Inattention and delayed reaction of stock returns to liquidity shock: Global evidence

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Abstract

For 40,000 stocks from 40 countries from 1985 to 2013, we examine delayed response of stock returns to liquidity shock and the variation in the delay across countries. We find significant delay in the infusion of liquidity shock into stock prices in both developed and emerging market countries. Portfolios based on liquidity shock produces 1.47% monthly abnormal risk-adjusted return and the profitability persists upto six months after the shock. Furthermore, we find that the delay is higher in countries with high individualism and high institutional ownership, while informational environment or the degree of development of stock markets does not explain the cross-country variations in the delay. Our findings have implication of frictions on market efficiency in that investor inattention is an important source of frictions driving delayed reaction around the world.

Keywords: liquidity, underreaction, delay, predictability, inattention, recognition, visibility, international stock market

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I. Introduction

Liquidity, easiness of trading shares or the degree to which a large quantity of shares can be sold without affecting a stock price too much, may impede infusion of information into stock prices since a lack of it may work as a friction to a trading. It is so even when investors are rational. Alternatively, but not mutually exclusively, investors' inattention may work against price efficiency even when financial markets have no significant institutional frictions. In this paper, we investigate the role of investor inattention and market friction in the response of stock prices to liquidity shock. Since a change in stock liquidity is, though elusive in nature, a publicly observable event, stock price should be adjusted quickly in efficient market to incorporate the change in liquidity premium required by investors (Chordia, Roll and Subrahmanyam, 2008). Recently, Bali, Peng, Shen and Tang (2014) examine the reaction of stock prices to liquidity shock in the U.S. market and find that it takes upto six months for stock prices to incorporate liquidity shock. They attribute such underreaction to both market friction and investor inattention, with more emphasis on the latter. Relative to the U.S. study, it is beneficial to examine this issue in global financial markets because global markets provide large variations in country-level characteristics that may affect the delayed response of stock price such as market liquidity (Lee, 2011; Karolyi, Lee, and van Dijk, 2012; Amihud, Hameed, Kang and Zhang, 2015), economic environment, (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1998; Leuz, Nanda and Wysocki, 2003; Bushman, Piotroski, and Smith, 2004), and culture (Hofstede, 2001), as well as wide dispersion in stock characteristics.

For 40,000 stocks from 40 countries from 1985 to 2013, we examine predictability of stock returns by liquidity shock and the variation in the predictability across stocks and countries in order to find implication on market efficiency of frictions arising from both investor recognition and institutional features of financial markets. We find that stock-level liquidity shocks predict returns upto six months in both developed and emerging markets after controlling for various stock characteristics such as market beta, size, book-to-market, momentum, return reversal, coskewness, idiosyncratic volatility, the first and the second moment of liquidity, trading

volume, extreme positive return, and liquidity risks. To see whether trading based on the predictability of liquidity shocks produces substantial returns in global stock market, we form portfolios of liquidity shocks by sorting in each country stocks based on liquidity shock and linking stocks with high and low liquidity innovations across countries. A country-neutral portfolio based on liquidity shock in the previous month, which is formed by taking long and short position in stocks with high and low liquidity shock respectively across countries, produces highly significant 1.47% of monthly abnormal returns after controlling for global Fama-French three factors. The abnormal return is higher in emerging market (1.54%) than in developed countries (1.41%). More importantly, the long-short strategy generates significant abnormal returns upto six month after the portfolios are formed. Six month holding period abnormal return is 3.33%, which is highly significant both statistically and economically.

In subsequent analyses, we investigate the sources of delayed reaction of stock prices to liquidity shock. In doing so, we develop a measure for price delay to stock-level liquidity shock (*LiqDelay*), which is similar in spirit to Hou and Moskowitz (2005), who designed the measure of price delay to fluctuations in market returns. Our *LiqDelay* measure varies substantially across stocks within each country and is significantly higher for stocks with low market capitalization, low liquidity, and low institutional ownership. Consistent to Bali *et al.* (2015), this stock-level analysis shows that frictions from low liquidity as well as low investor recognition may contribute delayed reactions to innovations in liquidity in global stock market.

By aggregating *LiqDelay* measures over all stocks in a given country, we find substantial difference in the delayed reaction is also present across countries. Our empirical exercises on the cross-country differences in the underreaction to liquidity shock show an interesting and important finding that the underreaction is stronger for countries with *less* market frictions. Specifically, delayed response is stronger in countries with *high* transparency (measured by financial disclosure, credibility of disclosure, and accounting standard) and does *not* show significant difference by the degree of stock market development or market friction (measured by market capitalization to GDP and market liquidity). This finding sharply contrasts to the

hypothesis that delayed reaction of stock returns to public information arises from stock market frictions. Furthermore, we find that *LiqDelay* is stronger in countries with high individualism (measured by Hofstede's (2001) Individualism Index). Investors in countries with high individualism are more likely to be overconfident and, hence, generally put more weight on private information than on public information (Chui, Titman, and Wei, 2010), leading to inattention to public information such as stock liquidity shock. Given elusive and intangible nature of changes in stock liquidity, investors' inattention reduces the chances of recognition of the liquidity shock, dampening the adjustment of stock prices to the shock.

Lastly, we examine whether the underreaction to liquidity shock varies over time. It is more likely for investors to pay more attention to the public information when uncertainty is high or investor sentiment is low. If investors' inattention is the source that drives the underreaction, more investor attention should lead to reduced underreaction to liquidity shock, and we finally should observe positive (negative) relation between the underreaction of stock returns and the investor sentiment (VIX). Consistent to our expectation, regressions with the implied volatility of S&P 500 index options, or VIX, and US investor sentiment index show that the impact of liquidity shock on stock return is mitigated when VIX is high or US sentiment is low. This supports the key role of investor inattention in price delay to stock liquidity shock.

II. Data

We collect the daily stock return, daily trading volume, daily adjusted stock price, annual number of outstanding shares, annual market capitalization, and annual book-to-market ratio for individual stocks from Datastream for all countries except for the U.S., for which we obtain the data from CRSP and Computstat. Institutional ownership data for stocks is from FactSet database. Following Griffin *et al.* (2010), Lee (2011), Karolyi, Lee, and van Dijk (2012) and Amihud *et al.* (2015), we restrict the sample to common shares listed on the major exchanges in

a country.[1] For the U.S., we use the stocks that listed on NYSE, Nasdaq, and AMEX with the CRSP share code of either 10 or 11.

For further daily data screening, if the total return index is less than 0.01 and daily return is larger than or equal to 200% then we set daily return to missing (Ince and Porter 2006). We exclude stock-day observations if the daily trading value is less than 100 US dollar. We use Amihud (2002) illiquidity measure to construct liquidity shock and discard the stock that have top 1% cross-sectional value of illiquidity measure in each country. To remove the potential influence of stocks with very high or low prices, we drop the stock-day observations if the previous year end stock price belongs to the top or the bottom 1% (inclusive) in the cross-section in a given country. We use the month-end total return index to compute monthly return. Monthly return is set to missing if the return is greater than (or equal to) 500% or if any monthly return above 300% (inclusive) is reversed in the following month (Ince and Porter 2006). We discard the stock-month observations if the number of valid daily liquidity measure is less than 15 in a given month or the number of zero-return days is larger than 80% (inclusive) of the total number of trading days in a month. Finally, we required a country to have at least 50 stocks for each month. Our final sample includes 40 countries with 3,475,240 firm-months observations over the period from January 1985 to December 2013. Following Amihud *et al.* (2015) and the World Bank, we classify 25 countries into developed countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, S. Korea, Singapore, Spain, Sweden, Switzerland, Taiwan, UK, and the US) and 15 emerging market countries (Brazil, Chile, China, India, Indonesia, Malaysia, Mexico, Pakistan, Philippines, Poland, Russia, S. Africa, Sri Lanka, Thailand, and Turkey).

[INSERT TABLE 1 HERE]

[1] To drop non-common shares from the sample, we applied the "name filter," which has been used in the previous literature. For more detailed information, refer to the footnote 5 of Lee (2010) and the footnote 3 of Karolyi, Lee, and van Dijk (2012).

Table 1 reports the number of stocks, sample beginning-year and the summary statistics of monthly return for our sample countries. The first two columns present the number of stocks in the sample and the starting year for each sample countries. We have total 40,002 stocks, of which 29,864 (10,138) stocks are from developed (emerging market) countries. U.S. has the largest amount of stocks (5,613), followed by Japan (4,447) and Canada (3,454). The earliest starting year is 1986. For Russia, the sample starts only from 2006. The third column shows the time-series average of cross-sectional mean of monthly returns for each country. The mean monthly return for developed and emerging market countries is 1.05% and 1.60%, respectively.

III. Delayed reaction to liquidity shock

3.1 Liquidity measure and liquidity shock

We use the Amihud measure (2002) of illiquidity in this study. It is a widely used measure and has been shown to be good in the literature (Goyenko *et al.*, 2009; Karolyi, Lee and van Dijk, 2012; Amihud *et al*. 2015). The measure is defined in Eq. (1) as a daily ratio of absolute return divided by dollar trading volume, in which both the return and dollar volume are in US dollars.

$$Illiq_{j,i,t} = Avg\left(\frac{Abs(ret_{j,i,d})}{Dollar\ Vol_{j,i,d}}\right)\times 10^{6} \qquad (1)$$

We use average of daily illiquidity for firm *i* in country *j* on day *d* within a month to get a monthly measure of illiquidity. Following Bali *et al.* (2014), we construct liquidity shock as the difference between illiquidity and the average illiquidity over the past 12 months. To convert illiquidity shock to liquidity shock, we multiply negative one and get:

$$Liq\ Shock_{j,i,t} = -\left(Illiq_{j,i,t} - AvgIlliq_{j,i|t-12,t-1}\right). \qquad (2)$$

Table 1 shows the time-series averages of cross-sectional mean of liquidity shock (*LiqShock*) and illiquidity (*Illiq*) for sample countries. The average of *Liqshock* across developed countries is -0.042 and it is -0.076 for emerging market countries. The table also shows that illiquidity varies across countries and that developed countries are more liquid than emerging market countries, with the average illiquidity measure of developed countries and emerging market countries being 1.14 and 3.11, respectively.

Figure 1 shows the six months moving average of liquidity shock computed as in Eq. (2), averaged across stocks from all, developed, and emerging market countries (panel A) and from the U.S. and all countries except for the U.S. (panel B).

[INSERT FIGURE 1 HERE]

As shown in panel A of Figure 1, the liquidity shock well reflects some important anecdotal financial events during the sample period. There exists negative liquidity shock in 1997 and 1998, in which the Asian financial crisis, Russian financial crisis, and the meltdown of the Long-Term Capital Management. Big negative peak in the early 2000's reflect the burst of Dot Com bubble, 9/11 terrorist attack, and the Enron scandal. The figure also shows dry-up of liquidity during the 2008 global financial crisis originated from the U.S. subprime mortgage markets and during the European sovereign debt crisis arisen from Greece in early 2010's. Consistent with Table 1, we see in the figure that liquidity shock of emerging countries is more volatile when compared to that of developed countries. The time-series pattern in Panel B for the U.S. and non-US world is very similar to Panel A.

3.2 Delayed reaction to liquidity shock

In this section, we examine the speed of stock price adjustment to a stock-level liquidity shock in the global financial markets. In the U.S., Bali *et al.* (2014) find that stock returns do not

immediately react to liquidity shock, but only slowly do so. We examine whether such underreaction is specific to the U.S. or worldwide phenomenon. We formally analyze delayed reaction to liquidity shock under the cross-sectional regression framework of Eq. (3) by controlling other risk factors. All cross-sectional regressions include country dummies so that we estimate coefficients based on within country variations of the variables considered.

$$ret_{j,i,t+i} = \alpha_{t+i} + \beta_{t+1} Liq.Shock_{j,i,t} + \gamma_{t+1} X_{j,i,t} + \varepsilon_{j,i,t+1} \qquad (3)$$

To see a long-term as well as short-term impact of liquidity shock on stock return, $ret_{j,i,t+i}$, a return of stock i in country j, is computed over three different periods - at month t+1, for months over t+2 to t+3, and for months over t+4 to t+6. $LiqShock_{j,i,t}$ is a liquidity shock of stock i in month t, which is computed based on the Eq. (2). $X_{j,i,t}$ is at set of control variables of for stock i in country j in month t. Specifically, we add control variables of market beta, size, book to market ratio, momentum (Mom), short-term return reversal (Rev.), co-skewness (Coskew), idiosyncratic volatility (*IdioVol*), extreme positive return in the previous month (MAX), illiquidity level (*Illiq.*), coefficient of variation of Amihud illiquidity ($CV_{illiq.}$), standard deviation of turnover (SD_{TV}), high and low abnormal dollar trading volume (Vol_H and Vol_L), and three liquidity risks from the liquidity-adjusted capital asset pricing model of Acharya and Pedersen (2005).

[INSERT TABLE 2 HERE]

Table 2 shows the average across months of the coefficients from the cross-sectional regressions of stock return on liquidity shock and control variables. We see that the predictability of liquidity shock exists for returns upto six months in the future. Regressions with stocks from all sample countries show that the average coefficient of *LiqShock* for return at month t+1, t+2 ~ t+3, and t+4 ~ t+6 is 0.228, 0.317, and 0.368, respectively, and they are highly significant in all cases. The table shows the similar results for developed countries without U.S., emerging market countries, and the U.S., supporting that investors' underreaction

to public information is not restricted to the U.S. or to some specific regions, but is a global phenomenon.

Given evidence of predictability of liquidity shock on stock returns in Table 2, it is interesting to see an economic importance of such predictability. To do so, we form decile portfolios for each country each month based on liquidity shock and then link the portfolio ranking across countries to compute portfolio returns. Table 3 reports the time-series average of holding period returns of these country-neutral portfolio returns over one to six months after the portfolio formation.

[INSERT TABLE 3 HERE]

Panels A, B, C, and D present the results for all countries, developed countries without U.S., emerging market countries, and the U.S., respectively. We only report the results for portfolios based on the lowest (Low) and the highest (High) liquidity shock together with the results for the long-short portfolios (High-Low) for brevity. *Ret* is monthly raw return and *Alpha* is an abnormal return from the global Fama and French (1993) three factor model. We see in the table that the return of a portfolio formed by longing stocks with high liquidity shock and shorting those with low liquidity shock is positive and highly significant over all different horizons. For all countries (Panel A), the return is 1.20% and 1.46% and *t*-values are 8.80 and 9.72 for equally-weighted and value-weighted portfolios, respectively. By comparing developed (panel B) and emerging markets (panel C), we find that the magnitude of return spread from High–Low group is similar, but the returns are much larger for each of High and Low group for emerging market countries than for developed countries, suggesting that the liquidity shock is more important in emerging market than in developed market. Consistent with Bali *et al*. (2014), we find positive and highly significant returns for the long-short portfolios of 1.68% and 1.73% for equally-weighted and value-weighted portfolios, respectively, in the U.S. (panel D).

The profitability from the delayed response of returns to liquidity shock is also shown over longer horizons. By holding long-short portfolios over the next six months after the portfolio formation, investors can obtain a highly significant and positive return of 3.44% (*t*-value of 7.19) and risk-adjusted return of 3.33% (*t*-value of 7.50) for the case of value-weighted portfolios. We also see similar results in other panels in the table.

We next turn to examine the gradual changes in the impact of liquidity shock on stock returns in each subsequent month after the portfolio formation. Figure 2 shows monthly stock returns of the difference between the portfolio of stocks with high liquidity shock (High) and the portfolio of stocks with low liquidity shock (Low) in each month from $t+1$ to $t+12$ following liquidity shock for all sample countries, developed countries without U.S., emerging market countries, and the U.S. in separate panels. The figure shows that the return of a long-short portfolio is positive and significant upto six months for all countries and developed countries. Surprisingly, the profitability persists for shorter horizons of only upto two months in emerging market countries and three to four months in the U.S. The U.S. result in the figure is consistent with the finding of Bali *et al.* (2014), who show the presence in the U.S. of the underreaction of liquidity shock. Shorter persistence or *faster* infusion of liquidity shock into the stock price in emerging markets than in developed markets implies that the market frictions may not be a driving force of delayed reaction since such frictions should be larger in emerging market than in developed markets. We will further investigate the issue on the source of underreaction in the later sections.

[INSERT FIGURE 2 HERE]

IV. Friction and slow infusion of liquidity shock

In the previous section, we find strong evidence of delayed reaction of stock returns to liquidity shock across countries. In this section, we investigate the mechanisms that may lead to such underreaction to liquidity shock. We can think of frictions such as investor inattention and

transaction cost like illiquidity as sources for stock price to underreact to public information. In the U.S. study, Bali *et al.* (2014) show that both market friction and investor inattention help explain the forces driving underrection to liquidity shock. Is there any difference in the delayed reaction among countries with different level of frictions? What is the source of underreaction? Is it due to market friction or investor inattention? To deal with these issues, we start by developing a measure of delayed reaction of stock prices to liquidity shock.

4.1 Measure of delayed reaction

Similar in spirit to the measure of price delay to fluctuations in market returns developed by Hou and Moskowitz (2005), we slightly modify their delay measure and construct a proxy for delayed response of stock returns to liquidity shock as follows:

$$r_{j,i,t} = \alpha_{j,i} + \beta_{j,i} LiqShock_{j,i,t} + \sum_{n=1}^{6} \delta_{j,t}^{(-n)} LiqShock_{j,i,t-n} + \varepsilon_{j,i,t} \quad (4)$$

$$LiqDelay_{j,i} = 1 - \frac{R^2_{\delta_{j,t}^{(-n)}=0, \forall n \in [1,6]}}{R^2} \quad (5)$$

To obtain the measure of delay, we regress monthly stock returns on contemporaneous and the six lags of liquidity shock over the entire sample period. We use lagged liquidity shocks upto six months in Eq. (4) because Figure 2 shows that delayed reaction persists upto six months in the overall country sample. $r_{j,i,t}$ is a return of stock *i* in country *j* at month *t*, and $LiqShock_{j,i,t}$ is month *t* liquidity shock of stock *i* in country *j*, defined in Eq. (2). The measure of delayed reaction of stock returns, $LiqDelay_{j,i}$, is constructed in Eq. (5) as a ratio of the variation of stock returns explained by lagged liquidity shocks relative to the variation explained only by the contemporaneous liquidity shock without lag terms. That is, *LiqDelay* is one minus the ratio of R^2 from the regression of Eq. (4) restricting all lags of liquidity shock to be zero, i.e., $\delta_{j,i}^{(-n)} = 0$ for $\forall n \in [1,6]$, relative to the R^2 in Eq. (4) without such restriction on lag terms. If the contemporaneous term explains all of stock return variation caused by liquidity shock, that is, if

there is no delayed reaction of stock returns, then R^2s for the numerator and the denominator in Eq. (5) should be the same and *LiqDelay* for a stock becomes zero. Table 4 shows the statistics of *LiqDelay* by country.

[INSERT TABLE 4 HERE]

Table 4 shows substantial variations in *LiqDelay* within each country. The average of standard deviation of *LiqDelay* is 26.4 for developed markets and 26.2 for emerging market countries. Interestingly, the average of *LiqDelay* is bigger in developed market (64.5) than in emerging market (61.8). We see similar pattern for median value. Figure 3, which is a graphical presentation of the average of *LiqDelay* across countries, shows that delayed reaction to stock liquidity shock varies a lot across countries. It is surprising to see that emerging market countries such as Turkey, China, Taiwan, Russia, Pakistan, and India are located at the bottom of the graph, representing that they are the countries with the lowest level of delayed response of stock prices to liquidity shock. Developed countries of Germany, Portugal, UK, and Canada are shown to have large *LiqDelay* relative to other countries. Even the U.S. is at the top tercile in terms of average *LiqDelay*.

[INSERT FIGURE 3 HERE]

The descriptive statistics of *LiqDelay* casts doubt on the potential role of frictions arising from under-developed institutional features such as regulations and taxation in the delay in reaction to liquidity shock since it is common to believe that the level of market frictions should be smaller in developed countries than in emerging market countries. We investigate this issue in the next section.

4.2 Frictions and the delayed response

We hypothesize that in countries with more developed markets and with high transparency, and in countries in which investor inattention is smaller, it is less likely to observe delayed reaction to liquidity shock. The wide dispersion in *LiqDelay* across countries presented in the previous section provides a good opportunity to investigate the source of delayed response to stock liquidity. We first examine the difference in *LiqDelay* by different country characteristics. We examine nine country-level variables, which are thought to be related to the level of market frictions: *Individualism index*, developed by Hofstede (2001), measures the degree to which people in a given country focus on internal attributes to distinguish themselves from other people. Since investors from countries with high individualism are generally more overconfident (Chui, Titman, and Wei, 2010), they tend to put less weight on public information, leading to higher inattention to public informational event such as liquidity shock. *Institutional ownership* is a percentage of shares held by institutional investors, as of previous year-end, relative to the total outstanding shares for a given firm, averaged across firms in a country. Since stocks with high institutional ownership are generally more likely to be visible, we use this as a proxy for investor attention. *Market Cap. to GDP*, previous year-end total market capitalization of firms in a country normalized by gross GDP, *Market Illiq.*, market aggregate of stock illiquidity, averaged over the previous year, and *Short-sale constraint*, a dummy variable for the restricted short selling in a country (Bris *et al.* 2007), are employed as proxies for stock market development and institutional frictions in a country. We also use the following proxies for the informational environment of a given country: *Financial disclosure* is corporate transparency measure from Bushman *et al.* (2004), whose value is the average of the ranks of answers to the questions on R&D, capital expenditure, subsidiaries, segment-product, segment-geographic, and accounting policy. *Credibility of disclosure* is a transparency measure from Bushman *et al.* (2004), which denotes the percentage of firms in the country audited by the big five accounting firms. *Accounting standards* is developed by La Porta *et al.* (1998) by rating companies based on whether the company includes 90 key items on annual reports. *Analyst forecast dispersion* is an average across firms in a given country of standard deviation of earnings forecasts normalized by the average forecasted values at the end of previous year.

[INSERT TABLE 5 HERE]

Table 5 shows the aggregate *LiqDelay*, which is an average across stocks in a given country, averaged for different group of countries sorted based on various country characteristics described above. A country is grouped into High (Low) if the value of the variable in the column head is above (below) median across sample countries. High-Low shows the difference in means of aggregate *LiqDelay* between High and Low country groups together with *t*-values.

LiqDelay is significantly high in more individualistic countries than in more collectivistic countries. This is consistent with the hypothesis that investors' recognition may work as a friction that causes delay in stock price to liquidity shock since investors in individualistic countries tend to pay less attention to public information due to high overconfidence. *LiqDelay* is also significantly different between countries with high and low institutional ownership. Since institutional ownership is a proxy of visibility of firms, this is also supporting evidence that inattention by investors is a source of delayed response.

Our *LiqDelay* does not show any significant difference according to the degree of stock market development, market aggregate liquidity, and short-sale constraint. Moreover, the measure is not different by the level of informational efficiency of a country. Three out of all four information-related proxies show that *LiqDelay* does not vary by the transparency or information asymmetry at the country level. The only exception is Accounting standards. However, surprisingly, High-Low is *positive* and significant, implying that the tendency of delayed response is *larger* in countries with high accounting standards, a finding that is not consistent with informational frictions. A simple empirical exercise in Table 5 shows that investors' inattention may drive delayed reaction, while other frictions do not.

To further investigate this issue, we now turn to regression analysis. We regress *LiqDelay* of each stock on firm characteristics as well as country characteristics, to which a firm belongs. We consider stock characteristics such as size, illiquidity, institutional ownership, and turnover

shock since they may be related to the level of frictions. Turnover shock is defined as the difference between turnover and its average over the past 12 months, where turnover is a monthly trading volume divided by the number of shares outstanding. Firm characteristics are averaged for each firm over the sample period. Standard errors are clustered by a country. In addition, since the number of stocks varies by country, we run weighted least squares regressions with the number of stocks of a country as weight in the regression.

[INSERT TABLE 6 HERE]

Table 6 shows that stock illiquidity and turnover shock are significant characteristics for *LiqDelay*, while size and institutional ownership for a firm are not. Since stocks with high turnover shock are more visible (Gervais, Kaniel, and Mingelgrin, 2001), we expect *LiqDelay* should be smaller for such stocks. The result in the table shows that it is indeed the case. Turnover shock is negative and significant in all specifications. The significant and positive relation of stock illiquidity with *LiqDelay* supports that frictions coming from a lack of liquidity work toward delayed reaction of stock returns.

The table provides further evidence that individualism and country-level institutional ownership matters for *LiqDelay* across countries. *LiqDelay* is significantly higher for stocks from more individualistic countries and countries with more institutional ownership. Financial disclosure, Credibility of disclosure and Analyst forecast dispersion are *positively* related to *LiqDelay*, implying that frictions from poor informational environment do *not* impede infusion of information into stock prices. Other country characteristics are not significantly related to *LiqDelay*.

Overall, empirical exercises in this section provide evidence that delayed response of stock returns to liquidity shock is largely due to investors' limited attention, rather than frictions arising from institutional features of a country.

4.3 When inattention is high

Investors may pay more attention when they are fearful about stock market. Therefore, in periods with high fears or low sentiment, delay is less likely, because investors pay more attention to public information. It is quite intuitive, because liquidity is more important especially when stock market declines and investors worry about the liquidity dry-up. We test this hypothesis using U.S. investor sentiment index of Baker and Wurgler (2006) and VIX, volatility index from the implied volatility of S&P 500 index options. Table 7 shows firm level panel regressions of return on liquidity shock, interacted with sentiment proxies. The dependent variable is a cumulative return for $t+1 \sim t+6$ and each regression contains control variables and country dummies. We first find positive and significant relation between return and *LiqShock*, confirming our previous results on the underreaction of returns to liquidity shock. More importantly, the interaction of *LiqShock* and VIX is negative and significant, implying that, when VIX is high, i.e. investors feel fear about stock market, delays of returns to liquidity shock are more likely to be alleviated. When we use sentiment index of Baker and Wurgler (2006), the interaction term of *LiqShock* and Sentiment is positively associated with stock returns, as expected. The findings that delay is smaller in periods with low sentiment or high fear, which are related to high level of attention, provide further supporting evidence for the role of investors' inattention in slow infusion of liquidity shock into stock prices.

[INSERT TABLE 7 HERE]

V. Conclusion

For 40,000 stocks from 40 countries from 1985 to 2013, we examine delayed response of stock returns to liquidity shock and the variation in the delay across countries. Consistent with the U.S. result of Bali *et al*. (2014), we find existence of significant delay in the infusion of liquidity shock into stock prices in both developed and emerging market countries. The profitability of a country-neutral portfolio formed based on

liquidity shock is significant upto six months after the shock. In cross-country analyses, the delay is shown to be higher in countries with high individualism and high institutional ownership. Interestingly, informational environment or the degree of development of stock markets of a country does not explain the variations in the delay across countries. Our findings have important implication of frictions on market efficiency by providing evidence that investor recognition or limited attention is an important source of frictions, which drives delayed reaction to liquidity shock or the predictability of liquidity shock on future returns around the world.

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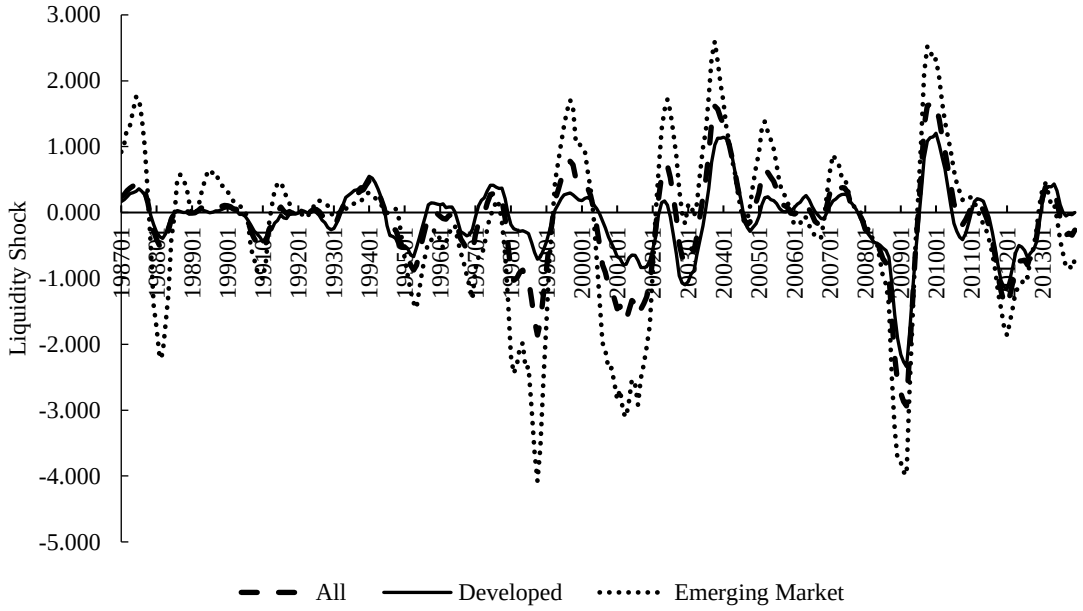
Figure 1. Aggregate liquidity shock over time

The figure shows six months moving average of liquidity shock, averaged across sample stocks from all 40 sample countries, 25 developed countries, 15 emerging market countries (panel A) and from the U.S. and all countries other than U.S. (panel B). Liquidity shock is defined as the difference between liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. Both the returns and the dollar volume are in U.S. dollars.

Panel A. Liquidity shock of all, developed countries and emerging market countries



Panel B. Liquidity shock of U.S. and all countries except for the U.S

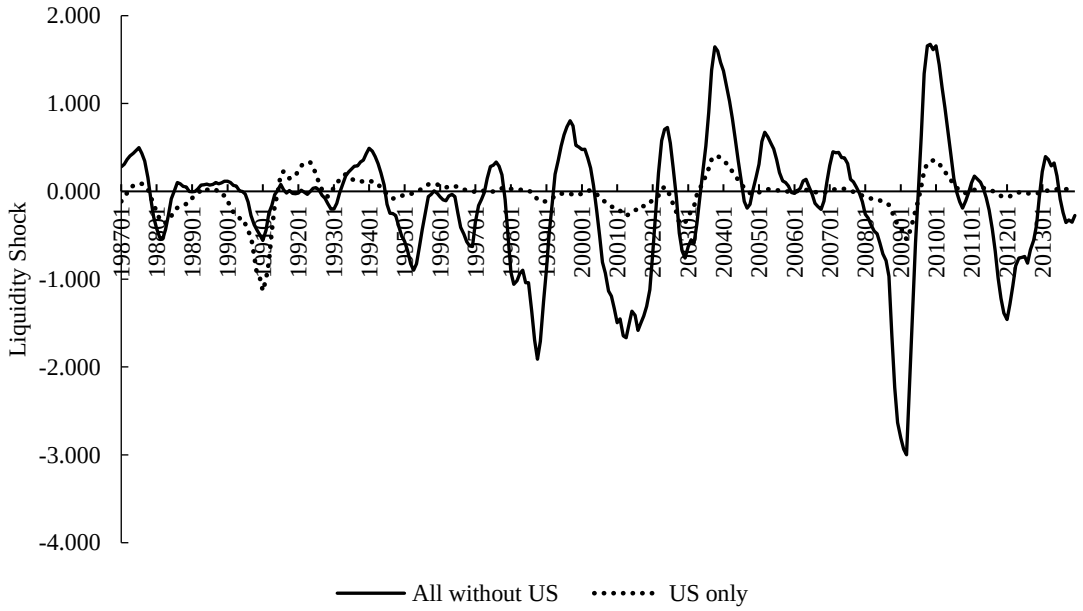
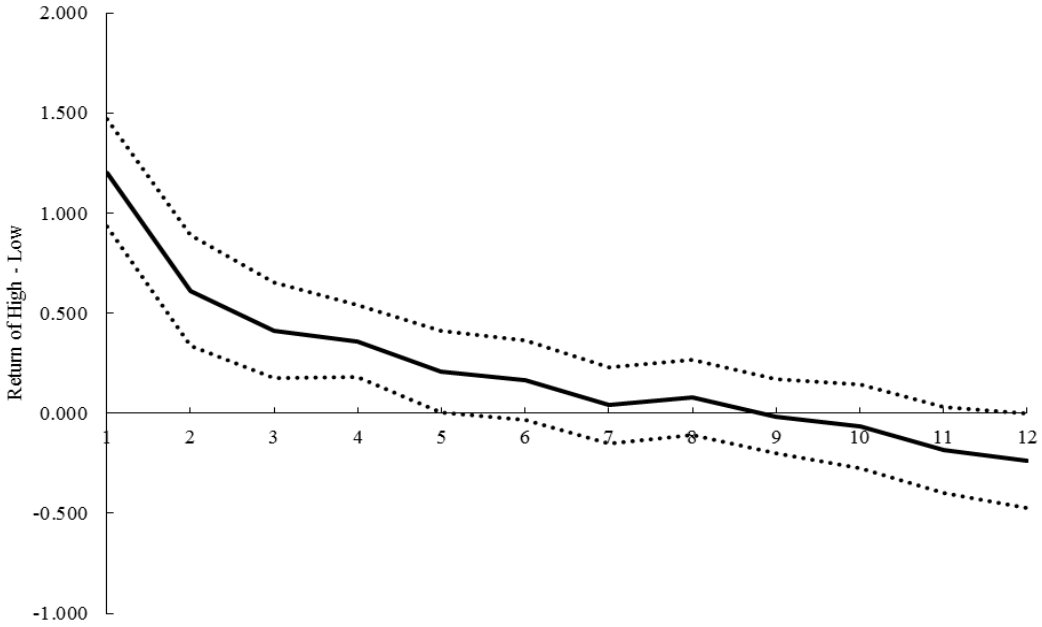


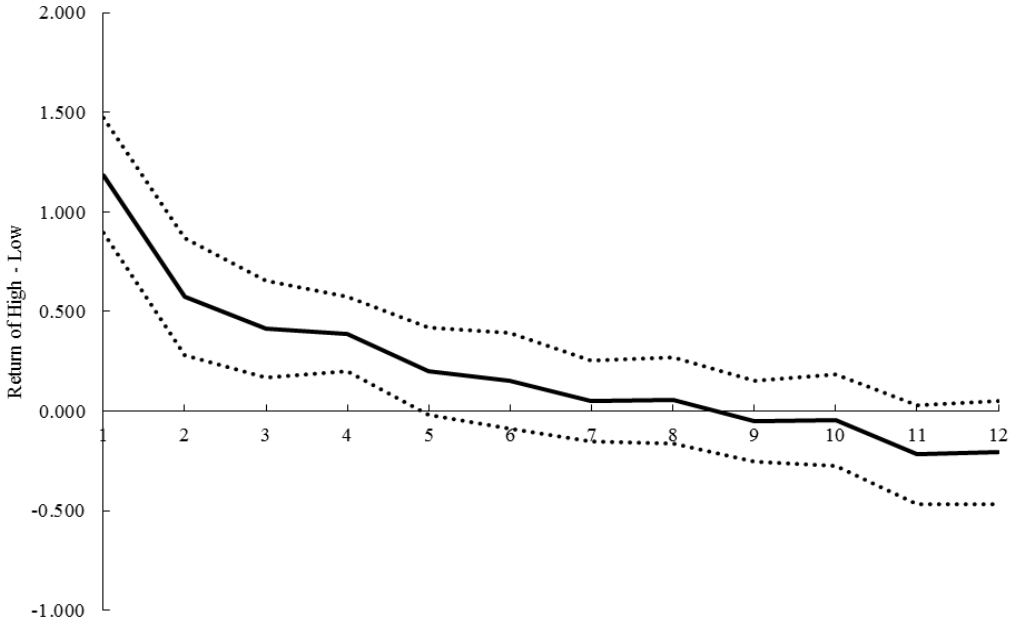
Figure 2. Response of stock returns to liquidity shock

The figure shows monthly stock returns of the difference between the portfolio of stocks with high liquidity shock (High) and the portfolio of stocks with low liquidity shock (Low) over the period from t+1 to t+12 months following liquidity shock. These returns are averaged across all 40 sample countries (panel A), developed countries without the U.S. (panel B), and emerging market countries (panel C). Panel D shows the U.S. returns. For a given month in a given country, we sort stocks into decile portfolios based on liquidity shock. Liquidity shock is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. Both the returns and the dollar volume are in U.S. dollars. The dashed line is a boundary for the significance at 5% level.

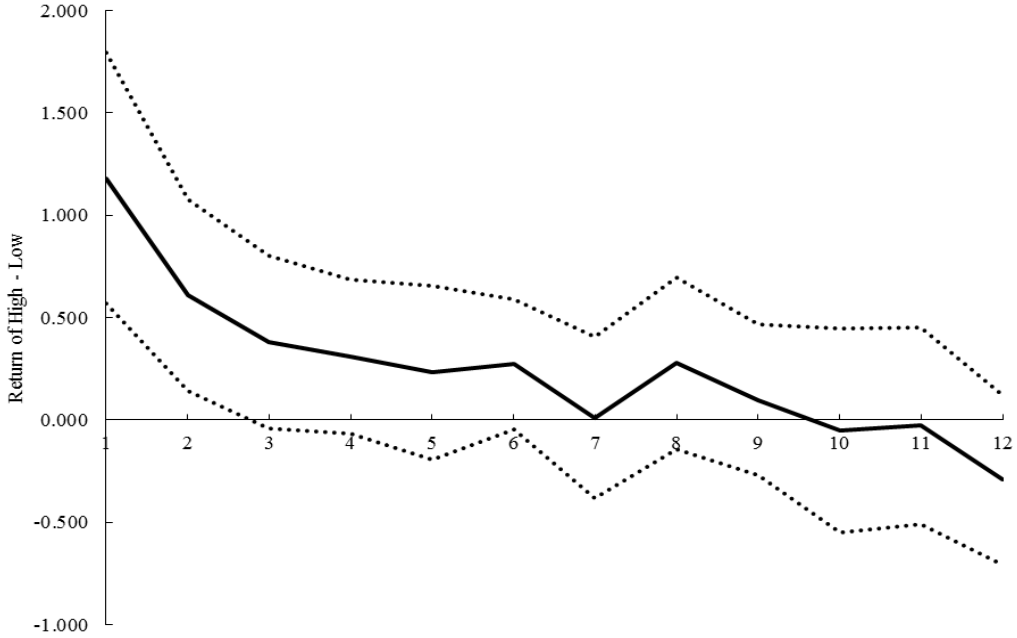
Panel A. All countries



Panel B. Developed countries without U.S.



Panel C. Emerging market countries



Panel D. U.S.

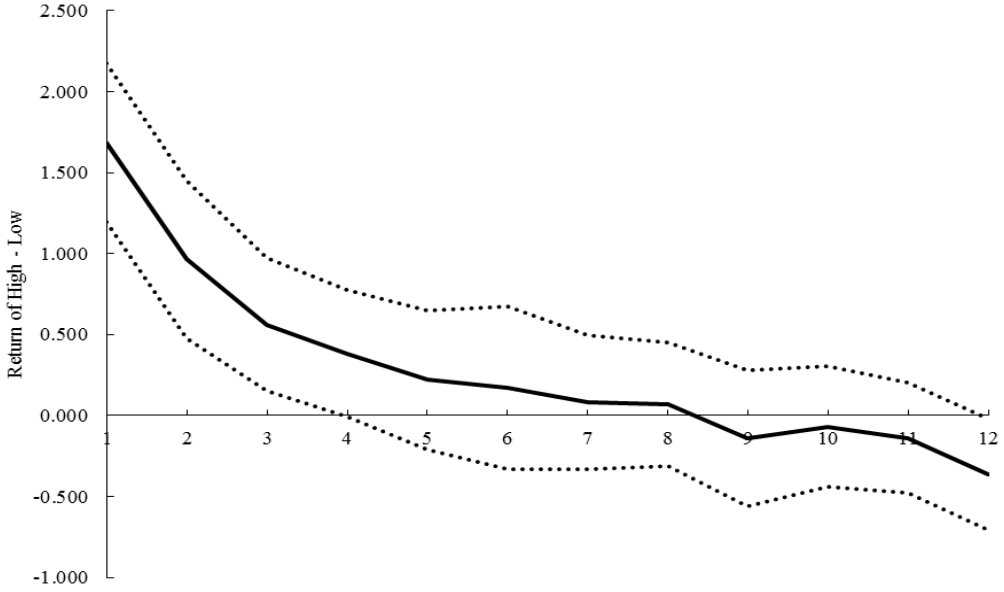


Figure 3. Average of delayed response of stock returns by country

The figure shows the mean of the measure of delayed reaction of stock returns to liquidity shock by country. The delay measure is motivated by Hou and Moskowitz (2005) and is computed for each stock over the sample period as:

$$r_{j,i,t} = \alpha_{j,i} + \beta_{j,i} LiqShock_{j,i,t} + \sum_{n=1}^{6} \delta_{j,t}^{(-n)} LiqShock_{j,i,t-n} + \varepsilon_{j,i,t} \quad (4)$$

$$LiqDelay_{j,i} = 1 - \frac{R^2_{\delta_{j,t}^{(-n)}=0, \forall n \in [1,6]}}{R^2} \quad (5)$$

Liquidity shock (*LiqShock*) is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one.

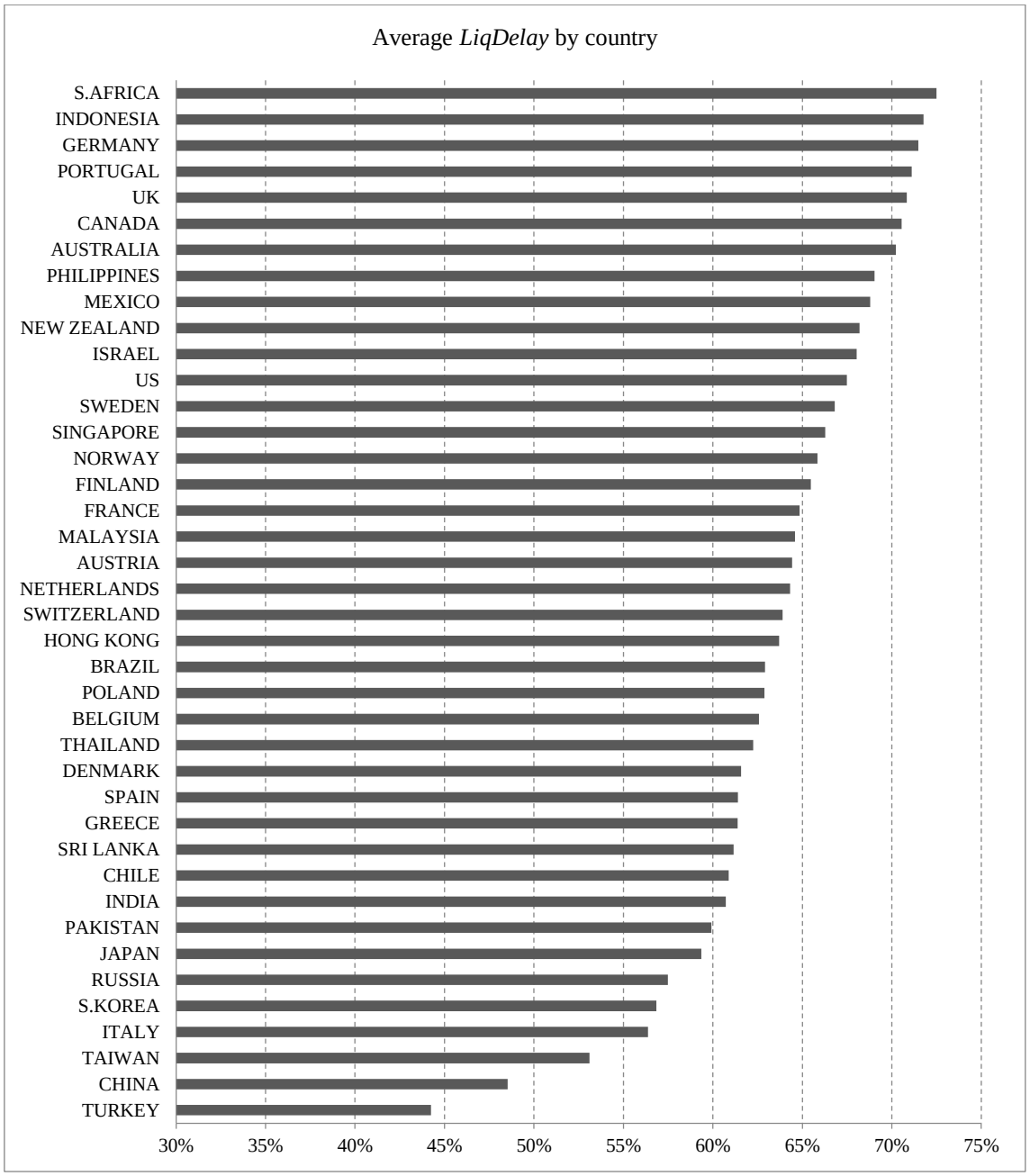


Table 1. Summary statistics

This table shows the statistics for the sample stocks from 40 countries over the period from January 1986 to December 2013. The first two columns present the number of stocks over the sample period and the starting year of sample for each country, respectively. The next three columns show the time-series averages of cross-sectional mean of monthly returns (in percentage), liquidity shock, and illiquidity in a given country. *LiqShock* is a liquidity shock defined as the difference, multiplied by negative one, between *Illiq* and the average of *Illiq* over the past 12 months (as in Eq. (2)), where *Illiq* is the Amihud (2002) illiquidity measure defined as an average in a month of a daily ratio of absolute return divided by dollar trading volume. The return and the dollar volume are based on the U.S. dollars.

	N of stocks	First Year	Return (%)	*LiqShock*	*Illiq.*
Panel A. Developed countries					
AUSTRALIA	2,162	1986	1.193	-0.084	2.374
AUSTRIA	148	1991	1.099	-0.016	0.291
BELGIUM	181	1996	0.733	-0.006	0.374
CANADA	3,454	1986	1.106	-0.384	5.288
DENMARK	268	1992	0.831	-0.040	0.766
FINLAND	162	1999	1.387	0.049	0.755
FRANCE	1,216	1991	1.135	-0.020	0.906
GERMANY	930	1999	0.674	-0.209	1.657
GREECE	386	1991	1.504	-0.317	2.556
HONG KONG	1,135	1988	1.262	-0.005	0.716
ISRAEL	475	1993	1.117	0.030	4.002
ITALY	483	1994	0.539	-0.002	0.227
JAPAN	4,447	1990	0.491	0.000	0.418
NETHERLANDS	274	1986	0.991	-0.007	0.352
NEW ZEALAND	185	1994	1.066	-0.014	1.558
NORWAY	370	1993	1.436	0.015	0.680
PORTUGAL	110	1994	0.743	-0.042	1.590
S.KOREA	2,082	1986	1.784	0.038	0.463
SINGAPORE	648	1986	1.444	0.012	1.162
SPAIN	228	1990	0.969	-0.008	0.230
SWEDEN	701	1991	1.250	-0.020	1.372
SWITZERLAND	327	1990	1.112	0.002	0.158
TAIWAN	1,834	1991	0.254	-0.004	0.329
UK	2,045	1988	0.978	0.000	0.005
US	5,613	1986	1.137	-0.019	0.375
Developed	29,864	1991	1.049	-0.042	1.144
Panel B. Emerging market countries					
BRAZIL	385	2000	1.854	0.043	1.070
CHILE	163	1991	1.654	0.052	0.832
CHINA	2,433	1994	1.581	0.009	0.098
INDIA	2,598	1995	1.722	0.203	11.270
INDONESIA	419	1992	1.565	-0.119	1.454
MALAYSIA	1,055	1987	1.604	-0.025	2.033
MEXICO	135	1997	1.560	-0.012	0.297
PAKISTAN	193	1999	1.764	0.392	4.097
PHILIPPINES	244	1994	1.431	-0.139	3.003
POLAND	353	1999	1.144	-0.335	6.939
RUSSIA	239	2006	2.146	-0.013	1.338
S.AFRICA	660	1991	0.988	-0.231	2.415
SRI LANKA	203	1994	1.367	-0.916	9.472
THAILAND	668	1988	1.734	-0.040	1.719
TURKEY	390	1995	1.865	-0.012	0.637
Emerging Average	10,138	1995	1.599	-0.076	3.111

Table 2. Regression of holding period returns on liquidity shock

This table shows the time-series averages of coefficients from the cross-sectional regressions of holding period returns on liquidity shock and control variables. Dependent variable is a holding period return (in percentage) for a stock over one month (t+1), the next two months (t+2 ~ t+3), and the next three months (t+4 ~ t+6) after the liquidity shock. Liquidity shock (*LiqShock*) is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. The return and the dollar volume are based on U.S. dollars. Beta is a market beta of an individual stock. Ln(Size) is a log of the market capitalization and Ln(BM) is a log of the book value of equity divided by market value of equity at the end of previous year. Mom is a cumulative stock return for the past 11 months, skipping one month prior to the portfolio formation. Rev is a stock return in the previous month. Coskewness (*Coskew*) is the covariance of stock excess return and the square of market excess return over the past 60 months. Idiosyncratic volatility (*IdioVol.*) is a standard deviation of residuals of daily returns from Fama and French (1993) three factor model in a given month. *Max* is maximum daily return of a stock in month *t*. $CV_{Illiq.}$ is a coefficient of variation of Amihud illiquidity, which is computed as a standard deviation of *Illiq.* in month *t*. SD_{TV} is a standard deviation of monthly turnover using the past 12 months data. Vol_H (Vol_L) is a high (low)-volume dummy that equals to one if the previous month-end trading volume of a stock is at the top (bottom) decile of the average trading volume over the past 50 trading days (Gervais *et al.* 2001). Beta2 is the covariance of stock illiquidity with market illiquidity. Beta3 is the covariance of stock return with market illiquidity. Beta4 is the covariance of stock illiquidity with market return. The *t*-statistics are in the parentheses and the standard errors are adjusted by Newey-West (1987) procedure with a lag of 12 months. The *, **, and *** are significance level of 10%, 5%, and 1%, respectively.

	All countries			Developed countries without U.S.			Emerging market countries			U.S.		
	t+1	t+2 ~ t+3	t+4 ~ t+6	t+1	t+2 ~ t+3	t+4 ~ t+6	t+1	t+2 ~ t+3	t+4 ~ t+6	t+1	t+2 ~ t+3	t+4 ~ t+6
LiqShock	0.228***	0.317***	0.368***	0.330***	0.400***	0.480***	0.420***	0.698***	0.551*	1.017***	1.488***	1.456***
	(5.04)	(5.13)	(4.19)	(6.30)	(5.82)	(5.11)	(2.84)	(2.87)	(1.94)	(3.53)	(3.22)	(2.93)
Beta	0.119	0.113	0.128	0.051	-0.030	-0.119	0.009	0.077	-0.166	0.267**	0.293	0.368
	(0.93)	(0.54)	(0.44)	(0.37)	(-0.13)	(-0.37)	(0.03)	(0.16)	(-0.23)	(2.02)	(1.44)	(1.46)
Ln(Size)	-0.073***	-0.074	-0.061	-0.084**	-0.089	-0.115	-0.115*	-0.074	-0.146	-0.068	-0.071	-0.100
	(-2.47)	(-1.49)	(-0.81)	(-2.04)	(-1.21)	(-1.01)	(-1.75)	(-0.58)	(-0.73)	(-1.60)	(-0.94)	(-0.78)
Ln(BM)	0.394***	0.705***	0.904***	0.375***	0.685***	0.798***	0.390***	0.667***	0.923***	0.153*	0.235	0.307
	(6.17)	(5.98)	(5.16)	(4.61)	(4.67)	(3.38)	(3.63)	(3.23)	(3.26)	(1.86)	(1.55)	(1.38)
Mom	0.004***	0.006*	0.002	0.003	0.004	-0.002	0.007***	0.009**	0.001	0.005	0.008	0.004
	(2.48)	(1.85)	(0.52)	(1.59)	(1.19)	(-0.44)	(3.25)	(2.20)	(0.27)	(1.60)	(1.56)	(0.50)
Rev.	-0.025***	0.015***	0.015*	-0.019***	0.024***	0.025***	-0.020***	0.013	0.019	-0.028***	0.006	0.008
	(-4.98)	(2.36)	(1.88)	(-2.88)	(2.54)	(2.37)	(-2.41)	(1.31)	(1.47)	(-4.13)	(0.67)	(0.62)
Coskew	-1.044	-1.347	-0.995	-2.030***	-2.638*	-2.710	5.438*	4.539	12.844	-0.410	-0.259	-0.414
	(-1.51)	(-0.91)	(-0.46)	(-2.55)	(-1.71)	(-1.22)	(1.96)	(0.85)	(1.31)	(-0.46)	(-0.16)	(-0.16)
IdioVol.	-0.195***	-0.282***	-0.288***	-0.228***	-0.384***	-0.435***	-0.304***	-0.388***	-0.247	-0.118**	-0.095	-0.072
	(-5.56)	(-4.45)	(-3.27)	(-5.49)	(-4.73)	(-3.23)	(-4.25)	(-4.36)	(-1.07)	(-2.26)	(-0.94)	(-0.58)
Max	-0.017**	-0.013	-0.004	-0.029***	-0.018	-0.017	-0.018	-0.030	0.011	0.004	0.014	0.040
	(-2.03)	(-0.98)	(-0.20)	(-3.25)	(-1.39)	(-0.70)	(-1.19)	(-1.19)	(0.31)	(0.33)	(0.60)	(1.53)
Illiq.	0.096*	0.367***	0.503***	0.129**	0.585***	0.780***	0.113	0.245	0.534	0.379	0.215	0.954
	(1.94)	(4.89)	(3.71)	(2.00)	(6.29)	(4.73)	(0.61)	(0.60)	(1.57)	(0.93)	(0.44)	(1.40)
$CV_{Illiq.}$	0.036	-0.009	-0.041	0.048	-0.064***	-0.120***	-0.040	0.142	0.003	0.104	0.519	0.325
	(1.38)	(-0.31)	(-1.02)	(1.37)	(-2.41)	(-2.43)	(-0.30)	(0.73)	(0.01)	(0.36)	(1.43)	(0.64)
SD_{TV}	-0.030	-0.088	-0.195	-0.044*	-0.050	-0.143	-0.153	-0.266	-0.459	-0.156	-0.582*	-0.930***
	(-1.32)	(-1.55)	(-1.50)	(-1.66)	(-1.41)	(-1.38)	(-1.37)	(-1.25)	(-1.41)	(-1.05)	(-1.90)	(-2.37)
Vol_H	0.223***	-0.016	-0.054	0.308***	-0.103	-0.191*	-0.143	-0.272	0.214	0.362***	-0.136	-0.146
	(3.87)	(-0.31)	(-0.95)	(3.54)	(-1.12)	(-1.82)	(-0.91)	(-1.54)	(0.94)	(3.37)	(-0.97)	(-1.26)
Vol_L	-0.478***	-0.115**	-0.028	-0.480***	-0.086	-0.172*	-0.200	0.135	0.060	-0.237***	-0.305***	-0.061

	(-11.69)	(-1.99)	(-0.37)	(-7.91)	(-1.39)	(-1.74)	(-1.42)	(0.78)	(0.28)	(-3.27)	(-2.34)	(-0.36)
Beta2	0.010	0.009	-0.180	0.007	0.106	-0.297	-0.234	0.242	1.092	1.157	2.348	0.540
	(0.09)	(0.05)	(-0.81)	(0.06)	(0.41)	(-1.16)	(-0.88)	(0.31)	(0.90)	(0.74)	(0.79)	(0.16)
Beta3	0.193	-0.996	-2.255	0.682	-0.621	-3.331	1.299	-6.235	-32.463	1.796	2.137	3.071
	(0.11)	(-0.35)	(-0.50)	(0.32)	(-0.17)	(-0.56)	(0.07)	(-0.24)	(-0.69)	(1.08)	(0.76)	(0.59)
Beta4	-0.209	0.032	-0.363	0.219	0.946	0.423	-12.123	-17.140	7.499	0.275	0.959	-2.096
	(-0.37)	(0.03)	(-0.25)	(0.25)	(0.47)	(0.14)	(-1.60)	(-1.13)	(0.31)	(0.10)	(0.19)	(-0.33)
Country dummy.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.205	0.216	0.216	0.202	0.211	0.206	0.306	0.317	0.311	0.095	0.093	0.092

Table 3. Liquidity shock and the delayed reaction of stock returns: Univariate sorts

This table shows the time-series average of holding period returns of liquidity shock portfolios over one to six months after the portfolio formation. For each country each month, we formed both equally-weighted (EW) and value-weighed (VW) decile portfolios based on liquidity shock and computed stock returns of the difference between the portfolio of stocks with high liquidity shock (High) and the portfolio of stocks with low liquidity shock (Low). Liquidity shock is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. The return and the dollar volume are based on U.S. dollars. *Ret* is a return (in percentage) of liquidity shock portfolios and Alpha is an abnormal return from the global Fama and French (1993) three factor model. Returns are cumulated for one month (t+1), three months (t+1 ~ t+3) and six months (t+1 ~ t+6) after the portfolio formation. The t-statistics are in the parentheses and the standard errors are adjusted by Newey-West (1987) procedure with a lag of 12 months. The *, **, and *** are significance level of 10%, 5%, and 1%, respectively.

	1 month (*t+1*)				3 months (*t+1 ~ t+3*)				6 months (*t+1 ~ t+6*)			
	EW		VW		EW		VW		EW		VW	
	Ret	Alpha	*Ret*	Alpha	*Ret*	Alpha	*Ret*	Alpha	*Ret*	Alpha	*Ret*	Alpha
Panel A. All countries												
1 (Low)	0.821**	0.231	0.495	-0.081	3.249***	1.394**	2.618***	0.844	6.560***	3.156***	5.680***	2.388**
	(2.07)	(0.95)	(1.33)	(-0.35)	(3.06)	(2.17)	(2.64)	(1.40)	(3.59)	(2.84)	(3.28)	(2.26)
10 (High)	2.023***	1.431***	1.955***	1.392***	5.398***	3.522***	5.183***	3.404***	9.578***	5.979***	9.116***	5.712***
	(4.93)	(5.48)	(5.04)	(5.54)	(4.67)	(4.70)	(4.75)	(4.73)	(4.67)	(4.50)	(4.65)	(4.47)
High - Low	1.202***	1.199***	1.460***	1.473***	2.149***	2.128***	2.564***	2.560***	3.018***	2.823***	3.436***	3.325***
	(8.80)	(9.08)	(9.72)	(10.29)	(6.24)	(6.15)	(6.72)	(6.96)	(6.45)	(6.02)	(7.19)	(7.50)
Panel B. Developed countries without U.S.												
1 (Low)	0.665*	0.079	0.358	-0.21	2.925***	1.019*	2.380***	0.561	5.966***	2.424**	5.166***	1.762*
	(1.68)	(0.33)	(0.99)	(-1.00)	(2.73)	(1.65)	(2.41)	(0.99)	(3.24)	(2.25)	(3.01)	(1.81)
10 (High)	1.848***	1.256***	1.761***	1.196***	5.012***	3.086***	4.793***	2.958***	8.911***	5.175***	8.591***	5.032***
	(4.55)	(5.32)	(4.55)	(5.37)	(4.36)	(4.58)	(4.40)	(4.63)	(4.34)	(4.42)	(4.35)	(4.48)
High - Low	1.183***	1.177***	1.403***	1.406***	2.087***	2.067***	2.412***	2.398***	2.946***	2.752***	3.425***	3.270***
	(8.05)	(8.37)	(9.00)	(9.34)	(5.86)	(5.95)	(5.89)	(6.20)	(6.13)	(6.17)	(6.50)	(7.48)
Panel C. Emerging market countries												
1 (Low)	1.352***	0.898**	0.972*	0.498	4.701***	3.201***	3.617***	2.130*	9.035***	6.397***	7.657***	4.969***
	(2.50)	(2.07)	(1.85)	(1.18)	(3.27)	(2.63)	(2.70)	(1.92)	(3.69)	(2.96)	(3.27)	(2.47)
10 (High)	2.532***	2.078***	2.468***	2.033***	6.784***	5.245***	6.422***	4.947***	12.138***	9.257***	10.929***	8.174***
	(4.09)	(3.83)	(4.22)	(3.89)	(4.06)	(3.40)	(4.10)	(3.38)	(4.25)	(3.36)	(4.04)	(3.17)
High - Low	1.180***	1.180***	1.496***	1.535***	2.083***	2.044***	2.804***	2.817***	3.104***	2.860***	3.273***	3.205***
	(3.78)	(3.68)	(5.14)	(5.37)	(2.99)	(2.70)	(4.55)	(4.38)	(3.20)	(2.52)	(4.02)	(3.41)
Panel D. U.S.												
1 (Low)	0.289	-0.361	0.051	-0.548***	1.721	-0.463	1.392	-0.576	4.423**	0.106	3.973***	0.197
	(0.70)	(-1.56)	(0.15)	(-2.78)	(1.54)	(-0.83)	(1.56)	(-1.24)	(2.21)	(0.12)	(2.41)	(0.26)
10 (High)	1.973***	1.380***	1.781***	1.220***	4.832***	2.798***	4.558***	2.709***	8.169***	4.222***	7.873***	4.316***
	(5.53)	(7.56)	(5.32)	(5.87)	(4.96)	(5.77)	(4.79)	(4.30)	(4.69)	(4.82)	(4.69)	(3.84)
High - Low	1.684***	1.742***	1.730***	1.769***	3.111***	3.262***	3.166***	3.285***	3.746***	4.116***	3.900***	4.119***
	(6.73)	(7.70)	(7.69)	(8.48)	(5.14)	(6.09)	(5.02)	(5.21)	(3.48)	(4.39)	(3.49)	(3.57)

Table 4. Statistics for delayed response of stock returns to liquidity shock

The table shows the mean, standard deviation, and the distribution of the measure of delayed reaction of stock returns to liquidity shock by country. The delay measure is motivated by Hou and Moskowitz (2005) and is computed for each stock over the sample period as:

$$r_{j,i,t} = \alpha_{j,i} + \beta_{j,i} LiqShock_{j,i,t} + \sum_{n=1}^{6} \delta_{j,t}^{(-n)} LiqShock_{j,i,t-n} + \varepsilon_{j,i,t} \quad (4)$$

$$LiqDelay_j = 1 - \frac{R^2_{\delta_{j,t}^{(-n)}=0, \forall n \in [1,6]}}{R^2} \quad (5)$$

Liquidity shock (*LiqShock*) is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. P25 and P75 denote the value of *LiqDelay* at 25 and 75 percentile, respectively.

	Average	Std	P25	Median	P75	N of firms
Panel A. Developed countries						
AUSTRALIA	70.22	25.22	51.40	75.84	93.29	1,653
AUSTRIA	64.42	26.00	43.77	65.24	88.08	110
BELGIUM	62.57	27.39	39.29	62.15	88.75	139
CANADA	70.55	25.21	52.28	76.24	93.37	2,539
DENMARK	61.57	27.81	36.83	64.93	88.49	175
FINLAND	65.48	25.95	45.52	68.02	89.28	134
FRANCE	64.84	26.39	44.18	69.26	88.49	861
GERMANY	71.48	25.47	52.40	78.25	94.30	654
GREECE	61.39	26.55	41.76	61.63	85.24	367
HONG KONG	63.70	26.94	42.04	68.35	87.24	937
ISRAEL	68.04	26.51	50.07	72.22	92.35	284
ITALY	56.37	25.93	34.50	56.49	77.77	406
JAPAN	59.36	27.17	36.64	60.17	83.53	3,921
NETHERLAN	64.31	27.03	44.23	69.08	87.95	234
NEW ZEALA	68.19	26.95	47.58	74.11	92.74	141
NORWAY	65.84	27.11	44.14	71.96	89.00	243
PORTUGAL	71.11	24.55	56.52	77.24	91.17	73
S.KOREA	56.84	26.43	35.13	56.66	79.57	1,968
SINGAPORE	66.28	26.45	44.87	71.02	90.61	518
SPAIN	61.40	27.98	36.48	66.09	87.07	212
SWEDEN	66.82	25.66	45.17	71.39	89.50	557
SWITZERLA	63.90	27.48	40.54	67.70	89.79	271
TAIWAN	53.10	26.98	29.97	50.89	75.54	1,489
UK	70.84	25.45	52.30	76.77	93.56	932
US	67.49	26.03	47.30	72.35	91.03	4,478
Developed market	64.64	26.42	43.79	68.16	88.31	932
Panel B. Emerging market countries						
BRAZIL	62.92	26.03	41.91	65.12	86.83	291
CHILE	60.88	25.39	40.99	60.13	83.35	102
CHINA	48.54	25.85	26.92	46.29	68.92	2,121
INDIA	60.72	26.50	39.49	61.47	84.31	2,285
INDONESIA	71.77	28.22	50.58	82.35	96.23	150
MALAYSIA	64.59	25.77	44.62	67.50	87.46	926
MEXICO	68.80	26.21	48.30	77.55	88.76	86
PAKISTAN	59.92	26.56	38.25	59.86	83.36	145
PHILIPPIN	69.04	25.65	47.76	75.92	91.86	173
POLAND	62.88	26.23	42.31	64.72	86.73	259
RUSSIA	57.48	28.34	34.58	59.68	82.09	139
S.AFRICA	72.50	24.45	56.22	76.90	95.06	418
SRI LANKA	61.15	26.38	42.68	58.72	84.81	123
THAILAND	62.24	26.38	40.47	65.65	86.27	576
TURKEY	44.24	25.44	23.84	39.01	60.70	374
Emerging market	61.84	26.23	41.26	64.06	84.45	545

Table 5. Difference in the delayed reaction by country

This table shows the average of the delayed reaction of stock returns to liquidity shock for groups of countries. The delay measure, *LiqDelay*, is motivated by Hou and Moskowitz (2005) and is computed for each stock over the sample period:

$$r_{j,i,t} = \alpha_{j,i} + \beta_{j,i} LiqShock_{j,i,t} + \sum_{n=1}^{6} \delta_{j,t}^{(-n)} LiqShock_{j,i,t-n} + \varepsilon_{j,i,t} \quad (4)$$

$$LiqDelay_{j,i} = 1 - \frac{R^2_{\delta_{j,t}^{(-n)}=0, \forall n \in [1,6]}}{R^2} \quad (5)$$

Liquidity shock (*LiqShock*) is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. A country is grouped into High (Low) if the value of the variable in the column head is above (below) median. High-Low shows the difference in means of *LiqDelay* between High and Low country groups together with *t*-values. Individualism index, developed by Hofstede (2001), measures the degree to which people in a given country focus on internal attributes to distinguish themselves from other people. Institutional ownership is a percentage of shares held by institutional investors, as of previous year-end, relative to the total outstanding shares for a given firm, averaged across firms in a country. Market Cap. to GDP is previous year-end total market capitalization of firms in a country normalized by gross GDP. Market *Illiq*. is market aggregate of stock illiquidity, averaged over the previous year. Short-sale constraint is a dummy variable that equals to one if short sales are restricted in a given country and zero otherwise (Bris *et al.* 2007). Financial disclosure is corporate transparency measure from Bushman *et al.* (2004), whose value is the average of the ranks of answers to the questions on R&D, capital expenditure, subsidiaries, segment-product, segment-geographic, and accounting policy. Credibility of disclosure is a transparency measure from Bushman *et al.* (2004), which denotes the percentage of firms in the country audited by the big five accounting firms. Accounting standards is developed by La Porta *et al.* (1998) by rating companies based on whether the company includes 90 key items on annual reports. Analyst forecast dispersion is an average across firms in a given country of standard deviation of earnings forecasts normalized by the average forecasted values at the end of previous year. The *t*-statistics are in the parentheses and superscript *, **, and *** are significance level of 10%, 5%, and 1%, respectively.

	Individualism	Institutional ownership	Market Cap. to GDP	Market *Illiq.*	Short-sale constraint	Financial disclosure	Credibility of disclosure	Accounting standards	Analyst forecast dispersion
High	69.664***	69.419***	68.238***	67.418***	67.854***	69.019***	69.449***	69.925***	67.123***
	(79.51)	(72.98)	(68.61)	(45.14)	(48.16)	(71.01)	(66.34)	(69.33)	(45.13)
Low	65.200***	65.071***	66.733***	67.272***	66.987***	66.917***	66.437***	66.270***	67.617***
	(38.44)	(37.53)	(39.74)	(51.12)	(51.61)	(42.01)	(41.70)	(41.31)	(47.94)
High-Low	4.463***	4.348**	1.505	0.147	0.867	2.102	3.012	3.655*	-0.494
	(2.37)	(2.20)	(0.77)	(0.07)	(0.44)	(1.13)	(1.60)	(1.93)	(-0.24)
N of countries	39	36	40	39	40	36	35	34	38

Table 6. Cross-country differences in delayed reactions: Weighted least squares

This table shows the regression of delayed response of stock returns to liquidity shock on stock characteristics as well as country characteristics. The delay measure, *LiqDelay*, is motivated by Hou and Moskowitz (2005) and is computed for each stock over the sample period:

$$r_{j,i,t} = \alpha_{j,i} + \beta_{j,i} LiqShock_{j,i,t} + \sum_{n=1}^{6} \delta_{j,t}^{(-n)} LiqShock_{j,i,t-n} + \varepsilon_{j,i,t} \quad (4)$$

$$LiqDelay_{j,i} = 1 - \frac{R^2_{\delta_{j,t}^{(-n)}=0, \forall n \in [1,6]}}{R^2} \quad (5)$$

Liquidity shock (*LiqShock*) is defined as the difference between the liquidity and the average of liquidity over the past 12 months (as in Eq. (2)), where liquidity is an average in a month of a daily ratio of absolute return divided by dollar trading volume, multiplied by negative one. Individualism index, developed by Hofstede (2001), measures the degree to which people in a given country focus on internal attributes to distinguish themselves from other people. Institutional ownership is a percentage of shares held by institutional investors, as of previous year-end, relative to the total outstanding shares for a given firm, averaged across firms in a country. Market Cap. to GDP is previous year-end total market capitalization of firms in a country normalized by gross GDP. Market *Illiq*. is market aggregate of stock illiquidity, averaged over the previous year. Short-sale constraint is a dummy variable that equals to one if short sales are restricted in a given country and zero otherwise (Bris *et al.* 2007). Financial disclosure is corporate transparency measure from Bushman *et al.* (2004), whose value is the average of the ranks of answers to the questions on R&D, capital expenditure, subsidiaries, segment-product, segment-geographic, and accounting policy. Credibility of disclosure is a transparency measure from Bushman *et al.* (2004), which denotes the percentage of firms in the country audited by the big five accounting firms. Accounting standards is developed by La Porta *et al.* (1998) by rating companies based on whether the company includes 90 key items on annual reports. Analyst forecast dispersion is an average across firms in a given country of standard deviation of earnings forecasts normalized by the average forecasted values at the end of previous year. Ln(Size) is a log of market capitalization. *Illiq* is the Amihud (2002) illiquidity measure defined as an average in a month of a daily ratio of absolute return divided by dollar trading volume. Institutional ownership (stock) is the number of shares held by institution investors divided by the number of shares outstanding. Turnover shock is the difference between turnover and its average over the past 12 months, where turnover is a monthly trading volume divided by the number of shares outstanding. All independent variables are averaged over the sample period for each firm. The regressions are based on weighted least squares with the number of stocks in a country as a weight. The *t*-statistics are based on the standard errors clustered by country and presented in parentheses. The superscript *, **, and *** are significance level of 10%, 5%, and 1%, respectively.

	Individualism	Institutional ownership	Market Cap. to GDP	Market *Illiq*.	Short-sale constraint	Financial disclosure	Credibility of disclosure	Accounting standards	Analyst forecast dispersion
Intercept	58.201***	57.892***	62.734***	61.143***	61.059***	50.484***	53.984***	50.064***	61.246***
	(18.85)	(24.33)	(30.71)	(31.45)	(23.16)	(8.23)	(11.23)	(4.06)	(36.43)
Country Characteristic	0.094**	0.508***	-0.804	1.056	1.331	0.147**	2.783**	0.205	0.000*
	(2.11)	(2.88)	(-1.48)	(0.37)	(0.44)	(2.26)	(2.13)	(1.13)	(1.70)
Ln(Size)	0.656	0.628	0.579	0.424	0.551	0.747*	0.726	0.909**	0.481
	(1.52)	(1.20)	(1.24)	(0.95)	(1.16)	(1.67)	(1.63)	(2.12)	(1.08)
Illiq.	0.695**	0.727**	0.762**	0.756**	0.771**	0.720**	0.853***	0.773**	0.738**
	(1.99)	(2.01)	(2.02)	(2.24)	(2.03)	(2.05)	(2.63)	(2.16)	(1.99)
Institutional	-0.045	-0.064	0.023	0.062	0.023	-0.007	-0.022	-0.024	0.042
Ownership (stock)	(-0.87)	(-0.93)	(0.34)	(0.95)	(0.35)	(-0.10)	(-0.34)	(-0.44)	(0.69)
Turnover Shock	-0.003***	-0.003***	-0.003**	-0.003*	-0.003**	-0.002**	-0.002***	-0.003***	-0.003**
	(-2.46)	(-2.75)	(-2.05)	(-1.96)	(-2.09)	(-2.25)	(-2.65)	(-2.46)	(-2.04)

R^2	0.014	0.015	0.009	0.009	0.008	0.017	0.019	0.013	0.010
N of firms	22,934	20,649	22,934	22,865	22,934	20,510	20,510	20,510	22,865

Table 7. Firm-level panel regression of return on sentiment measures

The table reports firm level panel regression of six months cumulative return on liquidity shock and sentiments measures. Liquidity shock (*Liq.Shock*) is defined as the difference, multiplied by negative one, between *Illiq* and the average of *Illiq* over the past 12 months (as in Eq. (2)), where *Illiq* is the Amihud (2002) illiquidity measure defined as an average in a month of a daily ratio of absolute return divided by dollar trading volume. The return and the dollar volume are denoted in U.S. dollars. VIX is volatility index from the implied volatility of S&P 500 index options. Sentiment is the first principle component of the six sentiment proxies developed by Baker and Wurgler (2006). Beta is a market beta of an individual stock. Ln(Size) is a log of the market capitalization and Ln(BM) is a log of the book value of equity divided by market value of equity at the end of previous year. Mom is a cumulative stock return for the past 11 months, skipping one month prior to the portfolio formation. Rev is a stock return in the previous month. Coskewness (*Coskew*) is the covariance of stock excess return and the square of market excess return over the past 60 months. Idiosyncratic volatility (*Idio. Vol.*) is a standard deviation of residuals of daily returns from Fama and French (1993) three factor model in a given month. *Max* is maximum daily return of a stock in month *t*. $CV_{Illiq.}$ is a coefficient of variation of Amihud illiquidity, which is computed as a standard deviation of *Illiq*. in month *t*. The *t*-statistics are in the parentheses and the standard errors are clustered both by country and month. The *, **, and *** are significance level of 10%, 5%, and 1%, respectively.

	(1)	(2)
Liq Shock	0.852***	0.328***
	(5.10)	(2.91)
Liq Shock×VIX	-0.015***	
	(-3.10)	
VIX	0.541***	
	(3.51)	
Liq Shock×US Sentiment		0.205**
		(2.27)
US Sentiment		-10.661***
		(-4.73)
Beta	0.243	-0.061
	(0.48)	(-0.12)
Ln(Size)	-0.465***	-0.156
	(-2.53)	(-0.70)
Ln(BM)	4.242***	4.805***
	(6.93)	(6.09)
Mom	-0.007	-0.039*
	(-0.50)	(-1.93)
Rev.	0.086**	0.028
	(2.11)	(0.53)
Coskew	-3.994	-3.735
	(-1.20)	(-1.09)
Idio. Vol.	-1.102***	-0.141
	(-3.07)	(-0.29)
Max	0.010	0.119
	(0.16)	(1.22)
Illiq.	0.273**	0.340***
	(2.14)	(3.03)
$CV_{Illiq.}$	0.065*	0.053
	(1.93)	(1.38)
Country dummy.	Yes	Yes
R^2	0.033	0.050