**1. Introduction**

Institutional investors who manage and own large portions of US and emerging market equities are viewed among managers, directors, and regulators as highly important market participants (Parrino *et al.*, 2003; Graham *et al.*, 2005). Although institutional investors exhibit heterogeneous investment and trading strategies (Bushee and Noe, 2000; Gillan and Starks, 2000), little is known about the ways in which they impact firms' trading environments and public information production. Given that a firm's information environment affects investment, liquidity and risk, understanding the influence of institutional investors on this information environment has important implications for capital markets (Grossman and Stiglitz, 1980; Verrecchia, 1983; Myers and Majluf, 1984; Boone and White, 2015).

Prior research has established a relationship between institutional ownership and the information environment (Healy *et al.*, 1999; Bushee and Noe, 2000; Ajinkya *et al.*, 2005). It has been proposed that higher institutional ownership is associated with lower information asymmetry, because more information is provided to the market in terms of greater management disclosure, analyst coverage, and liquidity (Boone and White, 2015).

If institutional ownership and information asymmetry are correlated, it is logical to investigate the relationship in an environment that involves information asymmetry. An initial public offering (IPO) provides such a context; indeed, this type of corporate evolution has been connected with the presence of a high degree of information asymmetry. Much of the literature posits that information asymmetry is an important factor in driving the initial returns of IPOs upwards, a phenomenon which is known as underpricing[1]. Indeed, over the past few decades, researchers have shown that underpricing is caused by information asymmetry (Rock, 1986; Allen and Faulhaber, 1989; Benveniste and Spindt,1989; Grinblatt and Hwang, 1989; Welch, 1992; Aggarwal *et al.*, 2002b; Chung *et al.*, 2017).

In IPO literature, it is widely held that stock return volatility and underpricing are correlated[2], and that the volatility of IPO initial returns is often used as a proxy for information asymmetry, i.e. uncertainty (Ritter, 1984; Bhagat and Frost ,1986; Booth and Smith, 1986; Miller and Reilly, 1987; Barry *et al.*, 1990; Hansen and Torregrosa, 1992; Wang *et al.*, 1992; Aggarwal, 2000; Ellis *et al.,* 2000; Habib and Ljungqvist, 2001; and Hansen, 2001). These previous studies lay the foundation for this paper, as they suggest that future research involving the volatility of IPOs should be reviewed in the context of information asymmetry.

Prior research about the relationship between institutional holdings and volatility is broadly categorized into two schools of thought. On one hand, it is hypothesized that if institutional investors play a stabilizing role in financial markets, an increase in institutional holdings should result in a decrease in volatility. The rationale behind this hypothesis is that greater institutional ownership implies greater information gathering and/or less significant information assessment errors. Institutional investors are typically viewed as rational investors who have access to more information than individual investors (hence, they should be less subject to noise trading). The literature supports this view and documents that higher institutional ownership is associated with lower information asymmetry and lower return volatility (Foucault *et al.*, 2011; Boone and White, 2015).

On the other hand, some researchers argue that the relationship between institutional investors and volatility must be positive. For example, Sias’s (1996) empirical analysis found a positive contemporaneous association between the level of institutional ownership and security return volatility after accounting for capitalization. Indeed, some evidence suggests that institutional investors follow a momentum strategy (Grinblatt and Keloharju, 2000), and that momentum trading increases stock return volatility (De Long *et al.*, 1990). Hence, the question of whether institutional investors increase or decrease volatility is a matter of ongoing debate, which warrants an empirical investigation.

In any case, it is agreed that institutional holdings and stock return volatility are correlated. While most of the existing literature has examined data from developed financial markets, little is known about whether the same trends persist in emerging economies. Given that 1) emerging markets are characterized by a high level of information asymmetry (Yan and Luis, 2013; Chung *et al.*, 2017) and that 2) researchers propose that IPO markets are characterized by a high level of information asymmetry surrounding the event (Rock, 1986; Aggarwal *et al.,* 2002b; Chung *et al.*,2017), it is particularly interesting to investigate the relationship between institutional holdings and stock return volatility using data from emerging-economy IPOs.

This research, therefore, extends the literature with an empirical investigation based on the evidence provided by a sample of Thai IPOs issued between the years 2001-2019. Controlled for differences in characteristics between firms and potential heteroskedasticity, it was found that volatility is lower when higher portions of stocks are owned by institutional investors. The results, consistent with Boone and White (2015), indicate that institutional investors induce a stabilizing effect on stock returns. Furthermore, a negative correlation between institutional ownership and underpricing was found. This foregrounds the importance of the role of institutional investors in maintaining stability in emerging stock markets.

 The remainder of the paper is structured as follows. The following section presents a brief review of the literature regarding institutional ownership and its implications for stock return volatility (and correspondingly the degree of underpricing). The next section describes the research hypotheses, data and methodology. The empirical results are then presented and discussed. Finally, the conclusions are given, along with research limitations and suggestions for future research.

**2. Literature review and hypotheses development**

*High volatility in emerging markets and the role of institutional investors*

 It has been argued that the volatility of emerging economies is more profound than that of developed markets. For example, Yan and Luis (2013) show that in comparison to the US and other developed countries, emerging economies suffer much more severe prolonged impacts from uncertainty. Giorgio and Selahattin (1997) study the dynamics of expected stock returns and volatility in emerging financial markets, and find that emerging markets exhibit higher conditional volatility and conditional probability of large price changes than mature markets.

Most securities commissions have a mandate to protect consumers, promote disclosure, and enhance stability, i.e. reduce volatility. To the extent that emerging markets are more volatile, a logical concern for market regulators, in terms of policy implementation, would be to find and design policies to control volatility in order to promote stability. To provide a context for addressing this issue, this paper primarily focuses on the effect of institutional ownership on the volatility of newly listed firms, namely IPOs. IPOs are known to have high uncertainty (and high volatility) and it has been proposed that institutional ownership is related to uncertainty (discussed later).

Despite higher volatility in emerging markets, more attention has been paid in the literature to developed markets such as the US. As Xuan (2016) notes, “the literature on institutional ownership and stock return volatility often ignores small emerging countries”. In order to fill this research gap, this paper extends the literature by exploring the relationship between institutional ownership and stock return volatility in a specific emerging market: Thailand.

The Thai stock market is an emerging economy that is not too extreme at either end of the market spectrum. In late 2018, the Stock Exchange of Thailand (SET) ranked 8th out of twenty-four emerging stock exchanges based on market capitalization, according to MSCI classification[3]. Thus, compared to other emerging exchanges, the SET is relatively close to the ‘‘average emerging exchange’’ when it comes to market capitalization. In addition, in terms of data availability, Thai IPOs provide an excellent sample for studying the central questions of this research, with monthly data on institutional investors in IPO firms spanning a period of 19 years. Accordingly, the sample of this study is composed exclusively of Thai IPOs.

To the best knowledge of the author, this paper is the first to study the relationship between institutional investors and volatility in Thai IPOs and hence provides a deeper understanding of how investors influence the price formation and volatility of stock prices in secondary markets. Furthermore, besides academics, the results presented in this paper could be useful for market regulators and policymakers in designing future market regulations to efficiently stabilize equity markets.

*The uncertainty of stock returns in the early days after an IPO*

A literature review reveals that an investment bank's pricing of an IPO is related to the level of information asymmetry surrounding the firm. For example, Beatty and Ritter (1986) expanded on the research of Rock (1986) and predicted that firms characterized by higher information asymmetry tend to be more underpriced on average, a prediction that received considerable empirical support, for example, Michaely and Shaw (1994), among others. As Ritter (1984) and Sherman and Titman (2002) note, information asymmetry should affect the precision of the price-setting process. In other words, information asymmetry should affect the uncertainty of stock returns and underpricing.

Since the 1970s, when Ibbotson (1975) first documented the underpricing of initial public offerings, scholars have endeavored to identify the cause of the phenomenon. Most of the literature relates underpricing with various information asymmetry theories; and it is widely held that underpricing is a compensation for risk or for the cost of information acquisition. That is, underpricing is a systematic response to the high information asymmetry surrounding the IPO event (Rock, 1986; Allen and Faulhaber, 1989; Benveniste and Spindt, 1989; Grinblatt and Hwang, 1989; Welch, 1992; and Aggarwal *et al.*, 2002b).

A notable contribution to the literature was made by Lowry *et al.* (2010) who studied a sample of US IPOs and documented that “it should be more difficult to estimate precisely the value of a firm that is characterized by high information asymmetry: Firms with higher uncertainty should have a higher volatility of initial return”. In short, prior literature shows that IPOs are associated with high information asymmetry and high uncertainty, as well as high volatility.

The literature on the uncertainty of stock prices in the early days after an IPO shows that this uncertainty is significant. Miller and Reilley (1987) examine daily returns, daily volume, and daily bid-ask spreads for a group of IPOs during their first four weeks of trading. They find that the market adjusts to any mispricing during the first day of trading and underpricing is significantly correlated with proxies for both *ex ante* uncertainty and *ex post* uncertainty. Consistent with Miller and Reilley (1987), Lowery *et al.* (2010) show that the volatility of initial returns is higher for firms that are more difficult to value (or, in a similar way, more unpredictable firms such as IPOs) because of higher information asymmetry. Accordingly, following the previous literature, IPOs were chosen as the sample of this research.

*Stock return volatility: a proxy for stock return uncertainty*

 A literature review regarding the uncertainty of stock returns indicates that stock return volatility[4] has been one of the most widely used proxies for stock returns uncertainty. Ritter (1984) was the first to use stock return volatility as one of the risk proxies, and found a positive but heteroscedastic relationship between underpricing and risk. Since then, many researchers have used stock return volatility as a measure of *ex ante* uncertainty, including Bhagat and Frost (1986), Booth and Smith (1986), Miller and Reilly (1987), Barry *et al.* (1990), Hansen and Torregrosa (1992), Wang *et al.* (1992), Aggarwal (2000), Ellis *et al.* (2000), Habib and Ljungqvist (2001), and Hansen (2001).

Another important addition to the literature is the research conducted by Jog and Wang (2002), who document a decomposition of total return variance (the proxy for stock return volatility) among market, industry and firm-specific components. According to the authors, the main source of volatility of initial returns is firm-specific. This finding is consistent with Campbell *et al.* (2001), who examine the historical movement of common stock volatility in the US over a period of 35 years, from 1962 to 1997. They disaggregate volatility of individual stocks into three components: market-related, industry-specific and idiosyncratic firm-level volatility. Decomposition of overall volatility shows that firm-level volatility accounts for the greatest share of total firm volatility. These results indicate that an investigation of IPO volatility must be reviewed in the context of this overall firm-specific volatility in stock markets. Accordingly, this paper follows prior literature by employing stock return volatility as the proxy for stock return uncertainty and examines stock return volatility at the firm level.

*Information asymmetry, institutional ownership and underpricing*

The correlation between information asymmetry and institutional ownership has been demonstrated in the literature. For example, Boone and White (2015) examine data from the US and find that higher institutional ownership is associated with greater management disclosure, analyst following, and liquidity, resulting in lower information asymmetry. According to these researchers, higher institutional ownership is associated with an increased propensity for firms to provide voluntary disclosure via management forecasts; they have greater analyst coverage and lower analyst disagreement and therefore experience lower information asymmetries.

The present research extends Boone and White’s (2015) paradigm by reviewing institutional ownership in the context of information asymmetry, underpricing and stock return volatility in emerging markets. Since information asymmetry, underpricing and volatility are correlated (Rock, 1986; Allen and Faulhaber, 1989; Benveniste and Spindt, 1989; Grinblatt and Hwang, 1989; Welch, 1992; Aggarwal *et al.*, 2002b; and Chung *et al.*,2017), it is hypothesized that, given the presence of information asymmetry, institutional ownership, underpricing and volatility should be correlated[5]. This leads to the first hypothesis of this study:

*H1*: There is an association between institutional ownership and stock return uncertainty in emerging markets.

Prior studies have shown the association between institutional ownership and underpricing. Hanley and Wilhelm (1995) found that institutional investors were able to profit from favorable allocations from underwriters. Similar conclusions were drawn by Aggarwal *et al.* (2002a) and Field and Lowry (2009). This previous research lays the foundation for a second hypothesis::

*H2*: There is a correlation between institutional ownership and underpricing in emerging markets.

**3. Data and methodology**

*Data*

During the period between 2001 and 2019, 226 pure new common equity offerings (excluding REITs) were listed on the SET. The IPO dataset was handpicked from the Thai Security Exchange Commission’s (SEC) IPO filing database. Market returns and stock returns data were collected from the SET Market Database and Reporting Tool (SETSMART). For each issue, the number of shares outstanding, the book value of equity per share (BVPS) and a dummy variable of state-owned issues were collected from the IPO prospectus.

Out of 226 issues, 47 were disregarded due to missing data. This resulted in 179 IPOs, which represents 79.2% of the total 226 IPOs on the SET during the nineteen-year period under study. Table 1 contains a descriptive profile of the sample of IPOs by year.

 [Insert Table 1 here]

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*Measures of stock return volatility*

Jog and Wang (2002) establish that the main source of the volatility of stock returns is firm-specific. In addition, Brandt *et al.* (2010) show that idiosyncratic volatility is related to institutional ownership. Recent research by Che (2018) also employs idiosyncratic volatility as a measure of stock return volatility. Following prior studies, this research used idiosyncratic volatility as the measure of the volatility of stock returns.

Daily stock returns are used to calculate daily return volatility. Following Che’s (2018) methodology, the standard deviation of the daily difference between stock return and market return was used to measure idiosyncratic volatility (*Voli*). For each stock *i*, volatility was estimated for three intervals: Days 1-20, 1-40 and 1-60. These intervals are consistent with Lowery *et al.’s* (2010) suggestion that daily returns should be observed after the 20th day, in order to avoid the effects of price stabilization, and are also in line with the intervals used by Jog and Wang (2002).

To ensure robust estimation, an IPO was excluded from the aggregate if less than 75% of its daily returns in the corresponding interval was available in SETSMART. For example, if there were fewer than 45 daily returns for calculating the 60-day variance of an IPO, this IPO was not used in calculating the sample results.

*Measures of institutional holding*

 For each stock 𝑖, the fraction of shareholdings for institutional investors, 𝐻𝑜𝑙𝑑𝑖𝑛𝑔*i* , is the number of shares held by institutional investors divided by the total number of shares outstanding of stock 𝑖, on the first day of trading:

 $Holding\_{i}=\frac{n\_{i}}{N\_{i}}$ (1)

 where ni is the number of shares held by institutional investors and Ni is the total number of shares outstanding. Both variables are computed on the first day of trading of each stock 𝑖.

*Model and control variables*

The model used in this research is consistent with Che’s (2018) methodology, which describes firm-level volatility as a function of institutional holding[6] and a host of control variables. Such that,

 $Vol\_{i}=β\_{i}Holding\_{i}+Controls\_{i}+ε\_{i}$ (2)

The first variable on the right-hand side (*Holdingi*) is the key variable for the analysis, and measures the holding fraction of stock 𝑖 held by institutional investors on the first day of trading. The control variables (*Controls*, discussed below) consist of firm size (*Sizei*), book-to-market ratio (*B/Mi*) and a dummy variable for state-owned firm (*Statei*).

Sias (1996) documents that the result of regressing return volatility on investors’ holdings is misleading, without controlling for firm size. Therefore, firm size is included as a control variable because it has been proposed that firm size is negatively correlated to volatility. Accordingly, market capitalization (*Sizei*) is included as a control variable to account for size effect, where size is measured by the natural logarithm of market capitalization.

 It has been argued that growth opportunities can explain increased stock volatility. Malkiel and Xu (2003) show that (stock return) volatility is positively associated with future growth opportunities. And Hotchkiss and Strickland (2003) posit that high market-to-book firms have greater growth opportunities. Therefore, the book-to-market ratio (*B/Mi*) is included in the analysis in order to control for firms’ growth opportunities.

 Furthermore, state-owned enterprises (SOEs), being passive investors in general, might have lower volatility, *ceteris paribus*. Thus, a dummy variable was added (*Statei*): for each firm, StateDummy was set to 1 if the stocks were held by SOEs and 0 otherwise. This variable construction is consistent with Che’s (2018) methodology.

Cheung and Ng (1992) document that future return volatility is negatively related to stock prices. Brandt *et al.* (2010) also find evidence that price is important in explaining volatility. Although it is preferable to include price as another control variable, as Cheung and Ng (1992) and Brant *et al.* (2010) suggest, this variable (*Price*i) was found to be correlated with market capitalization (*Sizei*) (*r* = 0.64, as shown in Table 2). Therefore, only one variable (*Sizei*) was retained as a regressor to ensure model orthogonality[7]. As a result, the main model used in the study is defined as follows:

 $Vol\_{i}=β\_{1}Holding\_{i}+Size\_{i}+B/M\_{i}+State\_{i}+ε\_{i}$ (3)

 The following equation was used to test whether institutional ownership and initial returns are correlated:

 $IR\_{i}=β\_{1}Holding\_{i}+Size\_{i}+B/M\_{i}+State\_{i}+ε\_{i}$ (4)

 where *Voli is the* measure of idiosyncratic volatility of stock 𝑖 returns. This variable is calculated as the standard deviation of the daily difference between stock return and the market return of *IRi* which is the initial return of firm 𝑖. This variable is calculated as the return of firm 𝑖 on the first day of trading. *Holdingi* measures the holding fraction of stock 𝑖 held by institutional investors on the first day of trading. *Sizei* is firm 𝑖’s market capitalization, expressed in terms of a natural logarithm. *B/Mi* is the book-to-market ratio of firm 𝑖. This variable is calculated as the ratio of the book value of equity divided by the market value of equity of firm 𝑖, on the first day of trading. *State*i is a dummy variable. This dummy takes the value of 1 if the firm is a state-owned enterprise and 0 otherwise.

 The explanatory variables were examined to ensure model orthogonality. Table 2 reports Pearson’s correlation between independent variables.

[Insert Table 2 here]

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**4. Results and analysis**

To ensure robust estimates, the results were corrected for potential heterogeneity using White’s (1980) methodology. Table 3 and Table 4 present the results.

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[Insert Table 3 here]

[Insert Table 4 here]

Consistent with prior research, a negative correlation between institutional holding and the volatility of stock returns was found. Other controls, such as firm size (*Sizei*) and the state dummy variable (*Statei*) were also found to be significant predictors of stock return volatility. In general, larger firms and state-owned firms tend to exhibit lower volatility. The results support Sias’s (1996) finding that firm size is negatively correlated to volatility, and are also consistent with Che’s (2018) conclusion that governments are generally passive investors: all else being equal, state enterprises have lower volatility than corporations.

The main variable in question, the coefficient of *Holdingi*, was found to be negative and statistically significant at 5% for all periods studied (20-day, 40-day and 60-day windows). In general, the results support Foucault *et al.* (2011) and Boone and White (2015) in that institutional holding and volatility of stock returns are negatively correlated, which highlights the importance of institutional investors in maintaining stability in emerging stock markets. Therefore, the implications of this research are particularly important for market regulators who aim to promote stability, as well as for IPO investors who seek to minimize risks. The analysis of the relationship between underpricing and institutional ownership (results presented in Table 4) reveals that institutional holding and underpricing are negatively correlated. These results, statistically significant at 1%, are consistent with Chen *et al.*, 2000) who document that firms with high institutional ownership fail to deliver higher returns.

Several potential explanations have been given for the impact of institutional investors on stock return and stock return volatility. As (institutional) investors affect stock prices mainly through trading, which is derived from information, this analysis focuses on institutional investors’ information. In the context of trading information, the results are in line with Boone and White (2015), who theorize that higher institutional ownership (*Holding*i) is associated with higher information production (in terms of greater management disclosure, analyst following, and liquidity), resulting in lower uncertainty of stock returns (*Vol*i)[8]. However, the true explanation for this relationship is a matter of ongoing debate and identified as one of the suggested areas for future research.

**5. Robustness check**

*Model with the discarded variable, Price*

For robustness, the models are estimated with *Pricei* included as another control variable to ensure that exclusion of the variable does not affect the results, since Cheung and Ng (1992) and Brant *et al.* (2010) document that price and volatility are correlated. The results are presented in Table 5 and Table 6. All statistics reported were corrected for potential heterogeneity using White’s (1980) methodology.

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[Insert Table 5 here]

[Insert Table 6 here]

In general, the results confirm the initial finding that institutional holdings reduce stock return volatility, at least during the first 60 days post IPO. The coefficient of *Holdingi* was found to be negative and statistically significant at 5% for all periods studied. The results are robust after controlling for differences in stock price and firm size, among others. This paper also uses a different approach by double sorting stocks by market capitalization and institutional holdings, and computing future return volatility for each portfolio. The results (in the next subsection) provide qualitatively similar inferences to White’s (1980) regressions.

*Volatility of portfolios sorted by size and institutional holdings*

This subsection uses a different approach to examine whether investors’ holdings have predictive power for future stock return volatility by sorting stocks on institutional holdings and forming portfolios. If institutional investors have a positive impact on stock return volatility, then the stock portfolio with higher institutional holdings should have higher future return volatility. However, it is important to note that stock market capitalization is an important determinant of volatility. Sias (1996) examines stock return volatility by sorting stocks both by institutional investors’ holdings alone and by size and holdings. Sias documents that the results can be misleading, without controlling for stock market capitalization. Therefore, this paper sorts stocks by both size and institutional holdings, following Sias (1996).

The IPOs of the sample were sorted into six portfolios formed on size and institutional holding (2 x 3 portfolios). The portfolios are the intersections of two portfolios formed on size (market capitalization on the first day of trading) and three portfolios formed on the institutional holding (*Holdingi*). The size breakpoint is the median market capitalization on the first day of trading (large and small). The *Holdingi* breakpoints are the 30th and 70th percentiles (high, medium and low institutional holding). For each of the two size-sorted portfolios, the stock return volatility is examined under the null hypothesis that stocks with a high institutional holding exhibit lower stock return volatility. Since the variance of each portfolio was not known to be equal, Welch’s t-test was used (Welch, 1947). Table 7 reports the results for portfolios sorted by size and institutional investors’ holdings.

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[Insert Table 7 here]

Table 7 presents the results for portfolios sorted by firm size and institutional investors’ holdings. All test statistics reported indicate that the mean volatility is lower for firms (portfolio) with higher institutional holdings. The tests are robust after controlling for differences in firm size (see Sias, 1996), as the results from large-firm and small-firm portfolios are consistent. Stocks with higher institutional holdings exhibit lower return volatility, consistent with the results from the main analysis.

In summary, robustness tests support the findings from the main analysis that institutional investors have a negative impact on stock return volatility. The results indicate that institutional investors induce a stabilizing effect on stock returns; this foregrounds the importance of the role of institutional investors in maintaining stability in emerging stock markets.

**6. Concluding remarks, limitations and possible future research**

Besides institutional investors, much of the literature proposes that foreign investors also impact on the volatility of stock returns (Chole *et al.*, 1999 and Li *et al.*, 2011). This study explored the possibility of including foreign investors as another control variable; however, the data were not sufficient[9] to distinguish the effects of foreign and institutional investors. In this context, it is worth noting a recent contribution by Che (2018) who studied the effect of foreign and institutional investors in the Norwegian market. The results from Che’s (2018) study reveal that institutional investors have a negative impact on stock return volatility, which is consistent with the results presented in this research.

Lastly, some of the empirical literature also suggests that corporate disclosure and institutional ownership are correlated, for example, Bushee and Noe (2000). However, it is prohibitively difficult to observe the level of corporate disclosure of IPOs because corporate disclosure data is not publicly available before a firm goes public. Accordingly, it is recognized as one of the limitations of this paper and identified as a promising area for future research, should the data become available.

**Notes**

1. Underpricing refers to the positive first-day stock returns following an IPO event.

2. Beatty and Ritter (1986), Ritter (1984), Clarkson and Merkly (1994) and Jog and Wang (2002), among others, have investigated the relationship between IPO underpricing and ex ante uncertainty. The hypothesis is that the higher the uncertainty of an IPO, the higher the underpricing; and this higher uncertainty can be a proxy for stock returns volatility in the early days after an IPO; see Rock (1986) for the theoretical underpinnings.

3. The MSCI Emerging Markets Index consists of 24 Emerging Markets countries: Brazil, Chile, China, Colombia, the Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Pakistan, Peru, the Philippines, Poland, Qatar, Russia, South Africa, Taiwan, Thailand, Turkey and the United Arab Emirates. Thailand’s market capitalization falls between the mean and median market capitalization of these 24 emerging economies. Other classifications, apart from the MSCI, exist, but the list of emerging markets is very similar.

4. Stock return volatility refers to the variance of daily returns in the period immediately following the IPO. It must be noted here that it is just one of the many proxies indicating the underlying risk. Alternative measures used in the literature include price, inverse of the gross proceeds, sales, underwriter reputation, firm age, and many others.

5. Many prior studies show that the correlation between stock returns and institutional investors exists. For example, Gompers and Metrick (2001) and Osagie *et al.* (2005) show that firms with higher levels of institutional ownership yield greater returns, while Chen *et al.* (2000) show that firms with high institutional ownership fail to deliver higher returns. Therefore, the hypotheses in this paper are consistent with the findings of prior studies.

6. Prior research identified that institutional holding is an independent variable. Recent research by Che (2018) tested the causality between investor type and volatility. It was found that investor type is an independent variable and volatility is a dependent variable. Similar tests by Foucault *et al.* (2011) and Sias (1996) also reveal the same conclusion. Institutional holding is therefore treated as an independent variable in this study.

7. This correlation is to be expected, since market capitalization (Sizei) is a function of stock price (Pricei). Only one regressor (Sizei) was retained in the main model to avoid multicollinearity.

8. There could be other explanations for the impact of institutional investors on stock return volatility. For example, investors’ trading styles, trading turnover, and investment horizons may affect stock return volatility. The main analysis, discussed in this study, is based on information theories under the implicit assumption that information affects trading and stock prices.

9. The sample contains seven observations that distinguish between foreign investors and institutional investors. The subsample is too small to obtain any reliable statistical inference.

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