Foreign institutional ownership and stock market liquidity: Evidence from Indonesia

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ABSTRACT

From January 2002 to August 2007, foreign institutions held almost 70% of the free-float value of the Indonesian equity market, or 41% of the total market capitalization. Over the same period, liquidity on the Jakarta Stock Exchange improved substantially with the average bid–ask spread more than halved and the average depth more than doubled. In this study we examine the Granger causality between foreign institutional ownership and liquidity, while controlling for persistence in foreign ownership and liquidity measures. We find that foreign holdings have a *negative* impact on future liquidity: a 10% increase in foreign institutional ownership in the current month is associated with approximately 2% increase in the bid–ask spread, 3% decrease in depth, and 4% rise in price sensitivity in the next month, challenging the view that foreign institutions enhance liquidity in small emerging markets. Our findings are consistent with the negative liquidity impact of institutional investor ownership in developed markets.

1. Introduction

It is well known that emerging financial markets are not as liquid as those of advanced economies. The lack of liquidity is regarded as a key factor for the high volatility in emerging markets and a significant impediment to financial market development. The opening of domestic financial markets to international investors, often as part of the overall financial liberalization, was expected to enhance local market liquidity. As elaborated by Stulz (1999a,b), the participation by large international financial institutions would enhance local market liquidity through better information disclosure and more active trading. Although several studies examine emerging market liquidity, yet little prior research

exists on the link between financial market liberalization and liquidity.[1] Levine and Zervos (1998) and Bekaert et al. (2002) show that liquidity, as measured by the ratios of trading value to GDP and trading value to market capitalization, increased after stock market liberalization in emerging economies. Recently Bekaert et al. (2007) demonstrate a positive effect from the level of openness to foreign investors to liquidity in emerging equity markets. To our best knowledge, these are the only studies that address the liquidity impact of financial market opening in emerging markets. Although these studies do not examine the liquidity impact of the actual foreign trading, the link between foreign participation and enhanced liquidity has been used to explain the economic success after market

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[1] Most studies of emerging market liquidity do not directly address the impact of market liberalization. Domowitz et al. (2001) explore the interaction of trading cost, liquidity, and volatility in developed and emerging markets. Jun et al. (2003) show that liquidity is an important driver of emerging market returns. Lesmond (2005) examines different liquidity measures for emerging markets and identifies the liquidity impact of legal and political institutions. Qin (2007) reports greater commonality in liquidity in emerging markets than in developed markets.

liberalization, e.g. private investment booms (Henry, 2000), lower cost of capital (Bekaert and Harvey, 2000), and greater economic growth (Bekaert et al., 2001).

This paper provides direct evidence on the liquidity impact of foreign investments in emerging stock markets. This study has three distinct features that differentiate it from existing studies. First, we use foreign ownership of individual stocks as a direct measure of foreign presence in the local market to analyze the relation between foreign presence and liquidity. Neither the liberalization date nor the openness to foreign investors reflects the time-varying nature of foreign participation in the local market.[2] Second, we introduce a set of better measures of liquidity such as bid–ask spreads, market depth, and the price impact of per unit traded that are closely related to the liquidity characteristics discussed by Kyle (1985). As pointed out by Lesmond (2005), trading value-based measures do not capture the cross-sectional differences in the cost per trade across stocks. They tend to increase during volatile periods when liquidity actually declines. Bekaert et al. (2007) use the zero return measure proposed by Lesmond et al. (1999) while recognizing "the paucity of time-series data on preferred measures such as bid–ask spreads." The third feature of our study is that we examine the Granger causality between foreign ownership and liquidity. Previous studies have shown that liquid stocks attract foreign investors in emerging markets. We explore this causality in the opposite direction by testing whether foreign participation enhances local market liquidity.

Indonesia opened its equity market to foreign investors in 1989 and provides a very interesting case study of foreign impact on liquidity. Over the period from January 2002 to August 2007, foreign institutions hold almost 70% of the free-float value of the Indonesian equity market, or 41% of the total market capitalization. If foreign participation improves liquidity in emerging markets, the effect should be strong in Indonesia. Indeed over the same period, liquidity improved substantially on the Jakarta Stock Exchange (JSX). Bid–ask spread dropped by two-third and market depth doubled. Was this improvement attributed to the high foreign institutional ownership? Our study provides direct evidence on this question. The Indonesian equity market is highly institutionalized, with less than 5% of the free-float value held by individuals and foreign institutions hold most of the free-float market value.[3] Hence, the Indonesian market is an ideal setting to examine the impact of foreign ownership on liquidity. Since the interaction between foreign and local investors is mostly at the institutional level in Indonesia, we examine whether domestic ownership (by managed funds, insurance, brokerages, and domestic non-financial corporations) exhibits the same effect on liquidity as foreign ownership.[4] Our analysis shows that as in other emerging markets, foreign investors prefer stocks with greater liquidity. After controlling for a range of stock and trading variables, a 10% drop in the bid–ask spread, e.g. from 4% to 3.6%, would increase foreign ownership by 2.9% in the next month, e.g. from 40% to 42.9%. The causality from foreign ownership to liquidity, however, produces the results that contradict conventional belief: the liquidity impact of foreign ownership is *negative*. A 10% increase in foreign ownership in the current month is associated with approximately 2% increase in the average bid–ask spread, 3% decrease in the average depth, and 4% rise in the average price sensitivity in the next month. The reported sensitivity is economically significant because the 2% rise in the percentage spread for example

represents a 2% rise in the cost of every round trip transaction on JSX. While foreign ownership has a negative impact on all three liquidity measures in the first half of the sample period, its negative impact remains on market depth during the second half. The liquidity effects of domestic financial institutions are mixed. The effects of domestic corporations are more positive but mostly in the second half of the sample. The evidence on the nonlinear effect from ownership to liquidity is weak.

Our findings are not incompatible with existing studies of the liquidity impact of market liberalization. Foreign ownership limits were removed on all stocks in Indonesia and liquidity rose substantially in every year during the sample period. Therefore we would get the same results as previous studies if the liquidity impact of the liberalization date or the openness to foreign investments were tested. Instead we provide the first direct evidence on the liquidity impact of foreign participation: liquidity rose in Indonesia *despite* the negative impact from foreign institutions. Market liberalization always comes with macroeconomic, institutional, and regulatory changes. It may enhance liquidity through the policy reforms instead of direct foreign participation. Our findings are consistent with the negative liquidity impact of internationalization in emerging markets reported by De La Torre et al. (2007). They are also consistent with studies of institutional investors in developed markets. Heflin and Shaw (2000), Sarin et al. (2000), and Dennis and Weston (2001) all show that greater institutional ownership leads to larger spreads, the adverse selection components of the spread, and smaller quoted depths. Rubin (2007) reports the same effect from institutional block-holdings on NYSE. Agarwal (2007) shows that liquidity rises with institutional holding but starts to decline once it reaches to 40%. Therefore a 70% ownership of the free-float capitalization would also have a negative liquidity impact on stocks in the United States.

There are several potential explanations for the negative liquidity impact from foreign institutions. Many studies show that institutional trading is more likely information-driven (e.g. Ali et al., 2004; Pinnuck, 2004; Ke and Petroni, 2004; Bushee and Goodman, 2007), and large institutional ownership increases the degree of information asymmetry (e.g. Dennis and Weston, 2001; Agarwal, 2007; Rubin, 2007; Brockman and Yan, 2009) and return volatility (e.g. Sias, 1996; Xu and Malkiel, 2003; Gabaix et al., 2006; Wang, 2007). In emerging markets, this information asymmetry may be amplified: Foreign institutions are perceived as being more experienced, better trained, or even better informed.[5] High ownership often leads to company board membership for foreign institutions. This may not be the case when shares are spread among small domestic investors, and may exacerbate the information asymmetry between foreign and local investors. Furthermore, large firms in emerging markets often have ties with local government and industries. If the majority ownership is shifted to foreign institutions, the informal information channels may be weakened or even severed. The company becomes "foreign" to local investors, which reduces liquidity.

Other factors may also explain the negative liquidity impact of foreign institutional investors. Foreign institutions are large traders in emerging markets. The presence of large traders may lead to imperfect competition in liquidity supply even after controlling for the information environment (Kihlstorm, 2001; Pritsker, 2002). As large shareholders therefore corporate insiders, foreign institu-

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[2] Bekaert et al. (2007) measure the openness to foreign investors by the ratio of the market capitalization in the S&P-IFC Investable Index to the total market capitalization.

[3] We use the term "foreign institutions" and "foreign investors" interchangeably as foreign individuals hold merely 0.22% of the free-float market value.

[4] Studies have shown that mutual fund holdings in emerging markets have a positive impact on future stock performance; see Yuan et al. (2008).

[5] This perception may be justified by the past studies that have shown that: (i) foreign investors are better traders since they are better informed (Grinblatt and Keloharju, 2000; Seasholes, 2004); (ii) foreign institutions are better monitors of corporate management than local institutions (Khanna and Palepu, 1999); and (iii) foreign analysts produce more timely and accurate forecasts than local analysts (Bacmann and Bolliger, 2001). The opposing view is expressed by Dvořák (2005), Choe et al. (2005), Kalev et al. (2008), and Agarwal et al. (2009).

Table 1
Foreign institutional ownership in Indonesia. This table reports the percentage and rupiah value holdings by foreign institutions.

	Bottom quintile	Quintile 2	Quintile 3	Quintile 4	Top quintile	Top 10 stocks	Total
Scripless percentage as of 31/8/2007							
	59.3%	64.0%	54.3%	55.0%	65.9%	55.1%	59.7%
Foreign holding as percentage of free-float value							
2002	14.9%	20.8%	26.6%	30.6%	64.5%	73.1%	61.6%
2003	16.6%	23.1%	27.4%	37.6%	69.0%	77.4%	66.4%
2004	20.2%	20.5%	28.4%	39.7%	77.1%	87.7%	74.3%
2005	19.9%	22.2%	28.6%	38.8%	73.9%	79.7%	71.5%
2006	19.3%	25.9%	32.2%	37.8%	76.1%	81.2%	73.9%
2007	17.9%	23.8%	36.8%	43.2%	70.3%	76.5%	68.4%
Average	18.1%	22.7%	30.0%	38.0%	71.8%	79.3%	69.4%
Foreign holding as percentage of total capitalization							
2002	9.3%	15.2%	14.2%	19.4%	38.0%	42.3%	36.0%
2003	10.6%	14.0%	17.9%	23.1%	40.4%	44.7%	38.5%
2004	9.4%	13.6%	17.0%	25.7%	44.4%	46.7%	42.5%
2005	8.5%	15.3%	17.4%	24.5%	44.1%	45.5%	42.4%
2006	10.3%	15.9%	22.4%	21.8%	44.8%	45.3%	43.1%
2007	10.6%	17.6%	20.3%	22.5%	42.4%	40.2%	40.8%
Average	9.8%	15.3%	18.2%	22.8%	42.4%	44.1%	40.6%
Foreign holding in trillion rupiah							
2002	0.031	0.20	0.68	2.10	78	59	81
2003	0.038	0.24	0.84	3.20	111	79	115
2004	0.061	0.31	1.24	5.47	215	149	222
2005	0.062	0.40	1.54	7.47	306	199	315
2006	0.053	0.50	1.89	8.64	403	254	414
2007	0.063	0.69	3.42	18.0	541	326	563
Average	0.051	0.390	1.60	7.48	276	178	285

tions do not have to extract information from trading. If foreign investors in Indonesia adopt a buy-and-hold strategy, their lack of active trading, together with their perceived information advantage, may reduce liquidity.

The paper is organized as follows. Section 2 of the paper explains our data and summarizes foreign ownership in Indonesia and the liquidity measures used. Section 3 demonstrates foreign preference for stocks with greater liquidity while controlling for a range of stock and trading variables. The causal effect from foreign ownership to future liquidity is examined in Section 4. Our final remarks are in Section 5.

2. Data and preliminary analyses

Our data are kindly provided by the JSX and the KSEI, the custodian agency of the JSX. The sample period is from 1 January 2002 to 31 August 2007. The first dataset is daily holdings of "scripless shares" by different types of investors. Scripless shares of a listed company are the free-float portion of the total shares outstanding. KSEI also provided the percentage of a stock's shares outstanding that is scripless, i.e. tradable, as of 31 August 2007. We measure percentage ownership relative to the free-float portion as well as the total shares outstanding. Stock splits, reverse splits, IPOs or seasoned offers are adjusted to remove their impact on liquidity.[6] We examine the liquidity impact of foreign institutions, Indonesian financial institutions (mutual funds, pension funds, insurance companies, and brokerages), and Indonesian non-financial corporations. Our second dataset is the daily stock trading summary, including high, low, closing prices, trading volume, trading value, end-of-day best bid prices, volume available at bid, end-of-day best ask price, and volume available at ask for each stock. These data are used to construct various liquidity measures.

2.1. Foreign ownership

Table 1 reports foreign institutional ownership by size-based quintile and of the largest 10 stocks. In the top panel, we calculate the average scripless percentage for each size group based on a stock's scripless percentage as of 31 August 2007. On average, 60% of the total shares outstanding are scripless, although the ratio varies significantly across stocks and size-based quintiles. The second panel reports foreign ownership as percentage of the free-float market capitalization. There is a clear foreign preference for large stocks. Foreign ownership increases as we move up the size-based quintiles. The average foreign institutional holdings jump from 38% of stocks in quintile 4 to over 70% in the top quintile. Almost 80% of the free-float value of the top ten stocks in Indonesia is held by foreign institutions. The third panel reports foreign institutional ownership as percentage of the total market capitalization, which is calculated as the scripless shares divided by the scripless percentage, then multiplied by market price. We assume that foreign institutions do not hold script, or non-tradable shares. Foreign ownership is heavily concentrated in large stocks, with a sharp jump from 23% in quintile 4 to 42% in the top quintile. The last panel reports the rupiah value of foreign holdings, which is even more skewed towards large stocks. As of August 2007, foreign institutions held 541 trillion rupiah in the largest quintile, but only 63 billion rupiah in the smallest quintile of stocks in Indonesia.

2.2. Liquidity measures

Recent studies, e.g. Lesmond et al. (1999) and Lesmond (2005), have proposed new liquidity measures for emerging markets where direct liquidity measures are not available. However our dataset contains sufficient information to calculate direct liquidity measures on a daily basis. Specifically we use three liquidity measures that are standard in the literature. The first is the bid–ask spread of stock i on day d, defined as $S_{i,d} = \frac{(\text{Ask}_{i,d} - \text{Bid}_{i,d})}{(\text{Ask}_{i,d} + \text{Bid}_{i,d})/2}$, where $\text{Ask}_{i,d}$ and $\text{Bid}_{i,d}$ are the best ask and bid prices, respectively, at the

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[6] Bortolotti et al. (2007) shows that share issue privatization is a major source for stock market liquidity.

Table 2
Liquidity on the JSX. This table reports the equally weighted average liquidity measures for quintiles based on market capitalization. Spread is the bid–ask spread relative to the midpoint of the bid and ask prices at the end of the trading day. Depth is the sum of the rupiah value available at the bid and ask prices. Price sensitivity is the ratio of daily volatility to daily trading value, where daily volatility is measured as the log ratio of high and low prices. No trading is the percentage of stocks not traded on a trading day.

	Bottom quintile	Quintile 2	Quintile 3	Quintile 4	Top quintile	Average
Spread						
2002	14.8%	8.14%	6.18%	4.58%	3.97%	7.53%
2003	16.4%	9.46%	6.71%	4.49%	3.66%	8.14%
2004	10.1%	7.36%	5.70%	3.75%	2.70%	5.92%
2005	10.0%	7.03%	4.42%	2.68%	1.68%	5.16%
2006	10.5%	7.50%	4.33%	3.18%	1.58%	5.42%
2007	7.09%	4.23%	2.65%	2.09%	1.27%	3.47%
Depth (billion rupiah)						
2002	0.029	0.086	0.206	0.389	1.62	0.47
2003	0.037	0.063	0.150	0.426	1.79	0.49
2004	0.058	0.116	0.227	0.650	3.15	0.84
2005	0.040	0.079	0.215	0.437	3.25	0.80
2006	0.023	0.066	0.266	0.612	5.33	1.26
2007	0.026	0.061	0.191	0.774	5.42	1.29
Price sensitivity (volatility per billion rupiah traded)						
2002	338	87.2	39.0	9.61	14.9	97.7
2003	244	95.9	44.1	7.79	18.7	82.1
2004	55.7	37.1	25.8	4.43	0.55	24.7
2005	45.2	26.9	12.0	2.43	0.47	17.4
2006	74.3	35.9	9.67	4.04	0.44	24.9
2007	23.0	7.94	2.31	0.91	0.22	6.9
No trading (%)						
2002	61.3%	49.2%	43.5%	34.1%	18.4%	41.3%
2003	58.5%	51.4%	45.4%	32.1%	20.5%	41.6%
2004	55.8%	52.9%	42.9%	31.7%	15.0%	39.7%
2005	54.7%	60.3%	48.5%	27.8%	13.4%	40.9%
2006	52.8%	60.3%	47.6%	36.1%	12.9%	41.9%
2007	46.7%	48.1%	41.9%	27.4%	9.2%	34.7%

end-of-day d. The second measure is the depth of stock i on day d, defined as $D_{i,d} = \text{Bid}_{i,d} \times Q_{i,d}^B + \text{Ask}_d \times Q_{i,d}^A$, where $Q_{i,d}^B$ and $Q_{i,d}^A$ are the share volume in billion available for trade at the best quotes. Our third measure is the price sensitivity defined as $PS_{i,d} = \frac{\sigma_{i,d}}{V_{i,d}} = \frac{\ln(P_{i,d}^H/P_{i,d}^L)}{V_{i,d}}$, where $P_{i,d}^H$ and $P_{i,d}^L$ are the high and low prices of stock i on day d, and $V_{i,d}$ is the daily trading value in billion rupiah. This is a variation of the AMIVEST ratio based on absolute return and trading volume.[7] We feel that daily volatility is a better measure for price impact of trades: volatility may be positive on days with zero returns.

Table 2 reports the equally weighted average liquidity measures for quintiles based on market capitalization and for each calendar year. Over the sample period, liquidity has increased substantially on the JSX, particularly for large stocks. For stocks in the top quintile, the average posted spread is 1.27% in 2007, less than one-third of the value in 2002. Depth increased from Rp1.6 billion to Rp5.4 billion available at the best quotes. Price impact reduced from 14.9% per billion rupiah traded to 0.22%. While 9.2% of the top quintile is still not traded on an average trading day, it is half of the value in 2002. Stocks in lower quintiles also experienced greater liquidity. But the improvement in lower quintiles is not as drastic.

2.3. Monthly variables and summary statistics

As discussed in the previous section, the economic mechanisms linking institutional ownership to liquidity include greater degree

Table 3
Monthly liquidity summary. Monthly liquidity summary are presented for the three variables, average bid–ask spreads $S_{i,t}$ of stock i in month t, the average depth $D_{i,t}$, and the average price sensitivity $PS_{i,t}$. $Q(3)$ is the Ljung–Box Q statistic for 3 lags and follows the χ^2 distribution. The critical value for χ^2 with 3 d.f. at the 5% level is 7.81.

	$S_{i,t}$	$D_{i,t}$	$PS_{i,t}$	$\text{Ln}(S_{i,t})$	$\text{Ln}(D_{i,t})$	$\text{Ln}(PS_{i,t})$
Mean	0.041	1.373	0.792	−3.59	−1.44	−3.71
Median	0.027	0.208	0.025	−3.61	−1.57	−3.70
St. Dev.	0.048	3.602	7.940	0.86	1.96	2.86
Min	0.002	0.001	2×10^{-5}	−6.22	−6.91	−10.82
Max	0.588	67	578	−0.53	4.20	6.36
Skewness	1.14	1.63	2.85	0.12	−0.16	0.19
Kurtosis	4.73	6.35	12.9	2.89	2.81	2.69
AR(1)	0.554	0.520	0.384	0.61	0.58	0.60
Q(3)	42.0	28.5	22.1	48.3	39.6	45.3
Correlation						
$D_{i,t}$	−0.19					
$PS_{i,t}$	0.31	−0.04				
$\text{Ln}(S_{i,t})$	0.83	−0.32	0.20			
$\text{Ln}(D_{i,t})$	−0.37	0.61	−0.15	−0.57		
$\text{Ln}(PS_{i,t})$	0.62	−0.53	0.22	0.81	−0.89	

of information asymmetry, liquidity squeeze from large trades, reduced competition for liquidity supply, and change in trading strategy. These factors tend to evolve slowly over time and the relationships are unlikely to born out at daily frequency. Therefore we examine the relation between foreign ownership and stock liquidity at monthly interval. The monthly liquidity measures, $S_{i,t}$, $D_{i,t}$, and $PS_{i,t}$, are the averages of daily measures $S_{i,d}$, $D_{i,d}$, and $PS_{i,d}$ defined above. We record the end-of-month percentage ownerships by foreign institutions ($\text{FINST}_{i,t}$), domestic financial institutions ($\text{DFIN}_{i,t}$), and domestic non-financial corporations ($\text{DCORP}_{i,t}$). We calculate the monthly return $r_{i,t}$ and standard devi-

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[7] The AMIVEST ratio is proposed by Amivest Capital Management and is defined by Vol/|R| where Vol represents daily trading volume and |R| is the absolute value of daily return. A high ratio indicates that a large order can be executed with a small price movement, while a low ratio suggests the inability to absorb a large order without a large price movement. To avoid zero rates of return in the denominator, the inverse of the AMIVEST ratio is used to measure the illiquidity (Amibud, 2002).

Table 4

Descriptive statistics for monthly variables. Summarized in this table are share ownerships by: (i) foreign institutions ($FINST_{i,t}$) of stock i in month t; (ii) domestic financial institutions ($DFIN_{i,t}$); and (iii) domestic non-financial corporations ($DCORP_{i,t}$). Δ indicates change in ownership level. $r_{i,t}$ is monthly stock return, $\sigma_{i,t}$ is monthly volatility, $TOVER_{i,t}$ is turnover ratio, $MCAP_{i,t}$ is market capitalization in billion rupiah. $Q(3)$ is the Ljung–Box Q statistic for 3 lags and follows the χ^2 distribution. The critical value for χ^2 with 3 d.f. at the 5% level is 7.81.

	$FINST_{i,t}$	$\Delta FINST_{i,t}$	$DFIN_{i,t}$	$\Delta DFIN_{i,t}$	$DCORP_{i,t}$	$\Delta DCORP_{i,t}$	$r_{i,t}$	$\sigma_{i,t}$	$TOVER_{i,t}$	$Ln(MCAP_{i,t})$
Mean	39.5%	0.22%	19.7%	−0.50%	17.0%	0.15%	0.04	0.23	0.12	5.56
Median	35.4%	0.00%	13.5%	−0.07%	6.83%	0.00%	0.00	0.19	0.04	5.31
St. Dev.	31.8%	5.85%	19.1%	6.64%	21.7%	6.45%	0.21	0.17	0.22	2.11
Min	0.0%	−93.5%	0.0%	−94.3%	0.0%	−98.2%	−0.94	0.02	0.00	−1.27
Max	99.1%	98.8%	99.9%	83.2%	98.4%	97.7%	1.98	1.94	1.96	11.6
Skewness	0.26	0.70	1.02	−0.65	0.43	0.59	0.86	0.93	2.48	2.30
Kurtosis	4.26	16.01	4.58	11.67	4.77	16.7	6.79	3.74	10.2	10.9
AR(1)	0.78	0.01	0.77	−0.05	0.74	−0.06	0.00	0.29	0.30	0.25
Q(3)	72.4	4.06	69.7	4.78	61.0	4.05	3.47	13.6	13.5	11.9
Correlation										
$\Delta FINST$	0.080									
DFIN	−0.487	−0.054								
$\Delta DFIN$	0.027	−0.341	0.086							
DCORP	−0.426	−0.046	−0.204	−0.073						
$\Delta DCORP$	−0.046	−0.295	−0.047	−0.461	0.156					
$r_{i,t}$	−0.015	0.058	−0.013	−0.003	0.027	−0.003				
$\sigma_{i,t}$	−0.225	0.001	0.113	−0.031	0.007	0.007	0.125			
$TOVER_{i,t}$	−0.124	0.051	0.162	−0.022	−0.112	0.004	0.197	0.193		
$Ln(MCAP_{i,t})$	0.598	0.017	−0.416	0.031	0.032	−0.014	−0.005	−0.272	−0.090	

ation $\sigma_{i,t} = \sqrt{\sum_{d=1}^{M_{i,t}} \left[\ln\left(\frac{P_{i,d}^H}{P_{i,d}^L}\right) \right]^2}$, where $M_{i,t}$ is the number of days stock i is traded in the month t. We require $M_{i,t} > 5$ in order to have reliable estimate of monthly standard deviation. Monthly turnover ratio $TOVER_{i,t}$ is the monthly trading value divided by the total scripless market value $MCAP_{i,t}$. The monthly sample contains 10,947 stock-month observations. We remove stock-month in which either return, or standard deviation, or turnover ratio is greater than 200%. This reduces our sample size to 10,802.

Table 3 reports the summary statistics for the monthly liquidity measures and their log transformations. The statistics are calculated for each stock, and then averaged across stocks. The median spread is 2.7%. The median depth is 0.21 billion rupiah (around US$22,000). The median price sensitivity is 2.5% return volatility per billion rupiah traded. The medians are much lower than the means, indicating large positive skewness. All three measures have extremely large outliers and significant kurtosis, and are highly persistent with significant Ljung–Box statistic for 3 monthly lags. However the log transformations have much lower skewness and kurtosis close to 3, suggesting that the impact of extreme values is much smaller. Therefore we use the log transformations for our analyses. As expected, spread is positively correlated with price sensitivity, but negatively related to depth. Greater liquidity is associated with lower spread, greater depth, and lower price sensitivity.

Table 4 reports summary statistics for share ownerships and monthly turnover. Because foreigners concentrate on large stocks, their percentage holdings of shares are lower than their holdings of market value reported in the last column in Table 1. The median share holdings by Indonesian financial institutions and non-financial corporations are 13.5% and 6.8%, respectively, much lower than the 35.4% of foreign institutions. Sometimes the entire free-float shares of a stock are bought or sold in a month, hence the monthly change in ownership ranges from −98.2% to 99.9%. Although ownerships are highly persistent, changes in ownerships are generally not. Foreign ownership is negatively correlated with domestic ownerships. Over the sample period, the median monthly volatility of individual stocks is 19% with a turnover of 4%. Return is positively correlated with volatility, which is negatively correlated with market capitalization.

3. Foreign preference for liquid stocks

Many studies have reported that, ceteris paribus, foreign investors prefer to hold liquid stocks.[8] All of them use turnover as the liquidity measure because it is widely available. As discussed before, turnover rises with volatility and is not an ideal measure for liquidity. In this section, we test the robustness of the previous finding using better liquidity measures and in a more recent sample period.

We estimate how the level and the change of foreign ownership are affected by lagged liquidity measures. The dependent variable is either the end-of-month foreign percentage ownership of free-float shares $FINST_{i,t}$ or its first difference $\Delta FINST_{i,t}$. We identify the impact of liquidity measures while controlling other factors that may affect foreign ownership. Two lags of the dependent variable are included to control for persistence in foreign ownership. Table 1 shows foreign preference for large-cap stocks. Foreign ownership may also be affected by stock returns, volatility, and trading activity. Therefore we include lagged log market capitalization, $Ln(MCAP_{i,t-1})$, and contemporaneous return $r_{i,t}$, volatility $\sigma_{i,t}$ and turnover $TOVER_{i,t}$ as these control variables affect foreign ownership. Our variables of interest are the log transformations of the lagged liquidity measures $S_{i,t-1}$, $D_{i,t-1}$, and $PS_{i,t-1}$, which allow us to identify any (Granger) causality from past liquidity to current foreign ownership. A cross-sectional regression is estimated for each month and the monthly average coefficients are reported in the panel. We calculate the modified Fama–MacBeth standard error as $\frac{\text{St. Dev.}(\beta)}{\sqrt{T}}\left(\frac{1+\rho(1)}{1-\rho(1)}\right)$, where "St. Dev." is the standard deviation of the estimated coefficient β across all months, $\rho(1)$ is β's first-order autocorrelation, and T is the number of month (Cochrane, 2001).

The results for the level of foreign ownership are reported in Panel A of Table 5. Foreign ownership in month t is highly correlated with its value in month $t-1$. Large stocks and positive returns attract greater foreign holdings, while higher volatility deters foreign holdings. Turnover has no effect once our liquidity measures are included. After other confounding factors are controlled for, foreign ownership decreases with spreads, increases with depth, and decreases with price sensitivity. Statistically the impact of liquidity measures appears to be small, as the adjusted R^2 does not change

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[8] Refer to Aggarwal et al. (2005), Chan et al. (2005), Covrig et al. (2006), and Ferreira and Matos (2008).

Table 5
Foreign preference for liquid stocks. This table reports the impact of liquidity on subsequent foreign ownership. In Panel A, the dependent variable is foreign institutional ownership $FINST_{i,t}$ of stock i at the end of month t. In Panel B, the dependent variable is the change in foreign institutional ownership $\Delta FINST_{i,t}$. The independent variables in the first column of each panel are the same as those in Tables 3 and 4. The coefficients are averaged across monthly estimations. The modified Fama–MacBeth standard error is given below the estimated coefficients.

	$FINST_{i,t}$	$FINST_{i,t}$	$FINST_{i,t}$	$FINST_{i,t}$
Panel A: Level of foreign ownership				
Constant	0.0041	0.0189***	0.0096***	0.015***
	0.0040	*0.0017*	*0.0017*	*0.004*
$FINST_{i,t-1}$	0.899***	0.896***	0.896***	0.897***
	0.0452	*0.0451*	*0.0464*	*0.045*
$FINST_{i,t-2}$	0.0623	0.0629	0.0604	0.061
	0.0447	*0.0445*	*0.0457*	*0.044*
$r_{i,t}$	0.0205***	0.0212***	0.0212***	0.021***
	0.0063	*0.0059*	*0.0063*	*0.006*
$\sigma_{i,t}$	−0.0321***	−0.0388***	−0.0320***	−0.036***
	0.0041	*0.0037*	*0.0032*	*0.004*
$TOVER_{i,t}$	−0.0055	−0.0076	−0.0102	−0.010
	0.0095	*0.0060*	*0.0073*	*0.009*
$Ln(MCAP_{i,t-1})$	0.0503***	0.0508***	0.0510***	0.051***
	0.0092	*0.0092*	*0.0093*	*0.009*
$Ln(S_{i,t-1})$	−0.0029**			0.0015
	0.0011			*0.0015*
$Ln(D_{i,t-1})$		0.0019***		8×10^{-5}
		0.0005		*0.0013*
$Ln(PS_{i,t-1})$			−0.0017***	−0.00194**
			0.0004	*0.00093*
$\bar{R}^2$	0.978	0.979	0.979	0.979
	$\Delta FINST_{i,t}$	$\Delta FINST_{i,t}$	$\Delta FINST_{i,t}$	$\Delta FINST_{i,t}$
Panel B: Change in foreign ownership				
Constant	−0.000634	−0.00124	−0.00176	−0.00154
	0.00401	*0.0039*	*0.00414*	*0.00412*
$\Delta FINST_{i,t-1}$	−0.0572	−0.0567	−0.06	−0.0611
	0.0414	*0.0406*	*0.0431*	*0.0428*
$\Delta FINST_{i,t-2}$	0.0225	0.0216	0.0236	0.0222
	0.0187	*0.0194*	*0.0191*	*0.0198*
$r_{i,t}$	0.0227***	0.0233***	0.0229***	0.0239***
	0.00772	*0.00803*	*0.00801*	*0.00838*
$\sigma_{i,t} \times 10^{-2}$	−0.0664	−0.0732	−0.0569	−0.105
	0.177	*0.166*	*0.19*	*0.18*
$TOVER_{i,t} \times 10^{-2}$	−0.0093	−0.023	−0.0198	−0.0234
	0.0827	*0.0919*	*0.0852*	*0.0873*
$Ln(MCAP_{i,t-1}) \times 10^{-2}$	−0.0006	−0.00169	0.00301	−0.00521
	0.028	*0.0265*	*0.029*	*0.0304*
$\Delta Ln(S_{i,t-1})$	0.0019			0.00329
	0.00227			*0.00273*
$\Delta Ln(D_{i,t-1})$		0.00216***		0.00121
		0.000783		*0.00149*
$\Delta Ln(PS_{i,t-1})$			−0.00206*	−0.00183
			0.0012	*0.00177*
$\bar{R}^2$	0.073	0.076	0.078	0.077

* One-sided significance at 10%.
** One-sided significance at 5%.
*** One-sided significance at 1%.

much when different liquidity measure is used. However, the economic impact is quite large. If the average percentage spreads increase from 4.1% in Table 3 to 4.5%, which is a 10% increase, this would lead to a 2.9% drop in foreign ownership. This would drop the average foreign holding 39.5% to 36.6%. Similarly a 10% increase in depth would lead to a 1.9% increase in foreign ownership, and a 10% rise in price sensitivity would reduce foreign ownership by 1.7% in the next month. The last column of Table 5 shows that price sensitivity has the most robust (and slightly larger) impact on foreign ownership when all three measures are included.

Panel B in Table 5 explores the relation between monthly changes in foreign ownership, i.e. foreign net purchase, and monthly changes in liquidity measures. The motivations for this analysis are two folds. First, foreign ownership and log liquidity measures are very persistent as shown in Tables 3 and 4. If the true relation between ownership and liquidity is contemporaneous, the high persistence may result in a significant relation between lagged liquidity and future foreign ownership. The use of the first differences of these variables alleviates this problem and offers a robustness check for the results in Panel A. Second, foreign net purchase is of interest in its own right. Holdings are likely driven by longer term expectations while trading is often driven by short term price movements. Therefore the determinants of foreign ownership in Panel A may not have the same impact on (net) foreign trading. The results in Panel B confirm this. Foreign net purchase is almost exclusively driven by monthly return. Price increase of 1% would lead to an average foreign net purchase of 2.3% of the total shares outstanding, similar to the average impact of 2.1% on foreign ownership reported in Panel A. The only other significant variables are the liquidity variables: greater depth and lower price sensitivity increase foreign net purchase, although

Table 6
The impact of foreign ownership on liquidity. Using the percentage of free-floating shares as a proxy for foreign share ownership, its impact on liquidity is examined in this table. The dependent variable is the log transformation of the liquidity measure $L_{i,t}$, which equals $S_{i,t}$, $D_{i,t}$, or $PS_{i,t}$. The independent variables are the same as those in Table 4. The coefficients are averaged across monthly estimations. The modified Fama–MacBeth standard error is given below the estimated coefficients.

	$Ln(S_{i,t})$		$Ln(D_{i,t})$		$Ln(PS_{i,t})$	
Constant	−0.567***	−0.498***	−1.738	−2.054***	1.838***	2.345***
	0.068	*0.043*	*0.107*	*0.146*	*0.181*	*0.195*
$Ln(L_{i,t-1})$	0.656***	0.653***	0.652***	0.657***	0.542***	0.543***
	0.011	*0.011*	*0.016*	*0.017*	*0.017*	*0.020*
$Ln(L_{i,t-2})$	0.120***	0.122***	0.152***	0.159***	0.177***	0.190***
	0.015	*0.015*	*0.016*	*0.019*	*0.016*	*0.020*
$r_{i,t}$	−0.321***	−0.318***	0.640***	0.646***	−1.388***	−1.382***
	0.052	*0.056*	*0.156*	*0.164*	*0.331*	*0.322*
$FINST_{i,t-1} \times r_{i,t}$	0.176***	0.148**	−0.424	−0.472	0.445	0.439
	0.065	*0.064*	*0.328*	*0.345*	*0.333*	*0.347*
$\sigma_{i,t}$	0.742***	0.710***	0.150	0.285*	0.712***	0.502*
	0.093	*0.094*	*0.124*	*0.152*	*0.253*	*0.257*
$FINST_{i,t-1} \times \sigma_{i,t}$	0.153	0.230	0.402	0.053	−0.223	0.168
	0.206	*0.141*	*0.288*	*0.214*	*0.390*	*0.314*
$TOVER_{i,t}$	−0.372***	−0.394***	1.333**	1.324**	−3.069***	−3.059***
	0.070	*0.079*	*0.640*	*0.551*	*1.102*	*1.043*
$FINST_{i,t-1} \times TOVER_{i,t}$	−0.621***	−0.543**	1.184***	1.314***	−1.687	−1.801**
	0.200	*0.248*	*0.306*	*0.263*	*1.024*	*0.945*
$Ln(MCAP_{i,t-1})$	−0.026***	−0.031***	0.101***	0.129***	−0.207***	−0.247***
	0.006	*0.004*	*0.008*	*0.010*	*0.020*	*0.020*
$FINST_{i,t-1} \times Ln(MCAP_{i,t-1})$	−0.021**	−0.009***	0.092***	0.002	−0.149***	−0.020***
	0.010	*0.002*	*0.010*	*0.004*	*0.016*	*0.007*
$FINST_{i,t-1}$	0.238*		−0.848***		1.134***	
	0.123		*0.140*		*0.206*	
$(FINST_{i,t-1})^2$	−0.062		−0.447***		0.733***	
	0.059		*0.101*		*0.096*	
$\Delta FINST_{i,t-1}$		0.129		−0.567***		1.079***
		0.113		*0.140*		*0.318*
$(\Delta FINST_{i,t-1})^2$		−1.25		−5.68***		5.47
		1.56		*2.46*		*3.33*
$\bar{R}^2$	0.879	0.879	0.907	0.908	0.929	0.929

* One-sided significance at 10%.
** One-sided significance at 5%.
*** One-sided significance at 1%.

the coefficients are much smaller than those of the monthly return.[9]

We carried out further robustness check for the results in Table 5. Resent studies have documented the impact of macro factors on the return and risk in different asset markets.[10] We test whether macro and business cycle variables affect foreign ownership in emerging markets and their preference for liquidity. We explored the relation between monthly average foreign holdings and several macroeconomic variables in Indonesia and the United States. Some Indonesian macro variables, e.g. interest rate and industrial production, are statistically significant but have very small coefficients relative to the average foreign holdings. The overall *F*-statistics are not significant for Indonesian and US macro variables. Foreign preference for liquidity is measured by the monthly cross-sectional coefficients of the liquidity measures. Overall the liquidity preference is not affected by macroeconomic conditions. These results are available from the authors.

4. Impact of foreign ownership on stock liquidity

This section examines whether the initial expectation of enhanced liquidity from foreign participation has been fulfilled in the case of Indonesia. We test for Granger causality from foreign ownership to liquidity. The baseline model estimates the impact of foreign ownership at the end of the previous month on liquidity measures in this month, while controlling for confounding effects. We then test whether the baseline results hold when domestic institutions are included. Alternative ownership measures and subperiod analysis are used to confirm the robustness of the baseline results. The net impact of foreign ownership is calculated for size-based quintiles and for each calendar year.

4.1. The baseline model and results

The dependent variable is the log transformation of the liquidity measure, $S_{i,t}$, $D_{i,t}$, or $PS_{i,t}$ introduced in Table 3. We use two lags of the liquidity measures to control for persistence in liquidity reported in Table 3. Monthly return $r_{i,t}$, standard deviation $\sigma_{i,t}$, turnover $TOVER_{i,t}$, and lagged free-float market value $Ln(MCAP_{i,t-1})$, are introduced as control variables. To examine the causality from foreign ownership to liquidity, we use the lagged $FINST_{i,t-1}$ and the change in foreign ownership, $\Delta FINST_{i,t-1}$, to capture the impact of past foreign ownership on current liquidity. The squared terms of $FINST_{i,t-1}$ and $\Delta FINST_{i,t-1}$ are included in light of the non-linear relation reported by Agarwal (2007). In addition, we include the interaction of lagged foreign ownership $FINST_{i,t-1}$ with the control variables [$r_{i,t}$, $\sigma_{i,t}$, $TOVER_{i,t}$, and $Ln(MCAP_{i,t-1})$] to capture any indirect effect from foreign ownership through these variables. For example, given the concentration of foreign holdings in the top quintile (Table 1) and much greater liquidity for the top quintile stocks (Table 2), one wonders whether large firms benefit more from foreign ownership than small firms. The interactive term, $FINST_{i,t-1} \times Ln(MCAP_{i,t-1})$, captures this joint effect. Similarly, we would like to capture any joint effect of high turnover and high foreign ownership that is not reflected by either turnover or foreign ownership standing alone.

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[9] We thank the anonymous referee for having forced us to review the stationarity question.

[10] See Shanken and Weinstein (2006) for stocks, Lu and Huang (2008) for bonds, and Batten et al. (2008) for commodities.

Table 7

The impact of foreign and domestic ownership on liquidity. This table reports the impact of foreign and domestic ownership on liqudity. The dependent variable is the log transformation of the liquidity measure $L_{i,t}$, which equals $S_{i,t}$, $D_{i,t}$, or $PS_{i,t}$ defined in Table 3. The independent variables include a constant, 2 lags of $Ln(L_{i,t})$, and the variables in the first column as defined in Table 4. Share ownership is the percentage of free-floating shares. The coefficients are averaged across monthly estimations. The modified Fama–MacBeth standard error is given below the estimated coefficients.

	$Ln(S_{i,t})$	$Ln(D_{i,t})$	$Ln(PS_{i,t})$
Panel A: Level of foreign and domestic ownership			
$r_{i,t}$	−0.327***	0.684***	−1.433***
	0.060	0.163	0.351
$FINST_{i,t−1} \times r_{i,t}$	0.200***	−0.488	0.536
	0.072	0.352	0.359
$\sigma_{i,t}$	0.759***	0.162	0.823***
	0.087	0.139	0.299
$FINST_{i,t−1} \times \sigma_{i,t}$	0.116	0.398	−0.258
	0.182	0.233	0.332
$TOVER_{i,t}$	−0.370***	1.274**	−3.002***
	0.068	0.606	1.088
$FINST_{i,t−1} \times TOVER_{i,t}$	−0.635***	1.317***	−2.046**
	0.164	0.252	1.074
$Ln(MCAP_{i,t−1})$	−0.028***	0.137***	−0.253***
	0.008	0.014	0.028
$FINST_{i,t−1} \times Ln(MCAP_{i,t−1})$	−0.018	0.057***	−0.105***
	0.011	0.011	0.021
$FINST_{i,t−1}$	0.258*	−0.772***	1.088***
	0.127	0.144	0.198
$(FINST_{i,t−1})^2$	−0.073	−0.071	0.304**
	0.077	0.100	0.130
$DFIN_{i,t−1}$	0.117**	0.386**	−0.266
	0.052	0.191	0.285
$(DFIN_{i,t−1})^2$	−0.064	−0.363	0.527
	0.087	0.305	0.473
$DCORP_{i,t−1}$	−0.005	0.405***	−0.500***
	0.046	0.159	0.141
$(DCORP_{i,t−1})^2$	0.078	−0.821	1.177***
	0.082	0.190	0.295
$\bar{R}^2$	0.880	0.909	0.931
Panel B: Changes in foreign and domestic ownership			
$r_{i,t}$	−0.346***	0.602***	−1.410***
	0.055	0.152	0.316
$FINST_{i,t−1} \times r_{i,t}$	0.200***	−0.443	0.537
	0.057	0.300	0.311
$\sigma_{i,t}$	0.722***	0.301*	0.523*
	0.095	0.161	0.273
$FINST_{i,t−1} \times \sigma_{i,t}$	0.223	0.027	0.157
	0.144	0.181	0.295
$TOVER_{i,t}$	−0.410***	1.299***	−3.020***
	0.081	0.448	0.834
$FINST_{i,t−1} \times TOVER_{i,t}$	−0.551**	1.462***	−1.952***
	0.254	0.323	0.829
$Ln(MCAP_{i,t−1})$	−0.031***	0.128***	−0.245***
	0.004	0.012	0.020
$FINST_{i,t−1} \times Ln(MCAP_{i,t−1})$	−0.009***	0.002	−0.019**
	0.002	0.004	0.007
$\Delta FINST_{i,t−1}$	0.397**	−0.798***	1.16***
	0.189	0.319	0.492
$(\Delta FINST_{i,t−1})^2$	−0.904	−11.2*	13.4*
	0.963	5.91	7.50
$\Delta DFIN_{i,t−1}$	0.165	0.0718	−0.399
	0.205	0.454	0.691
$(\Delta DFIN_{i,t−1})^2$	3.57***	−2.88	8.40
	1.32	4.64	8.99
$\Delta DCORP_{i,t−1}$	0.078	−0.148	−0.224
	0.253	0.350	0.449
$(\Delta DCORP_{i,t−1})^2$	−5.09**	−2.74	−9.55
	2.46	6.31	6.72
$\bar{R}^2$	0.879	0.909	0.929

Table 7 (continued)

	$\Delta\mathrm{Ln}(S_{i,t})$	$\Delta\mathrm{Ln}(D_{i,t})$	$\Delta\mathrm{Ln}(PS_{i,t})$
Panel C: Change of liquidity measures			
$r_{i,t}$	−0.425***	1.1***	−2.15***
	0.0985	0.104	0.296
$\mathrm{FINST}_{i,t-1} \times r_{i,t}$	0.308***	−0.87***	1.07***
	0.0764	0.177	0.345
$\sigma_{i,t}$	0.192***	0.175*	−0.157
	0.0639	0.0956	0.249
$\mathrm{FINST}_{i,t-1} \times \sigma_{i,t}$	−0.00923	0.417**	−0.613*
	0.143	0.176	0.345
$\mathrm{TOVER}_{i,t}$	−0.177*	0.729***	−1.62***
	0.0979	0.155	0.242
$\mathrm{FINST}_{i,t-1} \times \mathrm{TOVER}_{i,t}$	−0.185	0.847***	−0.481
	0.175	0.25	0.499
$\mathrm{Ln}(\mathrm{MCAP}_{i,t-1})$	−0.00075	0.00417	−0.00947
	0.00186	0.00743	0.0186
$\mathrm{FINST}_{i,t-1} \times \mathrm{Ln}(\mathrm{MCAP}_{i,t-1})$	−0.00179	0.000542	−0.00579
	0.00163	0.00554	0.00842
$\Delta\mathrm{FINST}_{i,t-1}$	0.415*	−1.50***	1.98*
	0.234	0.553	1.06
$(\Delta\mathrm{FINST}_{i,t-1})^2$	−0.0486	−16.8**	10.8
	3.05	9.89	7.88
$\Delta\mathrm{DFIN}_{i,t-1}$	0.231	0.183	−0.262
	0.248	0.732	1.13
$(\Delta\mathrm{DFIN}_{i,t-1})^2$	4.25	2.25	17.3
	4.26	10.8	22.4
$\Delta\mathrm{DCORP}_{i,t-1}$	0.158	0.0774	−0.643
	0.337	0.722	0.917
$(\Delta\mathrm{DCORP}_{i,t-1})^2$	−10.8*	−17.2	76.7
	5.99	28	80.4
$\bar{R}^2$	0.117	0.19	0.352

* One-sided significance at 10%.
** One-sided significance at 5%.
*** One-sided significance at 1%.

Table 6 reports the impact of the level and the change in foreign ownership on subsequent liquidity measures. Lagged liquidity measures are highly significant. Positive returns are associated with lower spread, greater depth, and lower price sensitivity in the month, and vice versa for negative returns. Volatility increases spread and price sensitivity, and has a marginally positive effect on depth. This is consistent with greater trading with more conservative and volume-sensitive pricing during volatile periods. After controlling for return and volatility, greater size and turnover are associated with greater liquidity. These results are consistent with theory and previous studies of liquidity determinants.

Foreign institutional ownership shows a negative impact on future liquidity. When standing alone, both the level and the change of foreign ownership generally reduce future liquidity, with the exception that monthly foreign net purchase $\Delta\mathrm{FINST}_{i,t-1}$ does not affect spread. Table 6 shows that a 10% increase in foreign ownership $\mathrm{FINST}_{i,t-1}$ leads to 2.38% increase in spread, 8.48% decrease in depth, and 11.34% increase in price sensitivity. If the monthly foreign net purchase $\Delta\mathrm{FINST}_{i,t-1}$ increases by 10%, it would reduce depth by 5.67% and increase price sensitivity by 10.8%. When they are significant, the squared terms of $\mathrm{FINST}_{i,t-1}$ and $\Delta\mathrm{FINST}_{i,t-1}$ have the same sign as the linear terms, reinforcing the negative effect from the linear terms. In addition, the interaction term of $\mathrm{FINST}_{i,t-1} \times r_{i,t}$ increases the bid–ask spread even though monthly return $r_{i,t}$ by itself reduces spread. Given the average monthly return of 4% (Table 4), a 10% increase in foreign ownership would increase the spread by $0.176 \times 4\% \times 10\% = 0.07\%$.

The positive impact of foreign ownership comes through its interaction with turnover and firm size. The term $\mathrm{FINST}_{i,t-1} \times \mathrm{TOVER}_{i,t}$ reduces spread, increases depth, and reduces price sensitivity. Given the average $\mathrm{TOVER}_{i,t}$ of 0.12 (Table 4), the impact of $\mathrm{FINST}_{i,t-1} \times \mathrm{TOVER}_{i,t}$ on spread, −0.621, implies that a 10% increase in $\mathrm{FINST}_{i,t-1}$ would reduce the spread by $0.621 \times$ $0.12 \times 0.1 = 0.75\%$. Similarly the term $\mathrm{FINST}_{i,t-1} \times \mathrm{Ln}(\mathrm{MCAP}_{i,t-1})$ reduces spread, increases depth, and reduces price sensitivity. With an average $\mathrm{Ln}(\mathrm{MCAP}_{i,t})$ of 5.56 in Table 4, a 10% rise in $\mathrm{FINST}_{i,t-1}$ would reduce the spread by $0.021 \times 5.56 \times 0.1 = 1.17\%$. There is no interactive effect from foreign ownership and volatility. Overall, the combined effect of a 10% rise in foreign ownership on spread is a net increase of $2.38\% + 0.07\% - 0.75\% - 1.17\% = 0.53\%$.

4.2. The joint estimation of the impact of foreign and domestic institutions

Given the negative liquidity impact from foreign institutions, a natural question is whether domestic institutions have the same effect. To answer this question, we add the level and the change of ownerships of domestic financial institutions and domestic non-financial corporations to the above analysis. The results are reported in Table 7. We do not report the constant and coefficients of lagged liquidity measures for brevity.

Panels A and B of Table 7 report the liquidity impact from the level and the change of institutional ownership, respectively. The negative liquidity impact of foreign institutions is not affected by the inclusion of domestic institutions. The coefficients of $\mathrm{FINST}_{i,t-1}$ remain significant and are of similar magnitude as in Table 6. The coefficients of $\Delta\mathrm{FINST}_{i,t-1}$ are all larger; the impact from $\Delta\mathrm{FINST}_{i,t-1}$ to $\mathrm{Ln}(S_{i,t})$ is now significant. The squared terms of $\mathrm{FINST}_{i,t-1}$ and $\Delta\mathrm{FINST}_{i,t-1}$, when significant, have the same signs as the linear terms. Therefore, when standing alone, both $\mathrm{FINST}_{i,t-1}$ and $\Delta\mathrm{FINST}_{i,t-1}$ increase spread, reduce depth, and increase price sensitivity. The interactive terms generally have the same sign and level of significance as in Table 6. The interactive terms of foreign ownership with turnover and size have a positive impact on liquidity as before. As will be demonstrated later, the net effects of foreign ownership on liquidity remain negative.

The liquidity impact of domestic institutions is mixed. While both $DFIN_{i,t-1}$ and $(\Delta DFIN_{i,t-1})^2$ increase the spread, $(\Delta DCORP_{i,t-1})^2$ reduces the spread. Both $DFIN_{i,t-1}$ and $DCORP_{i,t-1}$ increase depth. $DCORP_{i,t-1}$ reduces price sensitivity but $(DCORP_{i,t-1})^2$ increases it. The negative liquidity impact from domestic institutions is much smaller than that of foreign institutions. For the spread, the impact from $DFIN_{i,t-1}$ is less than half of that from $FINST_{i,t-1}$, while the impact from $(\Delta DFIN_{i,t-1})^2$ is even smaller. On the other hand, a 10% increase in $DFIN_{i,t-1}$ or $DCORP_{i,t-1}$ would increase the depth by 3.86% and 4.05%, respectively. A 10% increase in $DCORP_{i,t-1}$ would reduce price sensitivity by 3%.[11] Therefore the overall liquidity impact from domestic institutions is more positive than negative.[12] Panel C of Table 7 examines the impact of the change of institutional ownership on the monthly change of liquidity. Using the first difference of the liquidity measures removes any persistence and the potential for spurious results. The results are qualitatively the same as in Panel B. The monthly foreign net purchase, $\Delta FINST_{i,t-1}$, increases the spread and the prices sensitivity and reduces the depth in the following month. The non-linear effect from $\Delta FINST_{i,t-1}$ also reduces the depth. There is no effect from domestic financial institutions. The non-linear effect from domestic corporations on the spread remains as in Panel B. Compared to Panel B, the monthly changes in the liquidity measures show a greater impact from the contemporaneous return, weaker effect from volatility and turnover, and no effect from stock size. Overall Table 7 presents a robust negative relation between various liquidity measures and lagged foreign ownership.

4.3. An alternative ownership measure and sub-period analysis

The analyses up to now are based on ownership of the free-float portion of the total shares outstanding. The free-float percentage varies from 0% to 100% across stocks. The total number of shares outstanding is the scripless shares divided by the scripless percentage. As a robustness check of our results, we now measure ownership by foreign and domestic institutions relative to the total shares outstanding. The liquidity impact of the new ownership measure is presented in Table 8.

The impact of foreign institutions is highly consistent with the findings in Table 7. While the linear terms $FINST_{i,t-1}$ and $\Delta FINST_{i,t-1}$ are no longer significant for spread, they still reduce depth and increase price sensitivity as before. The squared terms of $FINST_{i,t-1}$ and $\Delta FINST_{i,t-1}$, when significant, have the same effect as the linear terms. In particular, $(FINST_{i,t-1})^2$ increases spread instead of $FINST_{i,t-1}$. The positive liquidity impact of the interactive terms $FINST_{i,t-1} \times TOVER_{i,t}$ and $FINST_{i,t-1} \times Ln(MCAP_{i,t-1})$ remains. The overall effects of domestic institutions are slightly weaker. $DCORP_{i,t-1}$ increases depth and reduces price sensitivity in Table 7, but is no longer significant in Table 8. The effects of $DFIN_{i,t-1}$ are more positive: it no longer increases spread, but significantly increases depth and reduce price sensitivity. The coefficients, when significant, are larger in Table 8 than in Table 7, partially because the percentage ownership is lower relative to the total shares outstanding.[13]

Table 9 reports the sub-period analysis for the level of institutional ownership measured against the free-float market value. We divide the sample into two halves: January 2002 to December 2004, and January 2005 to August 2007. Since we use two lags, the first half has 34 months and the second half has 32 months. While

Table 8

The impact of foreign and domestic ownerships based on total shares outstanding. The dependent variable is the log transformation of the liquidity measure $L_{i,t}$, which equals $S_{i,t}$, $D_{i,t}$, or $PS_{i,t}$ defined in Table 3. The same set of independent variables as that of Table 7 is used. The percentage ownerships, $FINST_{i,t-1}$, $DFIN_{i,t-1}$, and $DCORP_{i,t-1}$, are measured relative to the total shares outstanding, including non-tradable shares. The coefficients are averaged across monthly estimations. The modified Fama–MacBeth standard error is given below the estimated coefficients.

	$Ln(S_{i,t})$	$Ln(D_{i,t})$	$Ln(PS_{i,t})$
Panel A: Level of foreign and domestic ownership			
$r_{i,t}$	−0.256***	0.428***	−1.153***
	0.049	0.089	0.219
$FINST_{i,t-1} \times r_{i,t}$	0.059	0.005	−0.027
	0.101	0.322	0.319
$\sigma_{i,t}$	0.685***	0.195	0.656***
	0.083	0.110	0.290
$FINST_{i,t-1} \times \sigma_{i,t}$	0.219	0.412	−0.232
	0.164	0.668	0.487
$TOVER_{i,t}$	−0.418***	1.257***	−2.819***
	0.072	0.436	0.499
$FINST_{i,t-1} \times TOVER_{i,t}$	−0.692***	2.714***	−4.304***
	0.272	0.948	1.671
$Ln(MCAP_{i,t-1})$	−0.038***	0.124***	−0.253***
	0.003	0.011	0.018
$FINST_{i,t-1} \times Ln(MCAP_{i,t-1})$	−0.019***	0.072***	−0.128***
	0.007	0.018	0.015
$FINST_{i,t-1}$	0.130	−0.731***	0.859***
	0.102	0.204	0.184
$(FINST_{i,t-1})^2$	0.101**	−0.169	0.714***
	0.054	0.122	0.119
$DFIN_{i,t-1}$	0.062	1.120***	−1.020***
	0.091	0.336	0.359
$(DFIN_{i,t-1})^2$	−0.012	−1.231	0.968
	0.157	0.712	0.630
$DCORP_{i,t-1}$	0.030	0.337	−0.497
	0.076	0.225	0.344
$(DCORP_{i,t-1})^2$	−0.014	−0.405	0.755
	0.110	0.334	0.591
$\bar{R}^2$	0.879	0.909	0.929
Panel B: Changes in foreign and doremstic ownership			
r_t	−0.283***	0.419***	−1.193***
	0.039	0.110	0.155
$FINST_{t-1} \times r_t$	0.143***	−0.078	0.195
	0.066	0.370	0.278
σ_t	0.715***	0.414***	0.372***
	0.077	0.152	0.293
$FINST_{t-1} \times \sigma_t$	0.202	−0.001	0.028
	0.137	0.284	0.296
$Turnover_t$	−0.408***	1.119***	−2.570***
	0.077	0.270	0.411
$FINST_{t-1} \times Turnover_t$	−1.045**	3.226***	−5.614***
	0.480	0.560	1.643
$Ln(MCAP_{t-1})$	−0.043***	0.108***	−0.244***
	0.004	0.008	0.016
$FINST_{t-1} \times Ln(MCAP_{t-1})$	−0.0040**	0.012***	−0.024***
	0.0019	0.004	0.006
$\Delta FINST_{t-1}$	0.378	−1.582***	1.912***
	0.362	0.567	0.715
$(\Delta FINST_{t-1})^2$	5.34	−18.2*	35.5
	5.68	10.7	28.8
$\Delta DFIN_{t-1}$	0.393	0.006	−0.060
	0.246	0.753	0.616
$(\Delta DFIN_{t-1})^2$	13.3***	15.4	14.1
	4.16	14.0	13.8
$\Delta DCORP_{t-1}$	0.491	−0.336	0.016
	0.445	0.815	0.691
$(\Delta DCORP_{t-1})^2$	−19.9**	−29.9	−23.9
	9.91	21.1	18.6
$\bar{R}^2$	0.878	0.908	0.928

* One-sided significance at 10%.
** One-sided significance at 5%.
*** One-sided significance at 1%.

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[11] With an average DCORP 17% from Table 4, the net impact is −0.5 × ΔDCORP + 1.177 × ΔDCORP × overlineDCORP = −0.5 × 10% + 1.117 × 10% × (17%)2 = −3%.

[12] Given our focus on foreign institutions, we do not include the interactive terms between domestic institutions and control variables.

[13] One caveat for this alternative ownership measure is that we use the scripless percentage as of 31 August 2007 to calculate historical percentage ownerships relative to the total shares outstanding. The results may vary if historical scripless percentages are used.

foreign ownership has a negative impact on all three liquidity measures in the first half of the sample period, its negative impact remains on market depth during the second half. Table 1 show that

Table 9
Sub-period analysis. Regressions are carried out for two sub-periods: 2002–2004 and 2005–2007. The dependent variable is the log transformation of the liquidity measure $L_{i,t}$, which equals $S_{i,t}$, $D_{i,t}$, or $PS_{i,t}$ defined in Table 3. The independent variables include a constant, 2 lags of $Ln(L_{i,t})$, and variables in the first column as defined in Table 4. The coefficients are averaged across monthly estimations. The modified Fama–MacBeth standard error is given below the estimated coefficients.

	$Ln(S_{i,t})$		$Ln(D_{i,t})$		$Ln(PS_{i,t})$	
	2002–04	2005–07	2002–04	2005–07	2002–04	2005–07
$r_{i,t}$	−0.238***	−0.40***	0.457***	0.806***	−0.954***	−1.82***
	0.059	*0.117*	*0.126*	*0.234*	*0.362*	*0.464*
$FINST_{i,t−1} \times r_{i,t}$	0.202***	0.166	−0.102	−0.723	−0.0718	0.957
	0.063	*0.154*	*0.435*	*0.486*	*0.401*	*0.524*
$\sigma_{i,t}$	0.744***	0.814***	0.137	0.329*	0.894***	0.714
	0.069	*0.172*	*0.139*	*0.186*	*0.208*	*0.773*
$FINST_{i,t−1} \times \sigma_{i,t}$	−0.030	0.207	0.0383	0.518	−0.162	−0.193
	0.260	*0.256*	*0.156*	*0.461*	*0.235*	*0.649*
$TOVER_{i,t}$	−0.351***	−0.430**	1.47	1.02**	−3.33*	−2.69**
	0.036	*0.198*	*1.21*	*0.363*	*1.85*	*1.25*
$FINST_{i,t−1} \times TOVER_{i,t}$	−0.935***	−0.276	1.55***	1.11**	−2.71	−1.24
	0.222	*0.164*	*0.436*	*0.343*	*2.02*	*0.84*
$Ln(MCAP_{i,t−1})$	−0.016***	−0.0406***	0.107***	0.178***	−0.229***	−0.292***
	0.0054	*0.0099*	*0.009*	*0.020*	*0.0325*	*0.039*
$FINST_{i,t−1} \times Ln(MCAP_{i,t−1})$	−0.0315***	−0.0011	0.0701***	0.0336	−0.121***	−0.0657
	0.0058	*0.019*	*0.013*	*0.021*	*0.022*	*0.084*
$FINST_{i,t−1}$	0.446***	0.0592	−0.824***	−0.595**	1.345***	0.700
	0.075	*0.230*	*0.202*	*0.241*	*0.220*	*0.625*
$(FINST_{i,t−1})^2$	−0.041	−0.115	−0.0426	−0.0785	0.285	0.170
	0.118	*0.099*	*0.133*	*0.137*	*0.173*	*0.202*
$DFIN_{i,t−1}$	0.221**	−0.0045	0.370	0.465	0.369	−0.876**
	0.091	*0.084*	*0.207*	*0.342*	*0.442*	*0.40*
$(DFIN_{i,t−1})^2$	−0.0742	0.0555	−0.466***	−0.525	−0.155	1.40*
	0.087	*0.208*	*0.156*	*0.637*	*0.525*	*0.710*
$DCORP_{i,t−1}$	0.047	−0.0167	0.435	0.379***	−0.517**	−0.541***
	0.057	*0.065*	*0.298*	*0.124*	*0.254*	*0.175*
$(DCORP_{i,t−1})^2$	0.039	0.0815	−0.811***	−0.891***	1.39***	1.16**
	0.118	*0.111*	*0.305*	*0.228*	*0.508*	*0.404*
$\bar{R}^2$	0.903	0.857	0.901	0.917	0.933	0.930

* One-sided significance at 10%.
** One-sided significance at 5%.
*** One-sided significance at 1%.

foreign ownership has sharp increases in every year from 2002 to 2004 but has a general down trend in the second half. The declining foreign ownership coincides with the reduced liquidity impact of foreign institutions. Further analysis is required to confirm or rejection the connection.

4.4. The net impact of foreign ownership

We now examine how the net liquidity impact of foreign ownership changes with stock size and over time. For each size-based quintile k $(=1,...,5)$ and each calendar year y $(=2002,...,2007)$, the net impact of foreign ownership on liquidity measure $L_{k,y}$ $(=S_{k,y}, D_{k,y},$ or $PS_{k,y})$ is given by

$$\Delta L_{k,y} = \lambda_1 \times \Delta FINST \times \bar{r}_{k,y} + \lambda_2 \times \Delta FINST \times \bar{\sigma}_{k,y} + \lambda_3 \times \Delta FINST \times \overline{TOVER}_{k,y} + \lambda_4 \times \Delta FINST \times \overline{Ln(MCAP_{k,y})} + \lambda_5 \Delta FINST + \lambda_6 \Delta FINST \times \overline{FINST}_{k,y}$$

The parameters λ_i, $i = 1,...,6$, are the estimated coefficients of $FINST_{i,t−1} \times r_{i,t}$, $FINST_{i,t−1} \times \sigma_{i,t}$, $FINST_{i,t−1} \times TOVER_{i,t}$, $FINST_{i,t−1} \times Ln(MCAP_{i,t−1})$, $FINST_{i,t−1}$, and $(FINST_{i,t−1})^2$, respectively. The mean values of $r_{i,t}$, $\sigma_{i,t}$, $TOVER_{i,t}$, $Ln(MCAP_{i,t−1})$, and $FINST_{i,t−1}$ are calculated for each size quintile and calendar year. Table 10 reports the results for a 10% increase in foreign ownership ($\Delta FINST = 10\%$), with Panel A based on the estimated coefficients from Panel A of Table 7, and Panel B based on the estimated coefficients from Table 9 for the first half 2002–04.

Panel A shows that a 10% increase in foreign ownership results in an average 1.94% increase in spread, an average 3.11% decrease in depth, and an average 4% increase in price sensitivity. Foreign impact on spread increases slightly with size, and does not show a strong time trend. But foreign impact on depth and price sensitivity decreases significantly with size and over time. Panel B shows similar foreign impact on liquidity (1.96%) and depth (−3.1%), but higher foreign impact on price sensitivity (7.4%) than in Panel A. Foreign impact on all three liquidity measures decreases with size and over time. Overall our results indicate that a 10% increase in foreign ownership leads to almost 2% increase in spread, over 3% drop in depth, and over 4% rise in price sensitivity.

5. Summary and future research

One of the expected benefits of financial liberalization is that the participation by large international financial institutions in small emerging markets would reduce the level of information asymmetry and enhance local market liquidity. This study presents a careful analysis as to whether this expectation has materialized in Indonesia. Our findings contradict the perceived expectation. After controlling for stock characteristics, trading activities, persistence in liquidity and foreign ownership, we find that foreign ownership has a negative impact on liquidity. Our findings are robust to different liquidity and ownership measures.

Although similar findings have been reported for stocks in developed markets, the economic mechanisms leading to the empirical findings have yet to be understood, particularly in the content of emerging markets. The potential mechanisms include (i) greater information asymmetry induced by foreign institutional ownership, (ii) greater volatility induced by large trades by foreign institutions, (iii) reduced competition in liquidity supply due to the presence of dominant traders, and (iv) inactive trading, e.g. buy-and-hold strategy, by foreign institutions. The empirical findings

Table 10
Net impact of foreign ownership on liquidity.

	Bottom quintile (%)	Quintile 2 (%)	Quintile 3 (%)	Quintile 4 (%)	Top quintile (%)	Average (%)
Panel A: Net impact of a 10% increase in foreign institutional ownership based on parameter estimates in Table 7						
Spread						
2002	1.91	1.82	2.01	2.07	2.11	1.98
2003	1.97	1.98	1.88	2.04	2.27	2.03
2004	1.66	1.95	1.90	1.84	2.20	1.91
2005	1.99	1.95	1.85	1.96	2.16	1.98
2006	2.08	2.00	2.02	2.04	2.17	2.06
2007	1.42	1.43	1.63	1.80	2.00	1.66
Average	1.84	1.85	1.88	1.96	2.15	1.94
Depth						
2002	−5.02	−4.03	−3.85	−3.43	−2.47	−3.76
2003	−4.87	−4.02	−3.28	−2.96	−2.44	−3.51
2004	−4.04	−3.92	−3.26	−2.43	−2.13	−3.16
2005	−4.57	−3.71	−2.94	−2.44	−1.78	−3.09
2006	−4.69	−3.76	−3.00	−2.32	−1.61	−3.08
2007	−3.13	−2.33	−2.14	−1.61	−1.16	−2.07
Average	−4.39	−3.63	−3.08	−2.53	−1.93	−3.11
Price sensitivity						
2002	6.69	5.20	4.94	4.29	3.09	4.84
2003	6.47	5.28	4.33	3.89	3.14	4.62
2004	5.10	5.02	4.32	3.09	2.93	4.09
2005	5.97	4.76	3.87	3.09	2.44	4.03
2006	6.26	5.03	3.88	2.95	2.21	4.07
2007	3.71	2.78	2.45	1.70	1.22	2.37
Average	5.70	4.68	3.96	3.17	2.51	4.00
Panel B: Net impact of a 10% increase in foreign institutional ownership based on parameter estimates for 2002–2004 in Table 9						
Spread						
2002	2.70	2.15	2.15	1.93	1.41	2.07
2003	2.74	2.31	1.88	1.77	1.53	2.05
2004	2.21	2.21	1.83	1.36	1.29	1.78
Average	2.55	2.22	1.95	1.69	1.41	1.96
Depth						
2002	−4.99	−3.78	−3.55	−3.02	−1.84	−3.44
2003	−4.81	−3.78	−2.88	−2.47	−1.80	−3.15
2004	−3.83	−3.65	−2.85	−1.83	−1.42	−2.72
Average	−4.54	−3.74	−3.09	−2.44	−1.69	−3.10
Price sensitivity						
2002	10.39	8.81	7.81	6.61	4.38	7.60
2003	10.41	8.78	7.80	6.45	4.20	7.53
2004	10.22	8.48	7.33	5.86	3.55	7.09
Average	10.34	8.69	7.65	6.30	4.04	7.40

may reflect the joint effects of several mechanisms. For example, high ownership makes foreign institutions corporate insiders, e.g., company board members. This increases the information asymmetry between foreign and local investors. It also promotes the buy-and-hold strategy by foreign investors and reduces their need to trade frequently for price discovery. The greater information asymmetry and the lack of trading both reduce market liquidity. High foreign ownership tends to result in ownership concentration which also reduces liquidity. Future research should explore the relative significance of these economic mechanisms.

References

Agarwal, P., 2007. Institutional ownership and stock liquidity. Working Paper, Cornell University.

Agarwal, S., Faircloth, S., Liu, C., Rhee, S.G., 2009. Why do foreign investors underperform domestic investors in trading activities? Evidence from Indonesia. Journal of Financial Markets 12, 32–53.

Aggarwal, R., Klapper, L., Wysocki, P.D., 2005. Portfolio preferences of foreign institutional investors. Journal of Banking and Finance 29, 2919–2946.

Ali, A., Durtchi, C., Lev, B., Trombley, M., 2004. Changes in institutional ownership and subsequent earnings announcement abnormal returns. Journal of Accounting, Auditing, and Finance 19, 221–248.

Amibud, Y., 2002. Illiquidity and stock returns: Cross-section and time-series effects. Journal of Financial Markets 5, 31–56.

Bacmann, J.F., Bolliger, G., 2001. Who are the best? Local versus foreign analysts on Latin American stock markets. In: EFMA 2002 London Meetings.

Batten, J.A., Ciner, C., Lucey, B.M., 2008. The macroeconomic determinants of volatility in precious metals markets. Available at SSRN: <http://ssrn.com/abstract=1148741>.

Bekaert, G., Harvey, C.R., 2000. Foreign speculators and emerging equity markets. Journal of Finance 55, 565–613.

Bekaert, G., Harvey, C.R., Lundblad, C., 2001. Emerging equity markets and economic development. Journal of Development Economics 66, 465–504.

Bekaert, G., Harvey, C.R., Lundblad, C., 2002. Dating the integration of world equity markets. Journal of Financial Economics 65, 203–247.

Bekaert, G., Harvey, C.R., Lundblad, C., 2007. Liquidity and expected returns: Lesions from emerging markets. Review of Financial Studies 20, 1783–1831.

Bortolotti, B., De Jong, F., Nicodano, G., Schindele, I., 2007. Privatization and stock market liquidity. Journal of Banking and Finance 31, 297–316.

Brockman, P., Yan, X., 2009. Block ownership and firm-specific information. Journal of Banking and Finance 33, 208–316.

Bushee, B.J., Goodman, T.H., 2007. Which institutional investors trade based on private information about earnings and returns. Journal of Accounting Research 45, 289–321.

Chan, K., Covrig, V., Ng, L., 2005. What determines the domestic bias and foreign bias? Evidence from mutual fund equity allocations worldwide. Journal of Finance 60, 1495–1534.

Choe, H., Kho, B.C., Stulz, R., 2005. Do domestic investors have an edge? The trading experience of foreign investors in Korea. Review of Financial Studies 18, 795–829.

Cochrane, J., 2001. Asset Pricing. Princeton University Press, New Jersey.

Covrig, V., Lau, S., Ng, L., 2006. Do domestic and foreign fund managers have similar preferences for stock characteristics? A crosscountry analysis. Journal of International Business Studies 37, 407–429.

De La Torre, A., Gozzi, J.C., Schmukler, S.L., 2007. Stock market development under globalization: Whither the gains from reforms? Journal of Banking and Finance 31, 1731–1754.

Dennis, P.J., Weston, J., 2001. Who's informed? An analysis of stock ownership and informed trading. Working Paper.

Domowitz, I., Glen, J., Madhavan, A., 2001. Liquidity, volatility, and equity trading costs across countries and over time. International Finance, 221–255.

Dvořák, T., 2005. Do domestic investors have an information advantage? Evidence from Indonesia. Journal of Finance 60, 817–839.

Ferreira, M.A., Matos, P., 2008. The colors of investors' money: The role of institutional investors around the world. Journal of Financial Economics 88, 499–533.

Gabaix, X., Gopikrishnan, P., Plerou, V., Stanley, H.E., 2006. Institutional investors and stock market volatility. Quarterly Journal of Economics 121, 461–504.

Grinblatt, M., Keloharju, M., 2000. The investment behaviour and performance of various investor-types: A study of Finland's unique data set. Journal of Financial Economics 55, 43–67.

Heflin, F., Shaw, K.W., 2000. Blockholder ownership and market liquidity. The Journal of Financial and Quantitative Analysis 35 (4), 621–633.

Jun, S.G., Marathe, A., Shawky, H.A., 2003. Liquidity and stock returns in emerging equity markets. Emerging Markets Review 4, 1–24.

Kalev, P.S., Nguyen, A.H., Oh, N.Y., 2008. Foreign versus local investors: Who knows more? Who makes more? Journal of Banking and Finance 32, 2376–2389.

Ke, B., Petroni, K., 2004. How informed are actively trading institutional investors? Evidence from their trading behaviour before a break in a string of consecutive earning increases. Journal of Accounting Research 42, 895–927.

Khanna, T., Palepu, K., 1999. Emerging market business groups, foreign investors, and corporate governance. NBER Working Paper 6955.

Kihlstorm, R., 2001. Monopoly power in dynamic securities markets. Working Paper, The Wharton School, University of Pannsylvania.

Kyle, A.P., 1985. Continuous auctions and insider trading. Econometrica, 1315–1336.

Lesmond, D.A., 2005. Liquidity of emerging markets. Journal of Financial Economics 77, 411–452.

Lesmond, D.A., Ogden, J.P., Trzcinka, C., 1999. A new estimate of transaction costs. Review of Financial Studies 12, 1113–1141.

Levine, R., Zervos, S., 1998. Capital control liberalization and stock market development. World Development 26, 1169–1183.

Lu, L., Huang, J., 2008. Macro factors and volatility of bond returns: Short- and long-term analysis. Available at SSRN: <http://ssrn.com/abstract=1187364>.

Henry, P.B., 2000. Do stock market liberalization cause investment booms. Journal of Financial Economics 58, 301–334.

Pinnuck, M., 2004. What is the abnormal return performance of mutual funds due to earnings information? Working Paper, University of Melbourne.

Pritsker, M., 2002. Large investors, implications for equilibrium asset returns, shock absorption, and liquidity. Mimeo, Federal Reserve Board.

Qin, Y., 2007. Liquidity and commonality in emerging markets. Working Paper, Massey University.

Rubin, A., 2007. Ownership level, ownership concentration and liquidity. Journal of Financial Markets 10 (3), 219–248.

Sarin, A., Shastri, K.A., Shastri, K., 2000. Ownership structure and stock market liquidity. Working paper, University of Pittsburgh.

Seasholes, M.S., 2004. Re-examining information asymmetries in emerging stock markets. Working Paper, University of California-Berkeley.

Shanken, J., Weinstein, M., 2006. Economic forces and the stock market revisited. Journal of Empirical Finance 13, 129–144.

Sias, R., 1996. Volatility and the institutional investors. Financial Analyst Journal (March/April), 13–21.

Stulz, R., 1999a. International portfolio flows and security markets. In: International Capital Flows, NBER Conference Report Series, pp. 257–293.

Stulz, R., 1999b. Globalization of equity markets and the cost of capital. In: NBER Working Paper, 7021.

Wang, J., 2007. Foreign equity trading and emerging market volatility: Evidence from Indonesia and Thailand. Journal of Development Economics 84, 798–811.

Xu, Y., Malkiel, B., 2003. Investigating the behaviour of Idiosyncratic volatility. Journal of Business 76, 613–644.

Yuan, R., Xiao, J., Zou, H., 2008. Mutual funds' ownership and firm performance: Evidence from China. Journal of Banking and Finance 32, 1552–1565.