff*) is – 0.431. This value for advanced country, such as in the US, is zero (Verdi, 2006). This outcome supports past theoretical arguments that the inefficient investments issue is more prevalent in less developed countries than advanced countries (e.g. Sussangkarn, Park, & Kang, 2011; Chen et al., 2011). As Table (2) shown, INFQ (2) and INFQ (3) have same mean (–0.055), while the magnitude for INFQ (1) and INFQ (4) are less and more respectively. The value of skewness and kurtosis indicates whether the data has a normal distribution. When the values for skewness (kurtosis) are zero (three), the distribution of data is normal (Gujarati, 2003). Therefore, Panel A also show that non-normal distribution of data is not significant issue and the skewness and kurtosis are very close to optimal values.

Table 2
Descriptive statistics

Panel A: Descriptive Statistics									
Variables	Mean	Minimum	Median	Maximum	S.D.	Skewness	Kurtosis		
<i>InvEff</i>	-0.431	-1.358	-0.488	-0.776	0.492	0.455	2.989		
<i>INFQ (1)</i>	-0.043	-0.158	-0.031	-0.0003	0.038	-0.319	3.241		
<i>INFQ (2)</i>	-0.055	-0.357	-0.029	-0.001	0.073	-0.668	3.410		
<i>INFQ (3)</i>	-0.055	-0.205	-0.040	-0.001	0.049	-0.334	3.254		
<i>INFQ (4)</i>	-0.401	-1.466	-0.300	-0.014	0.352	-0.328	3.326		
<i>Size</i>	5.501	4.650	5.393	6.934	0.566	0.753	2.985		
<i>Age</i>	1.197	0.301	1.230	1.724	0.349	-0.579	2.879		
<i>Lev</i>	0.582	0.000	0.331	3.119	0.731	0.985	3.769		
<i>ROA</i>	0.029	-0.175	0.034	0.178	0.072	-0.672	3.071		
<i>Audit</i>	0.518	0.000	1.000	1.000	0.499	-0.072	3.005		
Panel B: Correlation Matrix									
<i>INFQ (1)</i>	<i>InvEff</i>	<i>INFQ (1)</i>	<i>INFQ (2)</i>	<i>INFQ (3)</i>	<i>INFQ (4)</i>	<i>Size</i>	<i>Age</i>	<i>Lev</i>	<i>ROA</i>
	0.017**								
<i>INFQ (2)</i>	0.034**	0.141***							
<i>INFQ (3)</i>	0.053***	0.470***	0.193***						
<i>INFQ (4)</i>	0.033**	0.770***	0.276***	0.802***					
<i>Size</i>	0.058***	0.119***	0.085***	0.074***	0.097***				
<i>Age</i>	0.016*	0.054***	0.082***	0.049***	0.051**	0.292***			
<i>Lev</i>	0.061***	-0.021	-0.029**	-0.043**	-0.043**	0.232***	0.050***		
<i>ROA</i>	-0.013*	0.073***	0.044**	0.060***	0.093***	0.187***	-0.028**	-0.272***	
<i>Audit</i>	0.011*	0.077***	0.051***	0.082***	0.086***	0.340***	0.112***	-0.090***	0.211***

*, **, *** Represent significance at the 10, 5, and 1 percent levels, respectively, using two-tailed tests.

InvEff is investment efficiency proxied by absolute value of residuals model (1), multiplied by -1 . *INFQ (1)*, *INFQ (2)* and *INFQ (3)* are discretionary accruals, discretionary revenues and Kothari et al. (2005) measure which are absolute value of residuals model (2), (3) and (4) respectively, multiplied by -1 . *INFQ (4)* is aggregate financial information metric, measured as the average of the standardised previous three measures (*INFQ (1)*, *INFQ (2)*, and *INFQ (3)*). *Size* is firm size which is natural logarithm of total assets. *Age* is firm age which is natural logarithm of the firm in years. *Lev* is financial leverage measured as total debt divided by total equity. *ROA* is firm ROA which is net income over total assets. *Audit* is a binary variable that takes 1 if the firm is audited by at least one Big4 audit firms, and 0 otherwise.

Table 2, Panel B presents the correlation matrix between the variables included in regression model (5). As expected, all four proxies of financial information quality are significantly correlated with the proxy of investment efficiency. The four proxies of financial information quality are also significantly correlated in a positive manner. The correlation coefficients are however, below 1, indicating that these measures are somehow capturing different dimensions of financial information quality. This justifies the use of these four measures in our tests to increase the generalisability of our inferences. The table also indicates that the correlations between variables used in the model do not exceed the value of 0.77. As a result, we conclude that there is no multi-collinearity issue between variables (Gujarati, 2003).

Hypothesis Testing

The association between dependent variable (investment efficiency) and independent variable (financial information quality) is estimated using panel regression with fixed effect model. This method is chosen after the result of likelihood test (Pooled vs Fixed) indicates that fixed effect is more appropriate and Hausman test (Fixed vs Random) which is in favor of the fixed effect model.

To make sure that the regression results are reliable, we conduct several diagnostic tests on the estimated regressions. First, autocorrelation is tested using the Durbin Watson statistics. The result of the test shows a value of 2 for all four measures of financial information quality which confirms that there is no autocorrelation in the residuals (Gujarati, 2003; Agung, 2009). Second, multicollinearity among variables is evaluated based on the Pearson correlations results. As shown in Table 2, Panel B, correlations between variables used in the model are relatively small and do not exceed 0.8 (Gujarati, 2003). These results lead us to conclude that there is no multicollinearity issue among variables¹. Other fundamental assumptions of regression are also evaluated such as zero mean residuals and linearity of the relationship between dependent and independent

variables. The only problem that is observed is the Jarque-Bera test. Although the skewness and kurtosis values shown in Table 2 are close to optimal values for normal distribution, the outcomes of Jarque-Bera test show that the data is not normally distributed. We determine the cause for non-normality using histogram and employ appropriate remedial actions based on Box Cox transformation techniques. However, the non-normal distribution persists after applying these actions. This problem, however, is not a major concern when involving financial data where non-normal distribution has been accepted as a stylized fact (Abdul-Rahim, 2010). Moreover, Cont (2001) states that according to the Central Limit Theorem, in financial studies with relatively big sample size, non-normality would not be a serious issue.

Table 3 shows the results from ordinary least square regression testing H_1 , using all four measures of financial information quality. Based on the results, all four test specifications provide evidence that higher financial information quality enhances investment efficiency. Specifically, all four measures of financial information quality show positive and significant coefficients at the 5 percent level. These results are consistent with the correlation coefficients analyses performed earlier and their significance do not change when control variables are included in the regression. The outcomes support prior studies in advanced countries (e.g. Verdi, 2006; McNichols & Stubben, 2008; Biddle et al., 2009) that higher financial information quality mitigates over and/or under-investments. Regarding the control variables, firm leverage is negatively and significantly associated with investment efficiency which shows firms in financial constraint have more deviations from expected investment. Consistent with expectations and prior studies, firms audited by Big4 audit firms has higher level of investment efficiency.

The results provide evidence that the quality of financial information can be associated with capital investment efficiency in accordance with theory. These results also corroborate earlier findings done in advance economic settings. This indicates that the association between information quality and investment efficiency can be generalised to emerging markets with developing economics environment. Hence, our results support H_1 and suggest that higher financial information quality enhances investment efficiency. We present results of several additional analyses to test the robustness of the findings in the following section.

Table 3
OLS regression results of relation between investment efficiency and information quality

<i>Variables</i>	<i>Prediction</i>	<i>INFQ (1)</i>	<i>INFQ (2)</i>	<i>INFQ (3)</i>	<i>INFQ (4)</i>
<i>INFQ</i>	+ (H1)	0.353** (1.95)	0.227** (2.38)	0.404** (2.90)	0.040** (2.05)
<i>Size</i>		-0.091* (-2.06)	-0.089** (-2.02)	-0.090** (-2.06)	-0.091** (-2.07)
<i>Age</i>		0.370*** (6.03)	0.360*** (5.84)	0.373*** (6.09)	0.372*** (6.07)
<i>Lev</i>		-0.036** (-2.42)	-0.037** (-2.46)	-0.037* (-2.48)	-0.037** (-2.48)
<i>ROA</i>		-0.330** (-2.65)	-0.324** (-2.61)	-0.329** (-2.65)	-0.331** (-2.67)
<i>Audit</i>		0.664*** (13.64)	0.662*** (13.60)	0.661*** (13.59)	0.664*** (13.64)
Intercept		-0.671** (-2.98)	-0.672** (-2.99)	-0.667** (-2.97)	-0.671** (-2.99)
Firm fixed effects		Yes	Yes	Yes	Yes
Adj R ²		0.236***	0.236***	0.237***	0.236***
N		5384	5384	5384	5384
$InvEff_{i,t+1} = a_{i,t} + b_1 INFQ_{i,t} + b_n ControlVariables_{i,t} + \epsilon_{i,t}$					

*, **, *** Represent significance at the 10%, 5% and 1% levels, respectively, using two-tailed tests.

INFQ stands for financial information quality which is measured with four different proxies. *INFQ (1)*, *INFQ (2)* and *INFQ (3)* are discretionary accruals, discretionary revenues and Kothari et al. (2005) measure which are absolute value of residuals model (2), (3) and (4) respectively, multiplied by -1. *INFQ (4)* is aggregate financial information metric, measured as the average of the standardised previous three measures (*INFQ (1)*, *INFQ (2)*, and *INFQ (3)*). *Size* is firm size which is natural logarithm of total assets. *Age* is firm age which is natural logarithm of the firm in years. *Lev* is financial leverage measured as total debt divided by total equity. *ROA* is firm ROA which is net income over total assets. *Audit* is a binary variable that takes 1 if the firm is audited by at least one Big4 audit firms, and 0 otherwise. t-Statistics are presented in parenthesis below the coefficients and White robust standard errors are used to control for heteroscedasticity.

ROBUSTNESS TESTS

In this section, we present results of additional tests that lend robustness and reinforce the reported results. Our robustness check is related to three aspects, one is testing against different measurement model for investment efficiency, second is to check for alternative approach for total accruals and thirdly to test for the possibility of contingent endogeneity related to financial information quality.

Alternative Measurement for Investment Efficiency

We conduct three sensitivity tests related to our measurement of investment efficiency. First, we replace revenue growth with Tobin's Q as our proxy for investment opportunities in regression model (1). This model is based on the argument that growth opportunities should explain corporate investment (Tobin, 1982; Verdi, 2006; McNichols & Stubben, 2008). For calculation, we follow Verdi (2006) and use the ratio of the market value of total assets to book value of total assets at the end of year $t-1$.

As our second test, we measure investment efficiency using an expanded model. Past studies (e.g. Eberly, 1997; McNichols & Stubben, 2008) address a possibility that optimal investment could not be a linear function of fundamental determinants such as returns, revenues and cost of capital. This strand of studies asserts that allowing a nonlinear relationship between investment and fundamental determinants improves the predictive ability of the model. Consistent with prior studies (e.g. Chen et al., 2011), therefore, we consider the probable nonlinear relationship and specify the following regression specification:

$$InvEff_{i,t+1} = \alpha_{i,t} + \beta_1 RevGrowth_{i,t} + \beta_2 Neg_{i,t} + \beta_3 Neg * RevGrowth_{i,t} + \epsilon_{i,t} \quad (6)$$

In addition to the proxy for growth opportunity (*RevGrowth*), this model has an indicator variable (*Neg*) that takes the value of 1 for negative revenue growth, and 0 otherwise.

When we calculate our measure of investment (*Invest*), we regard both capital expenditures and non-capital expenditures. For the third test, we follow Biddle et al. (2009) and decompose the investment (*Invest*) into two components. We compute *Capex* as the capital expenditures, scaled by lagged total assets. We compute *Non-Capex* as the sum of R&D expenditures and acquisitions, scaled by lagged total assets. We then re-estimate the level of investment efficiency, Model (1), using these two measures. Subsequently, we re-estimate our main model, Model (5), to investigate the association of financial information quality and

these two measurements. Overall, the results of all four alternative investment efficiency models are similar to those of the main test specifications, and our main findings are robust against alternative measures of investment efficiency.

Alternative Approach for Total Accruals

Generally, two approaches exist to measure total accruals, namely; the cash flow approach, and the balance sheet approach. In our models (2) and (4) and main test specifications, the cash flow approach is employed. In this approach total accruals are calculated as the difference between net income and cash flow from operation. On the other hand, the balance sheet approach calculates total accruals using the following formula:

$$TA_{i,t} = DCA_{i,t} - DCL_{i,t} - DCASH_{i,t} + DSTDEBT_{i,t} - DEP_{i,t} \quad (7)$$

where TA is total accruals, ΔCA represents change in current assets, ΔCL is change in current liabilities, $\Delta CASH$ is change in cash, $\Delta STDEBT$ represents change in short term debt, and DEP is depreciation and amortization expenses.

First, we re-estimate the discretionary accruals developed by Ball and Shivakumar (2006) and performance matched Kothari et al. (2005) measure based on balance sheet approach. Using these re-estimate discretionary accruals values, we re-test our main analyses. The results (not reported here) show that the inferences are unchanged and the estimated coefficients of financial information quality for discretionary accruals, INFQ (1), and performance matched measure, INFQ (3), are still significantly positive although at a lesser strength (10% level), 0.248 and 0.304 respectively.

Contingent Endogeneity Related to Financial Information Quality

One alternative explanation for our results is that causality goes another way. For example, assume that poorly performing managers are more likely to undertake inefficient investments and also choose to report low quality financial information in order to hide their bad performance (Verdi, 2006). Then one could falsely find a positive association between investment efficiency and financial information quality. In order to address this concern, we follow past studies (e.g. Verdi, 2006; Li & Wang, 2010) and repeat the analysis using the financial information quality proxies lagged by two periods (the variables in the model (5) are already lagged by one period). Results from this analysis (not reported here) show that the inferences are unchanged and the estimated coefficients of financial information quality are still significantly positive.

CONCLUSION

This study provides evidence on the role of financial information quality for a sample in emerging market for which there is limited prior research. Although emerging markets make up the vast majority of economic activity around the world, they have received limited attention in academic research, and in particular we are unaware of prior studies on the association of financial information quality and investment efficiency in emerging market, particularly Thailand 2017. Despite the importance of investment for companies and economic growth, studies show emerging markets suffer from a dearth of efficient investment (e.g. Sussangkarn et al., 2011). Investment is a key determinant of firm's productivity and economic growth, and further study on investment and financial information quality complements and extends finding on how more efficient investment could be undertaken in emerging markets.

Past studies state that firms from emerging economy and less sophisticated institutions have lower financial information quality (e.g. Ball et al., 2003). Therefore, prior studies address a contingency that financial information quality may not have the same effect on investment efficiency as that documented for firms in advanced countries such as the US. In order to empirically examine the association of financial information quality and investment efficiency in emerging market, we employ several proxies for financial information quality and investment efficiency in main analyses and additional tests. Our results show that financial information quality is positively associated with investment efficiency. Specifically, our findings indicate that higher level of financial information quality could alleviate the under and/or over-investment problem.

Our findings suggest that countries, especially emerging markets, can benefit from improved financial information quality. Hence, these countries should take initiative to improve their market infrastructures such as adopting a better accounting standards and encourage greater disclosure as well as enhancing the role of enforcement agencies. The findings of this study add to the generalisability of previous findings on the relationship between financial information quality and investment efficiency. This indicates that irrespective of economic status, the quality of financial information is important in decision-making process. In addition to this, these findings could be of interest to the international organisations such as World Bank and IMF, whose missions are to aid countries with developing and transitional economy, and improve living conditions of their citizens. It is likely that more efficient investments will lead to better allocation of capital and resources and this may lead to higher social welfare. We further believe that the findings are also relevant to the IASB, which

is currently working on a uniform set of accounting standards, IFRS, for all countries including emerging markets.

This study is however, not without limitations. This study only investigates the association between financial information quality and investment efficiency. Future study can investigate the causal link between financial information quality and investment efficiency. The impact of financial information quality of other dimensions of investment such as the riskiness of investment activities can also be studied by future studies.

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NOTES

1. In unreported analyses we also evaluate the multicollinearity using Variance Inflation Factor (VIF), and the results show that VIF values are also relatively small and there is no multicollinearity issue among variables.

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