Global Financial Crisis, Liquidity Shocks and Global Financial Stability

Tung Lam Dang[a], Fariborz Moshirian[a*], Avanidhar Subrahmanyam[b] and Bohui Zhang[a]

[a] *Institute of Global Finance, Australian School of Business, UNSW, Australia*

[b] *Anderson School of Management, UCLA, USA.*

Abstract

The most recent global financial crisis, characterized as a liquidity crunch, began in the U.S. in late 2007 and quickly spread to other countries. The rapid propagation of the liquidity shock and the severe effects of the crisis on stock market performance have raised several important questions. Which channels contributed to the transmission of liquidity shocks? Why were some stocks with similar characteristics and degrees of exposure to a market-wide shock more dramatically affected during the crisis? While the crisis could have spread through several channels such as trade dependence among firms and markets, there are reasons to believe that institutional investors played an important role in transmitting the shock across assets and countries. Using comprehensive data on international institutional ownership and global intraday stock transactions for 17,493 stocks across 41 countries, this study investigates the role of institutional investors in spreading the market liquidity shock during the global financial crisis. We document that stocks with high pre-crisis institutional ownership significantly underperformed during the crisis period and, more importantly, that this effect is detrimental to stocks with greater exposure to the market liquidity shock. This result suggests that institutional investors played a significant role in propagating the liquidity shock during the financial crisis. Further analysis reveals that the spread of the liquidity shock by institutional investors clusters on the non-block and/or independent institutional investors, who were more likely to face liquidity constraints during the crisis.

Keywords: Institutional investor, liquidity shock, financial crisis, global financial market

JEL Classification: G12, G15, G2, G29

---

[*] The Centre for International Finance and Regulation (CIFR) has commissioned the Institute of Global Finance at the UNSW to undertake this research project . This research was supported by the CIFR which is funded by the Commonwealth and NSW Governments and supported by other Consortium members (see www.cifr.edu.au). All errors remain the responsibility of the authors.

Fariborz Moshirian is the corresponding author,
Tel: 612-93855859, Fax: 61293854763
E-mail Address: f.moshirian@unsw.edu.au

1. Introduction

The most recent global financial crisis, characterized as a liquidity crunch, began in the U.S. in late 2007 and quickly spread to other countries. The rapid propagation of the liquidity shock and the severe effects of the crisis on stock market performance have raised several important questions. Which channels contributed to the transmission of liquidity shocks? Why were some stocks with similar characteristics and degrees of exposure to a market-wide shock more dramatically affected during the crisis? While the crisis could have spread through several channels such as trade dependence among firms and markets (e.g., Forbes, 2002; Calomiris et al., 2012), there are reasons to believe that institutional investors played an important role in transmitting the shock across assets and countries.[1]

In particular, the recent theoretical literature provides explanations for the destabilizing role of institutional investors during liquidity shocks. For example, Brunnermeier and Pedersen (2009) propose a theoretical model in which the interplay between the market liquidity of assets and the funding liquidity of leveraged financial institutions results in the amplification and transmission of liquidity shocks across assets. Other studies argue that shocks to asset markets may cause a wealth effect and lead to higher risk aversion among financial intermediaries (Xiong, 2001; Kyle and Xiong, 2001), tighter risk management (Garleanu and Pedersen, 2007), or even the withdrawal of capital based on the poor performance of financial institutions (Shleifer and Vishny, 1997). These combined effects contribute to an increase in selling pressures and a decline in liquidity provisions from financial institutions across the international markets. Eventually, the trading impact of institutional investors leads to the propagation of shocks.

[1] For the purposes of this paper, the terms "institutional investor" and "institution" are used interchangeably.

Although most previous empirical research documents the role of institutional investors in stock price contagion during crises (Broner et al., 2006; Boyer et al., 2006; Raddatz and Schmukler, 2012; Hau and Lai, 2012), there is no evidence about how institutional ownership spreads liquidity shocks during a financial crisis. This lack is surprising because of institutional investors' potential vulnerability to a market liquidity shock - in addition to the apparent importance of stock market liquidity during crises (e.g., Brunnermeier and Pedersen, 2009; Brunnermeier, 2009; Pedersen, 2009).

In this study, we empirically investigate whether and how institutional investors contribute to the spread of market liquidity shocks during a market crash in the global context, using the financial crisis of 2008-2009 as a natural occurrence. We construct a comprehensive dataset of institutional ownership and measures of stock exposure to a market liquidity shock for 17,493 firms across 41 countries. An advantage of utilizing institutional ownership data is that we are able to measure the direct impact of institutional investors rather than inferring such impact from capital flows or other proxies (as in previous studies). We utilize refined microstructure data to measure the liquidity exposure of stocks to a shock. The recent availability of intraday transaction data from Thomson Reuters Tick History (TRTH) for most countries enables us to construct global stock liquidity measures that are more precise than those used in previous empirical studies on the relationship between liquidity and asset prices outside the U.S.

We first examine whether stocks held by institutional investors experienced a steeper price decline during the crisis. Because institutional investors tend to allocate their investments across international assets and markets to exploit the benefits of diversification, we argue that institutional investors liquidate their positions on their global equity holdings when facing unexpected demands for liquidity as a result of increased margin calls, redemption requests from fund investors, or risk reduction after initial losses (e.g., see Shleifer and Vishny, 1997;

Kyle and Xiong, 2001; Goldstein and Pauzner, 2004; Garleanu and Pedersen, 2007). This effect can cause declines in the prices of stocks owned by institutions and lead to the propagation of shocks across stocks and countries. Additionally, the higher the level of institutional ownership for a stock at the onset of a crisis, the more likely it is that the stock will face selling pressure; thus, it will be expected to perform even worse during the crisis.

We find clear evidence that is consistent with this hypothesis based on stocks' exposure to the market return shock (β^{M}), stocks' exposure to the aggregate liquidity shock (β^{LIQ}), and other firm-specific variables, including market- and accounting-based characteristics, as well as country- and industry-fixed effects to account for other omitted variables, as controls. In particular, stocks with a high level of institutional ownership prior to the crisis significantly underperformed during the crisis period in the global sample and in both the developed and emerging market sub-samples. This evidence is consistent with the prediction that shocks are transmitted across stocks by the response of institutional investors during a global financial crisis.

These findings lead us to our primary question: Did institutional investors contribute to the amplification and propagation of the liquidity shock during the global financial crisis of 2008-2009? If the distressed selling across stocks by institutions is caused by liquidity needs, we expect that institutions would have a larger impact on the stocks with greater exposure to the liquidity shock. This effect comes from costly liquidation and a magnified liquidity shock caused by the interaction between asset market liquidity and the funding liquidity of institutions during the liquidity crisis (Brunnermeier and Pedersen, 2009).

We measure stocks' exposure to the market liquidity shock based on an approach similar to Acharya and Pedersen's (2005) liquidity risk measures in the liquidity-adjusted capital asset pricing model (LCAPM). Each liquidity exposure variable is measured during the pre-crisis period. We find that the effect of a stock’s ex-ante liquidity exposure on its crisis

performance is conditional on the stock's institutional ownership before the onset of the crisis. Specifically, stocks with high pre-crisis liquidity exposure that were held by institutional investors experienced significantly negative returns during the global financial crisis of 2008-2009. The effects are particularly strong for firms in emerging markets. This evidence is robust to alternative spread-based liquidity measures, alternative definitions of the crisis period, and liquidity exposure measured with respect to either global or local factors. These findings provide clear evidence that institutional investors spread the liquidity shock across stocks during the crisis.

Finally, we posit that not all institutional investors would be forced to sell their assets for liquidity purposes - particularly those institutions that were not leveraged or that did not face capital withdrawals (e.g., Shleifer and Vishny, 1997; Brunnermeier and Pedersen, 2009). Some institutions may engage in selling simply to rebalance portfolios or to reduce exposure to risk. Moreover, in some cases, high liquidation costs to exit from the positions held by institutions (and/or close business ties to firms in which the institutions invest) may make certain institutions reluctant to liquidate assets that are more sensitive to a liquidity shock (Ferreira and Matos, 2008; Edmans, 2009). Therefore, we expect that the liquidity shock may spread only through particular groups of institutional investors.

Consistent with this prediction, our results reveal that the high-liquidity-exposure stocks owned by non-block institutional investors and independent institutional investors (such as mutual fund managers and investment advisors) experienced steeper declines in prices during the crisis, whereas the effect of liquidity exposure on the stocks held by block institutional investors and grey institutional investors (such as bank trusts, insurance companies, pension funds and other institutions) were not significant. These results also extend Ferreira and Matos's (2008) findings in which the value effect of independent institutions not only stems from the monitoring role they play but also from actual exit even if the exit is costly.

Our study makes three important contributions to the literature. First, our findings provide further insights into the destabilizing role of institutional investors on the performance of stock markets during the recent global financial crisis, highlighting their importance in shock transmission, particularly with respect to the propagation of the liquidity shock. Previous empirical evidence directly or indirectly supports the theoretical arguments by Shleifer and Vishny (1997), Xiong (2001), Kyle and Xiong (2001), Garleanu and Pedersen (2007), and Brunnermeier and Pedersen (2009) that adverse shocks to assets held by institutions cause them to liquidate their positions, stressing stock prices and leading to the transmission of shocks.

However, prior research does not consider stocks' exposure to a liquidity shock as a potential factor increasing the effect of institutions on stock performance during a crisis. Our results show that the interaction between stocks' liquidity exposure and institutional ownership had an even greater effect on the performance of stocks during the crisis. Furthermore, we show that the spread of a liquidity shock is related to the heterogeneity of institutions, which is consistent with the prediction that the liquidity effect is amplified and transmitted by those institutions with an unexpected need for liquidity during market turmoil (Shleifer and Vishny, 1997; Brunnermeier and Pedersen, 2009).[2]

Second, our research also adds to the literature on the relationship between asset prices and market liquidity risk. The importance of liquidity risk as a priced factor is documented by Pastor and Stambaugh (2003), Acharya and Pedersen (2005), Sadka (2006), Bekaert et al. (2007), and Lee (2011), among others. However, previous studies are mostly limited to the U.S. market, with the exception of Bekaert et al. (2007) and Lee (2011). Furthermore, all prior studies focus on the pricing implications of liquidity risk; the effect of stocks' exposure to a market liquidity shock on realized stock returns during a crisis remains an open question.

[2] We do not have information on investor redemptions or the funding constraints of institutional investors to directly test the theoretical prediction of the models. However, because the implication of the models should be pronounced for institutional investors during the crisis, our evidence lends indirect support to those theories.

To our knowledge, this study is the first to empirically investigate whether stocks' ex-ante liquidity exposure has an effect on stock returns during a market crash in the global context. Specifically, our paper comprehensively investigates the impact of stocks' liquidity exposure measured over the pre-crisis period on ex-post global stock returns during the financial crisis of 2008-2009 in a framework similar to the LCAPM developed by Acharya and Pedersen (2005). We show that stocks' pre-crisis exposure to the market liquidity shock can explain the cross-sectional variation of stock performance during the crisis; our results provide further insights contributing to a comprehensive picture of the effects of liquidity exposure on asset prices under different market conditions.[3]

Finally, we contribute to the growing but limited literature investigating the transmission of the global financial crisis of 2008-2009 across markets worldwide. Tong and Wei (2011) find that firms that were intrinsically more dependent on external finances for their working capital before the global crisis of 2008-2009 were associated with more severe declines in their stock prices. Their findings suggest that the pre-crisis composition of international capital flows matters in the propagation of shocks. Bekaert et al. (2012) investigate the transmission of the financial crisis of 2008-2009 and find that countries with poor macroeconomic fundamentals, sovereign risk, and poor institutions experienced the largest equity market declines and contagion. Their evidence indicates that domestic fundamentals are more important than exposure to global factors in transmitting the crisis and that this feature is specific to the crisis of 2008-2009 but not for previous crises. Calomiris et al. (2012) show that the collapse of global trade, the contraction of the credit supply, and selling pressure on firms' equity jointly affected global stock returns during the crisis. Overall, findings from these studies suggest that a crisis is likely to spread through several channels,

[3] Lou and Sadka (2011) find that their pre-crisis liquidity beta, which is analogous to β^3 in Acharya and Pedersen (2005), has significant predictive power with respect to the U.S. stock returns in the crisis period of 2008-2009. By contrast, our focus is on the international financial markets, which are arguably much less liquid; therefore, the effects of liquidity exposure on stock returns could be more severe.

including both trade and financial links. However, none of these studies is able to identify a specific likely channel of transmission because of the features of the data used in their research.

Utilizing a comprehensive institutional ownership dataset at the firm level, our findings support the institutional investor-induced crisis transmission hypothesis. Hau and Lai (2012) also rely on institutional holding data to investigate the role of equity mutual funds in propagating shocks during the crisis of 2008-2009. Our focus, however, is different; we are interested in whether institutional investors spread the liquidity shock in addition to overall shock transmission. Furthermore, we provide evidence regarding the role of different institutional groups, not only mutual funds, based on their different effects.

In the next section, we briefly survey the related literature on institutional investors, the transmission of the crisis, and the associated liquidity shock. Section 3 describes our data sources, the variable construction procedure, and summary statistics. Section 4 offers empirical evidence regarding the role of institutional investors in spreading the liquidity shock and also presents robustness checks. We conclude the paper in Section 5.

2. Literature Review and Hypothesis Development

This paper's research focus is based on two streams of literature. The first stream suggests that the transmission of liquidity shocks and crises may be associated with institutional investors. Brunnermeier and Pedersen (2009) argue that the liquidity provided by traders is a function of funding availability and show that the initial market declines may cause shocks to funding liquidity, which affects traders' abilities to provide market liquidity; the reduced market liquidity then makes the market more volatile. Facing higher margins caused by market illiquidity and increased volatility, liquidity-constrained traders must de-leverage their positions across many assets to meet margin calls, which places greater pressure on prices

and further reduces market liquidity. The interplay between the market liquidity of assets and leveraged traders' funding liquidity creates downward liquidity spirals that ultimately lead to a liquidity crisis. An important implication is that assets held by leveraged investors tend to have the amplified liquidity exposure and a greater drop in value following a liquidity shock.

Shleifer and Vishny (1997) argue that arbitrage funds are much more susceptible to costly liquidation following a sudden drop in the stock market because such funds may face the risk of capital withdrawal from fund investors who often assess manager competence based on the fund's past returns, a phenomenon they call "performance-based arbitrage." In extreme circumstances, such as a financial crisis, funds may be required to involuntarily liquidate their holdings to meet investor redemptions, thus affecting market liquidity and leading to further price declines. Kyle and Xiong (2001) argue that when wealth constrained investors incur trading losses in one market, they may liquidate their assets in other markets, which results in price declines, reduced market liquidity, and increased volatility. Furthermore, tighter risk management during market turmoil can cause financial intermediaries to sell even more to reduce risk, which leads to more pressure on prices and liquidity (Garleanu and Pedersen, 2007).

Goldstein and Pauzner (2004) present a model in which the contagion of financial crises occurs because investors diversify their portfolios across countries, which leads to the transmission of negative shocks from one part of the world to another.[4] Thus, a financial crisis in one country can induce a crisis in other countries. All of these papers highlight the role of institutional investors in the amplification and transmission of shocks. The liquidation or risk reduction of one institutional investor creates pressure on other investors and leads to further selling, which causes the crisis to spill over into other markets.

[4] Wagner (2010) also shows that diversification at financial institutions can increase systemic risk and the likelihood of crises.

Recent empirical studies lend support to the theoretical arguments. For example, Boyson et al. (2010), Sadka (2010), Teo (2011), and Aragon and Strahan (2012) provide supporting evidence for the prediction of Brunnermeier and Pedersen (2009) for U.S. hedge funds. Ben-David et al. (2011) report evidence that hedge funds exited the U.S. equity market during the financial crisis of 2007-2009 and suggest that the aggregate hedge fund sector reduces its exposure to equity in bad times. Coval and Stafford (2007) investigate asset fire sales in the U.S. equity market and find that the funds that experience large outflows tend to reduce existing positions, which puts price pressure on the securities held in common by those distressed funds.

In bond markets, Manconi et al. (2012) find that the U.S. institutional investors who held both securitized bonds and corporate bonds transmitted the shock from the securitized bond market to the corporate bond market when they faced negative flows or high liquidity needs during the crisis and when the securitized bond market became illiquid following the subprime mortgage problem.

Empirical evidence also suggests that institutional investors contribute to the transmission of the financial crisis across countries. For example, Broner et al. (2006) find that when the returns of a particular fund are low relative to a benchmark, its fund manager will be more risk averse and reduce the fund's weight in the countries in which it is overexposed. Their findings show that a crisis in one country can easily spread to another country by means of foreign investors through portfolio rebalancing. Boyer et al. (2006) document supporting evidence that a financial crisis spreads globally through the asset holdings of foreign investors. Raddatz and Schmukler (2012) find that underlying investors who withdraw from mutual funds may cause managers to retreat from investments in particular countries, which can amplify a crisis and transmit shocks across countries. Hau and Lai (2012) document evidence that shocks were globally transmitted from financial stocks to non-financial stocks

through the equity mutual funds that were exposed to losses in financial stock holdings during the crisis of 2008-2009.

The theoretical discourse and empirical evidence suggest that institutional investors are likely to have played a significant role in propagating the global liquidity shock during the financial crisis of 2008-2009. The focus on institutional investors appears reasonable because issues such as liquidity constraints or redemption requests are more specific to institutions. Moreover, institutional investors are often large investors. Their selling activity, for whatever reason, has a significant impact on the market and can induce market-wide shocks. Our first hypothesis is stated as follows:

H1: The crisis performance of a stock is negatively associated with the pre-crisis institutional ownership of the stock.

Second, our analysis is closely related to the literature on the importance of liquidity as a characteristic and a risk factor for asset prices. Since the seminal study of Amihud and Mendelson (1986), there has been a large body of literature exploring the link between asset prices and various liquidity measures (e.g., Brennan and Subrahmanyam, 1996; Datar et al., 1998; Eleswarapu, 1997). More recent studies have emphasized the role of liquidity as a systematic risk factor.

Pastor and Stambaugh (2003) investigate the relationship between asset prices and the sensitivity of stock returns to market-wide liquidity. Their results show that the difference in expected returns between the most and the least liquidity-sensitive stock portfolios is 7.5% per annum, which is economically significant. Sadka (2006) also finds similar evidence that the liquidity factor is priced with a positive risk premium by using alternative measures of liquidity. Watanabe and Watanabe (2007) examine whether the effects of liquidity and liquidity risk on stock returns vary over time. They find that the pricing of liquidity risk strengthens in the high-liquidity beta state.

Acharya and Pedersen (2005) develop a broad pricing model that embeds different aspects of liquidity risk by extending the traditional CAPM to include transaction costs. In their model, a stock's expected return is determined by the expected liquidity cost and three liquidity risk measures in addition to market risk. These liquidity risks include various liquidity effects that have been previously empirically documented (e.g., Chordia et al., 2000; Pastor and Stambaugh, 2003) and a newly proposed measure, i.e., co-movement between individual stock liquidity and the market return. They find that liquidity risks are priced for the U.S. market. Specifically, the difference in annualized expected returns between the highest and lowest liquidity portfolios is 4.6% per year, of which 3.5% is attributable to expected illiquidity and 1.1% to the total effect of liquidity risk.

The pricing of liquidity risk in an international setting is studied by Bekaert et al. (2007). Using data from 19 emerging markets, they find that liquidity risk with respect to the local market is significantly priced, whereas the price of global liquidity risk is only marginally significant. Lee (2011) utilizes the LCAPM of Acharya and Pedersen (2005) to investigate the effects of liquidity (both as a characteristic and a risk factor) on asset prices for stocks from 50 countries using data from January 1988 to December 2007 - a period that ended immediately before the onset of the global crisis. He documents supporting evidence that liquidity risks are priced factors in the global financial market. He also finds that global liquidity risk is more important than local liquidity risk in developed countries and in countries with large cross-border portfolio holdings.

Although U.S. and international evidence elucidates the importance of liquidity risk for asset prices, few researchers investigate how a stock's exposure to a liquidity shock actually affects stock performance during a crisis (which may have more practical significance). In considering a situation in which market returns or market liquidity significantly decline, a wealth-constrained investor must liquidate his position to raise cash for unexpected needs. If

his asset liquidity or returns are highly correlated with market returns or liquidity, then liquidation is more expensive. Unless equitably compensated, investors would not be willing to hold these assets (Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005). The implication is that these assets would experience a greater decline in prices during market downturns. In support of this argument, Lou and Sadka (2011) find that stocks with high pre-crisis liquidity exposure with respect to either Pastor and Stambaugh's (2003) liquidity factor or Sadka's (2006) liquidity factor exhibited steeper drops in prices than low-liquidity exposure stocks for the U.S. market during the 2008-2009 crisis.

Because of the global nature of the recent financial crisis, extending the study to an international setting might provide further understanding about the relationship between liquidity and asset prices worldwide under different market conditions. Furthermore, institutional investors could have effects beyond their role in stock price contagion in general. If the distressed selling across stocks by institutional investors is caused by funding liquidity problems or redemption requests, then their selling would magnify the impact of the liquidity shock and cause a greater negative effect for the stocks in their portfolios that are more sensitive to a market-wide liquidity shock (Brunnermeier and Pedersen, 2009). This argument leads to our second hypothesis as follows:

H2: The negative effect of pre-crisis institutional ownership on stock returns during the crisis is stronger for stocks with a larger ex-ante exposure to liquidity shocks.

Our second hypothesis assumes that a liquidity shock is transmitted among stocks owned by homogeneous institutional investors when the market experiences the liquidity shock. However, it is reasonable to believe that not all groups of institutions engage in selling for liquidity-motivated reasons. Institutions that do not generally use leverage or that face a lower likelihood of capital withdrawals (e.g., bank trusts, insurance companies, or pension funds) may not be concerned with liquidity issues during a crisis (Shleifer and Vishny, 1997;

Brunnermeier and Pedersen, 2009). In addition, “block” and “grey” institutional investor groups may be reluctant to liquidate assets that are sensitive to market liquidity shocks because the costs to exit from stock holdings are expensive during market illiquidity - and/or because of close business relationships with the firms in which the institutions invest (Ferreira and Matos, 2008; Edmans, 2009). By contrast, non-block institutional investors or independent institutional investors are more likely to face funding constraints or capital withdrawals from fund investors during market turmoil. Therefore, we expect that the spread of the liquidity shock may occur only through these groups of institutional investors. We formalize our third hypothesis as follows:

H3: Stocks with high non-block or independent institutional ownership shares prior to the crisis and large ex-ante exposure to liquidity shocks experience greater declines in price during the crisis.

Before continuing with the next section, we should note that investigating the causes of institutional selling (i.e., funding liquidity constraints, redemption requests, increased risk aversion, or simply portfolio rebalancing) is beyond the scope of this study. Instead, we intend to document the effect of institutional investors and the interactions of institutional ownership with stocks' ex-ante liquidity exposure on the crisis performance of stocks.

3. Data and Sample Description

Our key variables are pre-crisis institutional ownership and measures for stocks' ex-ante exposure to the liquidity shock. We collect data from several sources to construct these variables and other control variables. Specifically, financial institutional holding data come from the FactSet/Lionshares database; the real-time transaction data to estimate liquidity measures come from the Thomson Reuters Tick History (TRTH); stock returns (in U.S.

dollars) come from Datastream; and other accounting-based control variables come from Worldscope via Datastream.

3.1. INSTITUTIONAL OWNERSHIP

Institutional holding data are taken from FactSet/Lionshares. FactSet/Lionshares gathers the most comprehensive data on international institutional ownership and has been commonly used in recent studies (e.g., Ferreira and Matos, 2008; Aggarwal et al., 2011; Ng et al., 2011).[5] The pre-crisis institutional ownership of each stock is the annual percentage of outstanding shares held by institutions in 2007. Following Ferreira and Matos (2008), we divide institutional ownership into independent institutional ownership (mutual fund managers and investment advisors) and grey institutional ownership (bank trusts, insurance companies, pension funds, and other institutions); we also divide it into domestic institutional ownership and foreign institutional ownership. In addition, we classify institutions according to their ownership stakes in firms, i.e., block institutions and non-block institutions. We set the missing observations of institutional ownership to zero to avoid unnecessary loss of information (Ferreira and Matos, 2008; Aggarwal et al., 2011).[6] A detailed construction of the institutional ownership variables is provided in the Appendix.

3.2. MEASURES OF LIQUIDITY AND THE ESTIMATION OF A STOCK'S EXPOSURE TO MARKET LIQUIDITY SHOCK

3.2.a. Measures of liquidity

We are interested in how stocks' pre-crisis exposure to a liquidity shock affected the ex-post return behavior of the stocks held by institutions during the financial crisis of 2008-2009. To examine this, we utilize the percentage-effective spread and the percentage-quoted spread as

[5] Ferreira and Matos (2008) provide a detailed discussion on the FactSet/LionShares database.
[6] In unreported results, we re-estimate regressions using only institutional ownership with non-missing observations. The results do not qualitatively change.

liquidity measures - these are arguably the most refined liquidity measures. For example, Goyenko et al. (2009) use spread-based liquidity measures as one of the benchmarks in testing the appropriateness of their various liquidity measures. Furthermore, because the LCAPM is built on the basis of transaction costs, these measures appear to be more suitable than other liquidity measures. The percentage-effective spread is defined as twice the absolute value of the difference between the trading price and the midpoint of the bid and the ask price, which is then divided by the midpoint of the bid and the ask price; the percentage-quoted spread is defined as the absolute value of the difference between the ask and the bid price, which is then divided by the midpoint of the bid and the ask price. A higher value in these measures for a given stock indicates that the stock is less liquid (or greater illiquidity).

To estimate the liquidity measures discussed above, we collect real-time transaction data from the Thomson Reuters Tick History (TRTH), which is managed by the Securities Industry Research Center of Asia-Pacific (SIRCA). The initial sample covers available stocks from 53 countries. We impose several filters on each stock to build reliable samples for regression analyses. Specifically, for a stock to be included in the sample, we require its trades and quotes to be submitted during regular trading hours. We exclude irregular trades (which are identified with information on trade qualifiers provided by TRTH) and trades with negative trading prices. Quotes with bid-ask spreads that are larger than half of their mid-point quote prices are also deleted. Following Chordia et al. (2000), we also eliminate spread measures that are greater than 0.40. The monthly liquidity measures are estimated from the intraday bid-ask spreads by first calculating the dollar-volume weighted spread measures in a given day and then averaging the daily spread measures over a given month.

3.2.b. Estimation of a stock's exposure to market liquidity shock

Acharya and Pedersen (2005) propose an LCAPM that presents three components of liquidity risk in addition to traditional market risk. β^1 is similar to the traditional market beta of CAPM.[7] β^2 is the liquidity risk caused by the covariance between the liquidity of an individual stock and market liquidity (Chordia et al., 2000).[8] β^2 should be positively related to expected returns because investors want to be compensated for a stock that becomes illiquid when market liquidity deteriorates. β^3 captures the liquidity risk that arises as the result of the covariance between an individual stock's return and market liquidity (Pastor and Stambaugh, 2003). An unexpected decline in market liquidity may have a wealth effect on stocks that are sensitive to market liquidity. β^3 is negatively correlated with expected return because investors are willing to accept a lower return on an asset with a higher return in times of market illiquidity. β^4 represents an individual stock's liquidity sensitivity to market returns and is a new measure of liquidity risk. β^4 negatively affects the required returns because investors prefer stocks that have low liquidity costs when the market declines.

Specifically, these betas are measured as follows:

$$\beta_i^1 = \frac{Cov(r_t^i, r_t^M)}{var(r_t^M - c_t^M)} \qquad \beta_i^2 = \frac{Cov(c_t^i, c_t^M)}{var(r_t^M - c_t^M)} \tag{1}$$

$$\beta_i^3 = \frac{Cov(r_t^i, c_t^M)}{var(r_t^M - c_t^M)} \qquad \beta_i^4 = \frac{Cov(c_t^i, r_t^M)}{var(r_t^M - c_t^M)},$$

where r^i_t, and r^M_t are individual stock returns and the market return, respectively, and c^i_t, and c^M_t are individual stock liquidity costs and market illiquidity, respectively. More negatives in β^3 and β^4 imply greater risk, whereas more positives in β^1 and β^2 indicate greater risk.

These beta measures reflect stocks' return/liquidity sensitivity to market returns/liquidity. Because we are interested in assessing whether stocks that are more sensitive or exposed to unexpected changes in market returns or liquidity would be more vulnerable during the crisis,

[7] The symbols β^1 and β^M are used interchangeably throughout this paper.
[8] β^2 is sometimes referred to as a commonality beta.

the above betas provide us with reasonable measures to estimate stocks' ex-ante exposure to market shocks.

To comprehensively investigate the effects of stocks' ex-ante exposure to a liquidity shock on their crisis performance, we use all of these betas in our study. Following Acharya and Pedersen (2005) and Lee (2011), we define the liquidity net beta as the following:

$$\beta_i^5 = \beta_i^2 - \beta_i^3 - \beta_i^4 , \qquad (2)$$

Due to the possible wealth effect of exposure to liquidity shock on stocks, we expect that stocks with higher ex-ante liquidity exposure would exhibit greater drops during the crisis, i.e., β^2 would negatively affect the realized stock returns, while β^3 and β^4 would positively affect the realized stock returns. β^5 would be negatively related to the stock returns during the crisis.

To estimate the measures of pre-crisis liquidity exposure using (1) and (2), we use monthly stock liquidity and return data from January 2003 to December 2007. We impose several requirements for estimating reliable liquidity betas. First, to mitigate the effects of potential data errors or other problems from the Datastream data, we set all monthly stock returns in excess of 300% to missing. For a stock to be included in a monthly market portfolio, it must have at least 10 daily observations in that month. We also discard the monthly returns of the 0.1% extremes at the top and bottom of the return distribution in each country in a given month. The global (local) market return and liquidity in each month are computed as the equally weighted average of individual stock returns and liquidity, respectively, across countries (or in a given country) in that month. We require at least 10 stocks in each country to calculate the market return and liquidity for a given month. Finally, stocks must have at least 36 monthly observations over the five-year period to have their liquidity betas estimated.

Because market illiquidity is persistent (Pastor and Stambaugh, 2003; Acharya and Pedersen, 2005; Sadka, 2006; Lee, 2011), we use innovations in illiquidity to estimate the liquidity betas. Following the approach of Liu (2006) and Lee (2011), we obtain the innovations in illiquidity for the market portfolio and the individual stocks by applying the AR(1) process to the first difference of illiquidity:[9]

$$\Delta c^{M}_{t} = \rho^{M} \Delta c^{M}_{t-1} + u_{M,t} \ , \quad (3)$$

where c^{M}_{t} denotes the illiquidity, $u_{M,t}$ is the innovation in illiquidity of the global (local) market (or stock *i*, with *M* replaced by *i*) in month *t*, and Δ is the first-difference operator.

Because the liquidity crisis is a global event - as shown by the financial crisis of 2008-2009 - the exposure of each country or individual stock to the global factor appears to be more significant than exposure to the local factor. Furthermore, previous evidence suggests that global liquidity risk is a priced factor (e.g., Lee, 2011). Therefore, we utilize the liquidity betas measured with respect to the global market portfolio (global-liquidity betas) in the primary analyses. However, we also report the results of local liquidity betas as an additional check.

3.3. CONTROL VARIABLES

We also control for a battery of pre-crisis firm-specific characteristics that are shown to be correlated with liquidity, and to account for institutional preference. All control variables are measured over or at the end of 2007, and these include the MSCI index dummy (*MSCI*), return on assets (*ROA*), the log of book-to-market ratio (*BM*), the log of market capitalization (*MCap*), the proportion of a firm's shares that are closely held (*Closely-held*), a dummy for

[9] The first-order serial correlation (p-value) of the global market illiquidity is 0.76 (<0.001) at a monthly frequency. The first difference of the global market illiquidity has a serial correlation coefficient of -0.34 (p-value: 0.008), whereas the serial correlation of residuals from the AR(1) process of the first difference of illiquidity is not significant (p-value: 0.649). Furthermore, consistent with Lee (2011), we find that local market illiquidity is highly persistent in most sample countries, with serial correlations ranging from 0.36 (Argentina) to 0.93 (India). No country shows significant serial correlation for residuals from the AR(1) fitting the first difference of illiquidity.

whether a stock lists in the U.S. (*ADR*), the number of stock analysts following the firm (*Analyst*), annual stock returns (*Return*), the annualized standard deviation of monthly stock returns (*STD*), the log of stock price at the end of 2007 (*Price*), and the log of the pre-crisis liquidity level of individual stocks (*Liq*). The pre-crisis liquidity levels of individual stocks are calculated as the average of the daily stock liquidity over 2007. To ensure that only liquid stocks are included in the sample, stocks must have at least 60 daily observations in 2007. The definitions of firm-specific variables are found in the Appendix.

We then merge these different databases by using the codes provided by the Thomson Reuter terminals. The stocks that cannot be matched by Thomson Reuter codes are manually matched using the names of the firms. We include only common stocks in our sample and exclude stocks with special features such as ADRs, GDRs, warrants, trusts, funds, and non-equity securities. We use stocks from the single major exchange for each country, except for China (Shanghai Stock Exchange and Shenzen Stock Exchange), Japan (Tokyo Stock Exchange and Osaka Stock Exchange), and the U.S. (American Stock Exchange and New York Stock Exchange), where we use two exchanges because of their equal importance in these countries.

In the analysis, we only consider countries with at least 10 firms that have pre-crisis measures for liquidity, liquidity betas, and institutional ownership data.[10] The final sample includes 17,493 stocks across 41 countries.[11] The countries are grouped into 21 developed markets (Australia, Austria, Belgium, Canada, Denmark, Ireland, Finland, France, Germany, Hong Kong, Italy, Japan, the Netherlands, Norway, New Zealand, Singapore, Spain, Sweden, Switzerland, the U.K., and the U.S.) and 20 emerging countries (Argentina, Brazil, China,

[10] Four countries (Bulgaria, Oman, Pakistan, and Portugal) are excluded because of filtering requirements for estimating liquidity and liquidity betas. The following eight countries are removed because there are not enough observations on institutional ownership or the data are not available: Sri Lanka, Jordan, Kuwait, Qatar, Romania, Saudi Arabia, United Arab Emirates, and Ukraine. However, we do use the return and liquidity data of stocks from these eight countries to form the global portfolio.

[11] The number of observations is lower in regression analyses because of missing data when we combine variables.

Chile, Egypt, Greece, Indonesia, India, Israel, South Korea, Mexico, Malaysia, Peru, Poland, the Philippines, Russia, South Africa, Thailand, Turkey, and Taiwan), based on the International Finance Corporation classification.

3.4. SUMMARY STATISTICS AND THE VARIATION OF GLOBAL STOCK MARKETS DURING THE CRISIS PERIOD

3.4.a. Summary statistics and correlation matrix

Table 1 presents the summary statistics of different pre-crisis institutional ownership groups and the ex-ante average liquidity exposure measures with respect to the global market portfolio for each of the 41 sample countries. The global, equally weighted average of total institutional ownership is 12.6%. As a general rule, emerging markets have relatively fewer institutional investors than developed countries. The highest institutional ownership shares are found in the U.S. (67.6%) and Sweden (20.2%), whereas Argentina and China have the lowest average total institutional ownership shares at 0.2% and 0.3%, respectively. In most sample countries, non-block institutional ownership and independent institutional ownership are considerably greater than the ownership of block institutions and grey institutions, respectively. Foreign institutional ownership tends to be higher than domestic institutional ownership in many countries, except in Canada, the U.K. and the U.S.[12]

The results presented in Table 1 show that all betas have the expected signs. β^2 and β^5 are positive, whereas β^3 and β^4 are negative. We find that stocks in China, Spain, and the U.S. have, on average, the lowest ex-ante global commonality betas (β^2). Similarly, the average sensitivities of stock returns to global market liquidity (β^3) in these countries are -0.004, -0.008, and -0.007, respectively, which are well above the global average of -0.014. A similar

[12] Compared to Ferreira and Matos (2008) (Table 1 - page 507), our average for institutional ownership is slightly higher. The difference is likely the result of our larger country sample, different sample period, and different definition of institutional ownership percentage (i.e., institutional ownership as a percentage of a stock's total market capitalization versus institutional ownership as a percentage of a stock's total outstanding shares).

pattern is also shown for β^4. As a result, they all have the lowest liquidity net exposure (β^5). By contrast, Indonesia and Singapore are among those countries with the highest average liquidity exposure, with liquidity net betas of 0.118 and 0.109, respectively. The global mean of the liquidity net beta is 0.042, ranging from 0.007 to 0.118.

Table 1 also presents average cumulative stock returns (Cum.Ret) from January 2008 to March 2009, during the global crisis. Global stock markets had significantly dropped by March 2009, with average global returns of -47.4%. Remarkably, although the crisis originated in the U.S., it appears to have affected the equity markets of other countries more severely, with 26 of 41 sample countries exhibiting average cumulative returns lower than -50%. Furthermore, stock returns indicate considerable variations across countries, with India and Russia experiencing the largest price declines (-73.8% and -71.6%, respectively), whereas Japan and Chile experienced the smallest (-27.1% and -31.5%, respectively).

Table 2 shows the Pearson correlation coefficients among the variables used in our regression analyses. We observe negative correlation coefficients between the different institutional ownership groups and β^2, in addition to β^5, whereas the correlation between institutional ownership and β^3 and β^4 is mostly positive. This result implies that institutional investors appear to have preferred stocks with lower exposure to liquidity shock in the pre-crisis period. We also note that correlation coefficients between cumulative stock returns over the crisis period and pre-crisis institutional ownership groups, β^2 and β^5 are negative, whereas the correlation between cumulative stock returns and β^3 and β^4 is positive. This result elucidates the expected relationship between key variables of interest. In general, the moderate correlation between variables eliminates concerns about multicollinearity issues in our regression analyses.

3.4.b. Liquidity and returns of the global stock markets during the crisis period

Before we turn to formal regression analyses in the next section to examine the impact of institutional investors on the performance of stocks during the crisis and their role in the spread of the liquidity shock, we report on the behavior of global stock market liquidity and returns during the crisis.

There is no consensus on the exact span of the recent global financial crisis. Previous studies on the crisis have used various definitions of the crisis period. Bekaert et al. (2012) use the total equity market returns from August 2007 to March 2009 as the returns for the crisis period. Tong and Wei (2011) examine whether pre-crisis stock characteristics predicted stock price changes over the crisis period, which they define as July 2007 to December 2008, whereas Raddatz and Schmukler (2012) define the crisis as beginning in September 2008 and ending in June 2009.

However, the crisis may have only affected global financial markets beginning in early 2008 following events in the U.S. (with the quant-event and the sale of Bear Stearns). Therefore, we utilize the period from January 2008 through March 2009, which is considered to be the nadir of the global equity market during the crisis (Bekaert et al., 2012), in our study of the crisis effects. We also report results for two alternative definitions of the crisis period as robustness checks. The first is the extended period from January 2008 to June 2009, and the second is from September 2008 (which marks the collapse of Lehman Brothers) to March 2009.

During the crisis, it may be argued that investors would choose to first sell the stocks with the least liquidity declines to limit effects on prices, which implies that stocks with lower exposure to liquidity shock may experience greater price drops in the initial stage of the crisis because they are likely to be sold first. However, investors who face both current and future unexpected liquidity needs may wish to retain lower liquidity exposure stocks that allow them to more easily liquidate later to meet future liquidity needs. We emphasize that we do

not intend to investigate the trading behavior of investors during the crisis.[13] Instead, we only examine how the crisis returns of stocks with different pre-crisis liquidity exposure fared in the presence of institutional investors. The definition of the period from January 2008 to March 2009 is the crisis period that is most likely to affect all stocks, regardless of whether high or low liquidity exposure is to be presented.

Table 3 reports the condition of the global stock markets, and Figure 1 plots the liquidity and cumulative returns of the global sample through each month of the crisis period. Global market liquidity, as measured by the percentage-effective spread (PESprd), deteriorated significantly compared to the pre-crisis period (2007). Specifically, the difference in the percentage-effective spread of the financial crisis period versus the pre-crisis period increased to 0.013 by September 2008 (the collapse of Lehman Brothers). In the wake of Lehman Brothers' bankruptcy, global liquidity fell sharply, with changes in the average percentage-effective spread reaching 0.021 in both October and November 2008, followed by a slight recovery (but still at a severe level of deterioration). We find that the average transaction costs during the global financial crisis were almost twice as high than those of the pre-crisis period, which indicates the significant impact of the crisis on the liquidity of equity markets.[14] Furthermore, the slow recovery of global market liquidity indicates that liquidity is not resilient after an extreme market downturn. Developed markets appear to have experienced more liquidity problems than emerging markets during the crisis of 2008-2009.

Financial crises are often characterized by declines in both liquidity and prices. We observe that global stock markets dropped significantly during the months of the recent global financial crisis. Monthly returns began with a drop of 8.3% in January 2008 and reached their lowest level of -24.3% in October 2008, which is consistent with the largest

[13] Anand et al. (2013) investigate institutional trading on the U.S. stock market during the crisis.
[14] The global average for the pre-crisis percentage-effective spread (2007) is 0.015.

liquidity decline in this month. Monthly global stock returns remained negative for several months and had barely recovered by March 2009.

The effects of the crisis can be more clearly observed through the cumulative price declines in the stock markets. The cumulative returns from January 2008 for the global market are only -8.3%, but quickly plummet to below -45% from the fourth quarter of 2008 through the first quarter of 2009. A similar trend is observed for both emerging and developed markets, although the emerging market appears to relatively underperform.

In general, both market liquidity and market performance experienced significant declines throughout the months of the financial crisis period, and the effects of the crisis appeared to be particularly severe after the Lehman Brothers collapse.

4. Empirical Results

Our analysis focuses on how pre-crisis institutional ownership affects the performance of stocks held by institutions and whether institutional investors contributed to the spread of the liquidity shock during the crisis. We conduct this analysis by first running the cross-sectional regression of the cumulative stock returns on the pre-crisis institutional ownership variable at the firm level while controlling for pre-crisis firm characteristics (including the ex-ante liquidity exposure of the stocks). We then add an interaction term between the liquidity betas and institutional ownership to investigate the role of institutional investors. In the regression analyses, we include each liquidity beta individually instead of combining all of the liquidity betas in a single regression - to avoid multicollinearity (Acharya and Pedersen, 2005) - together with the market beta and other firm-level control variables. We also present results for the effect of the liquidity net beta, which facilitates an investigation of the combined effect of the ex-ante liquidity exposure on realized stock returns.

Formally, our baseline OLS regression model is of the following form:

$$R_i = \lambda_0 + \lambda_1 IO_i + \lambda_2 \beta_i^{LIQ} + \lambda_3 \beta_i^M + other\ controls + \varepsilon_i\ , \quad (4)$$

where R_i denotes the cumulative return of stock *i* from January 2008 to March 2009. We use cumulative returns (rather than monthly returns) in the empirical analyses because the impact of the investors' holding period on liquidity (Amihud and Mendeson, 1986) would be less relevant; therefore, the effects of selling pressure by institutional investors and liquidity exposure on stock returns should be clearer during the crisis. *IO* is the fraction of pre-crisis total institutional ownership of stock *i*. $\beta^{LIQ}{}_i$ is the pre-crisis respective liquidity betas of stock *i*, and $\beta^M{}_i$ is the pre-crisis market beta of stock *i*. All βs are estimated using monthly data from January 2003 to December 2007.

Following the literature (e.g., Lang and Maffett, 2011; Aragon and Strahan, 2012; Ferreira and Matos, 2008), we control for pre-crisis firm characteristics that are shown to be potentially correlated with liquidity and the preferences of institutions, including *MSCI*, *ROA*, *BM*, *MCap*, *Closely-held*, *ADR*, *Analyst*, *Liq*, *Return*, *STD*, and *Price*. ε_i is the firm-level error term. To the extent that the crisis caused a macroeconomic recession that resulted in a negative impact on the overall stock markets, this effect will be reflected in the intercept term. We include country-fixed effects in the regressions to account for potential determining factors that differ across countries and industry-fixed effects to control for differences between industries that might be correlated with liquidity (and different industry responses to the crisis). All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms.

4.1. EFFECTS OF PRE-CRISIS INSTITUTIONAL OWNERSHIP ON THE CRISIS PERFORMANCE OF STOCKS

Table 4 presents the regression results of model (4) for the emerging, developed, and global samples. Our key variable of interest in these specifications is total institutional ownership.

Consistent with expectations, the cross-sectional distribution of stock returns in the crisis is related to the institutional ownership prior to the onset of the crisis. Specifically, all coefficient estimates on total institutional ownership are negative and highly statistically significant across all sub-samples, which suggests that a stock's worsening performance during the crisis is associated with higher pre-crisis institutional ownership in that stock. The magnitude of these results is also economically significant. Taking the global sample as an example, an increase in the fraction of total institutional ownership in a stock by one standard deviation (0.229) is associated with an additional drop of approximately 3.7% (=-0.160*0.229) in stock returns (we take the specification with the liquidity net beta (β^5) (column 12) as an illustration in this case).

We interpret the negative effects of institutional ownership on stock returns in the crisis as the result of selling pressure by institutional investors because of various possible demands during the crisis that transmitted shocks across stocks held by institutions. Indeed, it is hardly likely that an alternative sensible explanation exists because we control for a variety of variables and include country-fixed and industry-fixed effects in the models to eliminate the concern of omitted variables.

Importantly, we find that the pre-crisis liquidity beta can help explain the crisis performance of stocks. In particular, β^3 is significantly positive as expected over all sub-samples and the evidence is statistically strong. Stocks with high pre-crisis return sensitivity to market liquidity are unambiguously associated with a larger drop in prices during the crisis. The estimated coefficients vary from 0.8 for the developed markets to 1.019 for the emerging markets, with t-statistics of 2.20 and 3.35, respectively. If the magnitude of β^3 changes by a standard deviation (0.016) from a lower liquidity exposure stock to a higher liquidity exposure stock (i.e., more negative), the cumulative returns of the higher liquidity exposure stock will further decline by 1.5% (0.016*0.951) in the global sample.

The coefficient estimates for the market beta (β^M) are negative and significant at the conventional 1% level in all specifications, which suggests a "flight to quality" effect during the crisis. The statistical significance of other firm-specific characteristics also shows the strong relevance of the control variables. Furthermore, we note that the regression R^2s are relatively high (because all independent variables are predetermined with respect to the financial crisis), which suggests their highly collective explanatory power for the crisis performance of stocks.

In summary, we find supporting evidence that institutional investors contributed to crisis propagation during the crisis of 2008-2009. Our findings are consistent with theoretical predictions and prior empirical studies, and they provide more insight into the destabilizing role of institutions during the crisis.

4.2. INSTITUTIONS AND SPREAD OF THE LIQUIDITY SHOCK

We argue in the previous sections that institutions are more likely to face funding liquidity problems or redemption requests during the crisis. Therefore, their selling tends to meet liquidity needs. Distressed selling to meet liquidity needs results in the transmission of the liquidity shock among the stocks that are owned by institutional investors. This transmission results in even greater price declines in the stocks with high sensitivity to a market-wide shock and held by institutions. We investigate this hypothesis by modifying model (4) to allow interaction between the institutional ownership variable and the betas. Specifically,

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i \ , \quad (5)$$

All control variables are identical to those defined in model (4). We also include the interaction terms of the betas with the control variables in the regression. To save space, we include the market beta (β^M), other interaction terms, and control variables in the *other controls* term.

Table 5 summarizes the cross-sectional regression results of the ex-ante liquidity exposure effects on stocks held by institutions. For brevity, we only report the coefficients of the liquidity betas, institutional ownership, and the interaction term between the liquidity betas and institutional ownership. The results reveal notable findings. First, the coefficients for the total institutional ownership variables remain significant and negative as expected, although the magnitude of the coefficient estimates is slightly lower, which suggests that stock price declines are generally associated with pre-crisis institutional holdings. Second, the coefficients for the covariance between the stock returns and market liquidity (β^3) are positive as expected across the sub-samples and statistically significant in the samples from the emerging and global markets, which indicates that stock returns' exposure to market liquidity shocks matters to all investors during the crisis, independent of the effect of institutional investors. Third - and most importantly - we find that stocks with higher pre-crisis liquidity exposure are associated with greater declines in prices during the crisis, which is conditional on total institutional ownership at the firm level. Specifically, the interaction of institutional ownership with the commonality beta (β^2) is significantly negative across the sub-samples, with the coefficient estimates varying from -67.321 (t=-2.57) for the developed sample to -126.829 (t=-3.41) for the emerging sample.

To observe the economic significance of these results, consider as an example the impact of total institutional ownership on the relationship between the pre-crisis commonality beta (β^2) and realized stock returns during the crisis for the global sample. An increase in the fraction of total institutional ownership by one standard deviation (0.229) and an increase in the commonality in liquidity (i.e., more sensitivity to the market liquidity shock) of a stock by one standard deviation (0.002) results in an additional decline of 3.9% (=0.229*0.002*(-84.801)) in stock returns. The coefficient estimates on the interaction terms of the total institutional ownership with β^4 and β^5 have the predicted signs for all of the sub-samples and

are statistically significant for the emerging and global samples. Specifically, the coefficient estimates are 3.494 (t=2.99) and -3.567 (t=-2.92), respectively, for the emerging sample, and 1.435 (t=2.57) and -1.509 (t=-2.85), respectively, for the global sample.

The significant coefficient estimates for the interaction terms of institutional ownership with β^2, β^4, and β^5 suggest that the effects of these liquidity betas on ex-post stock returns are caused by the transmission induced by institutional investors, who are likely to face significant liquidity needs during the crisis.[15]

4.3. INSTITUTIONS AND SPREAD OF THE LIQUIDITY SHOCK: EFFECTS ON TOBIN'S Q

We supplement our analysis of the role of institutional investors during the crisis by using an alternative measure of firm performance: Tobin's Q. To the extent that the performance of stocks during the crisis was negatively linked to pre-crisis institutional ownership caused by institutional selling pressure during the crisis, institutional ownership should have similar effects on firm valuation as measured by the change in Tobin's Q during the financial crisis period versus the pre-crisis period.

Table 6 presents regression results for model (5) with the dependent variable measured as the change in the log of Tobin's Q between the crisis period (2009) and the pre-crisis period (2007). We define Tobin's Q as the market value of equity plus the book value of total debts divided by the book value of total assets. All independent variables are identical to the regression with stock returns. The results are consistent with those reported in the previous section. All interaction terms for the liquidity betas with institutional ownership are statistically significant with the predicted signs for the emerging market. The evidence is also pronounced for both the global sample (three out of four interaction terms are significant) and

[15] It should be noted that these liquidity betas are not significant (except for in the emerging markets) in Table 4.

the developed market (two out of four interaction terms are significant). Furthermore, the magnitude of the coefficients is considerably greater.

Overall, these findings provide two important new pieces of evidence. First, the ex-ante exposure to market liquidity shocks matters for the performance of firms during the crisis, and this effect is significantly related to the fraction of pre-crisis institutional ownership whether we use stock returns or Tobin's Q as performance measures. In particular, firms with higher ex-ante stock liquidity exposure that are held by institutions experience steeper declines in stock prices or firm valuation as measured by Tobin's Q during the crisis. The findings, therefore, support the hypothesis on the role of institutional investors as a channel for the spread of liquidity shock. Second, the liquidity betas proposed by Acharya and Pedersen (2005) as estimated over the pre-crisis period can significantly help explain the performance of stocks during a financial crisis.

4.4. ROBUSTNESS CHECKS

In this section, we implement further robustness checks to assess the reliability of our results. First, rather than estimating a stock's exposure to the global market, we measure its exposure to the respective local market. Second, we repeat the previous analysis with the percentage-quoted spread to check whether our results are sensitive to spread-based liquidity measures.[16] Third, we admit that our results may be subject to the definition of the crisis period. To alleviate this concern, we use two alternative definitions of the crisis period: one from January 2008 to June 2009 and another from September 2008 (the collapse of Lehman Brothers) to March 2009. To save space, we report only the results for model (5) and use stock returns as a dependent variable.

[16] Goldreich et al. (2005) find that the quoted bid-ask spreads have more explanatory power than the effective bid-ask spreads on the prices of U.S. Treasury securities.

Table 7 presents the regression results using local betas that show that our findings do not change considerably with the alternative measures for betas. Overall, the statistical significance is consistent with those of the primary analysis, although the magnitude of the coefficient estimates is slightly lower. The lower magnitude of the estimates may be the result of the global nature of the crisis. Therefore, exposure to global factors may have greater effects than exposure to domestic factors.

Cross-sectional regression results for model (5) are summarized in Table 8 with the percentage-quoted spread as a liquidity proxy. The results are essentially similar to those using the percentage-effective spread. First, stocks with high pre-crisis institutional ownership are associated with poor performance during the crisis across sub-samples. Second, the effects of pre-crisis liquidity exposure on stock returns are stronger for stocks held by institutional investors, and the evidence is particularly strong for the emerging and global samples.

Table 9 reports results for model (5) using the alternative definitions for the crisis period. Although the statistical significance of the coefficient estimates for the variables of interest is slightly lower in some cases, the results remain consistent with the findings in the primary analysis. The smaller significance of coefficients when we use the alternative definitions of the crisis period is likely caused by the decreased impact of the crisis in the second quarter of 2009 (for the period from January 2008 to June 2009). Alternatively, we may miss particular effects in the early stage of the crisis when we use the period from September 2008 to March 2009.

In general, this evidence further confirms that the findings in the previous section are not affected by whether betas are measured with respect to either global or local factors, alternative spread-based liquidity measures, or when using alternative definitions of the crisis period.

4.5. WHAT TYPES OF INSTITUTIONS DRIVE THE SPREAD OF A LIQUIDITY SHOCK?

In this section, we investigate whether heterogeneity of institutions matters in the propagation of a liquidity shock.

Following previous studies (e.g., Ferreira and Matos, 2008), we classify institutional ownership according to several criteria, such as the size of institutional ownership stakes (block institutional ownership versus non-block institutional ownership), the degree of independence from the firms in which there is an investment (independent institutional ownership versus grey institutional ownership), and the nationality of institutions (foreign institutions versus domestic institutions). We argue that costly transactions to exit holdings and/or current/potential business relationships with firms in which the institutions invest would make “block” and “grey” institutions less willing to sell stocks that are sensitive to liquidity shocks. Furthermore, these institutions tend to be long-horizon investors and less subject to liquidity issues when the market experiences a shock. Therefore, they are less likely to forcibly liquidate their assets because of unexpected exogenous shocks such as the financial crisis. By contrast, non-block institutional investors or independent institutional investors tend to be short-horizon investors and are more likely to face funding constraints or capital withdrawals from fund investors during market turmoil. These investors are expected to play a significant role in transmitting a liquidity shock across stocks in their portfolios. We have no prior expectations regarding the type of institutions - insofar as their geographic origin is concerned (i.e., foreign or domestic) - that would contribute to propagating a liquidity shock, given their similar exposure during market liquidity shocks.

Table 10 reports the regression results for the effects of the various groups of institutions. We substitute the total institutional ownership variable in model (5) with block and non-block

institutions (Panel A), independent and grey institutional ownership (Panel B), and foreign and domestic institutional ownership (Panel C). Consistent with the prediction, the coefficient estimates for the interaction terms are statistically significant only for non-block institutions and independent institutional ownership across the sub-samples (except for the case in which the interaction term between grey institutions and the commonality beta is marginally significant for the emerging market). We also observe that the number of interaction terms that are statistically significant is similar to that of the regression with total institutional ownership in the primary analysis. Additionally, the magnitude of the coefficients is higher, which suggests that the spread of the liquidity shock is driven by non-block investors or independent institutional investors.[17] We find a similar role for both foreign and domestic institutional investors in propagating the liquidity shock among stocks in their portfolios.

In Table 11, we further stratify foreign institutions into U.S. foreign institutions and non-U.S. foreign institutions because U.S. foreign institutions might have experienced greater liquidity constraints because of the U.S.-originated shock. We find that the effects of U.S. and non-U.S. foreign institutions are similar in the emerging sample. However, the coefficient estimates of the interaction terms on U.S. and non-U.S. foreign institutions are almost insignificant in the developed and global samples, which is in contrast to the results of the global sample in Table 10, in which all interaction terms are significant when foreign institutional ownership is considered as a group. This result may be because the power of the test is reduced when we separate foreign institutional ownership.[18] However, we note that all institutional investors - whether U.S. foreign, non-U.S. foreign, or domestic - have significant effects on overall stock performance.

[17] In fact, block and grey institutional ownership account for a small percentage of total institutions in our sample. The result, therefore, is not surprising.

[18] In unreported results, we find that in the early stages of the global crisis, in particular immediately after Lehman Brothers' collapse, U.S. foreign institutions had a significant role in the propagation of liquidity shocks across all sub-samples, whereas the effect of non-U.S. foreign institutions is not significant. These findings are consistent with the notion that shocks are transmitted from the crisis-origin country to other countries initially by institutions in the crisis country and are then further amplified by institutions in the affected countries.

5. Conclusion

The global crisis of 2008-2009 provides an ideal opportunity to revisit the role of institutional investors. In this paper, we examine the role of institutional investors as a transmission channel for the crisis and for the liquidity shock. Using a comprehensive dataset of financial institutional ownership at the firm level and more refined microstructure data to measure stocks' exposure to market shocks for firms across 41 countries, we first document that the poor performance of global stocks during the crisis was associated with pre-crisis exposure to institutional ownership. We interpret these results as institutional selling pressures (and therefore the transmission of shocks) during the crisis because we control for a variety of firm characteristics and include country- and industry-fixed effects to account for omitted variables.

We then investigate whether institutional investors contributed to the spread of the liquidity shock during the crisis. Consistent with the prediction, we find that the effects of stocks' ex-ante exposure to the market liquidity shock on stocks' crisis returns are significantly related to institutional ownership. Specifically, stocks with high pre-crisis exposure to liquidity shocks that are held by institutional investors experienced steeper declines in prices during the crisis. Our results are robust whether we use global or local betas, alternative spread-based liquidity measures, or alternative definitions for the crisis period. Finally, our further analysis suggests that the spread of the liquidity shock by institutions is attributable to non-block investors and independent institutional investors, who are more likely to face liquidity constraints during a crisis.

Our findings have important management and policy implications. In particular, better liquidity risk management is necessary for investors to avoid forced liquidations. However, to comprehensively assess the relationship between institutional ownership and market liquidity

risk, further empirical research should be extended to include normal periods, which is on our future research agenda.

References

Acharya, Viral V., and Lasse Heje Pedersen (2005) Asset pricing with liquidity risk, *Journal of Financial Economics* **77**, 375–410.

Aggarwal, Reena, Isil Erel, Miguel Ferreira, Pedro Matos (2011) Does governance travel around the world? Evidence from institutional investors, *Journal of Financial Economics* **100**, 154-181.

Amihud, Yakov, Mendelson, H. (1986) Asset pricing and the bid-ask spread, *Journal of Financial Economics* **17**, 223-249.

Anand, Amber, Paul Irvine, Andy Puckett, Kumar Venkataraman (2013) Institutional trading and stock resiliency: Evidence from the 2007–2009 financial crisis, *Journal of Financial Economics* **108**, 773-797.

Aragon, George O., Strahan, Philip E. (2012) Hedge funds as liquidity providers: Evidence from the Lehman bankruptcy, *Journal of Financial Economics* **103**, 570-587.

Bekaert, Geert, Michael Ehrmann, Marcel Fratzscher, and Arnaud Mehl (2012) Global crises and equity market contagion, Working paper series, Emerging Markets Group.

Bekaert, Geert, Harvey, Campbell R., and Christian Lundblad (2007) Liquidity and expected returns: Lessons from emerging markets, *Review of Financial Studies* **20**, 1783–1831.

Ben-David, Itzhak, Francesco Franzoni, and Rabih Moussawi (2011) Hedge fund stock trading in the financial crisis of 2007-2009, Working paper series, Fisher College of Business.

Boyer, Brian H., Tomomi Kumagai, and Kathy Yuan (2006) How do crises spread? Evidence from accessible and inaccessible stock indices, *Journal of Finance* **61**, 957-1003.

Boyson, Nicole M., Christof W. Stahel, and René M. Stulz (2010) Hedge fund contagion and liquidity shocks, *Journal of Finance* **65**, 1789-1816.

Brennan, Michael J., Avanidhar Subrahmanyam (1996) Market microstructure and asset pricing: On the compensation for illiquidity in stock returns, *Journal of Financial Economics* **41**, 441-464.

Broner, Fernando A., R. Gaston Gelos, Carmen M. Reinhart (2006) When in peril, retrench: Testing the portfolio channel of contagion, *Journal of International Economics* **69**, 203-230.

Brunnermeier, Markus K. (2009) Deciphering the liquidity and credit crunch 2007–2008, *Journal of Economic Perspectives* **23**, 77-100.

Brunnermeier, Markus K., Lasse Heje Pedersen (2009) Market liquidity and funding liquidity, *Review of Financial Studies* **22**, 2201-2238.

Calomiris, Charles W., Inessa Love, Maria Soledad Martínez Pería (2012) Stock returns' sensitivities to crisis shocks: Evidence from developed and emerging markets, *Journal of International Money and Finance* **31**, 743-765.

Chordia, Tarun, Richard Roll, Avanidhar Subrahmanyam (2000) Commonality in liquidity, *Journal of Financial Economics* **56**, 3-28.

Coval, Joshua, and Erik Stafford (2007) Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* **86**, 480-512.

Datar, Vinay T., Narayan Y. Naik, Robert Radclie (1998) Liquidity and stock returns: An alternative test, *Journal of Financial Markets* **1**, 203–219.

Edmans, A. (2009) Blockholder trading, market efficiency, and managerial myopia, *Journal of Finance* **64**, 2481–2513.

Eleswarapu, V. R. (1997) Cost of transacting and expected returns in the Nasdaq market, *Journal of Finance* **52**, 2113– 2127.

Ferreira, Miguel A., Pedro Matos (2008) The colors of investors' money: The role of institutional investors around the world, *Journal of Financial Economics* **88**, 499-533.

Forbes, Kristin J. (2002) Are trade linkages important determinants of country vulnerability to crises?, in: Preventing currency crises in emerging markets (University of Chicago Press), edited by Sebastian Edwards and Jeffrey A. Frankel.

Garleanu, Nicolae B., Lasse Heje Pedersen (2007) Liquidity and risk management, *American Economic Review* **97**, 193–197.

Goldreich, David, Bernd Hanke, and Purnendu Nath (2005) The price of futures liquidity: Time-varying liquidity in the U.S. treasury market, *Review of Finance* **9**, 1-32.

Goldstein, Itay and Ady Pauzner (2004) Contagion of self-fulfilling financial crises due to diversification of investment portfolios, *Journal of Economic Theory* **119**, 151-183.

Goyenko, Ruslan Y., Craig W. Holden, and Charles A. Trzcinka (2009) Do liquidity measures measure liquidity?, *Journal of Financial Economics* **92**, 153-181.

Hau, Harald and Sandy Lai (2012) The role of equity funds in the financial crisis propagation, Working paper.

Kyle, Albert S., and Wei Xiong (2001) Contagion as a wealth effect, *Journal of Finance* **56**, 1401-1440.

Lang, Mark, Mark Maffett (2011) Transparency and liquidity uncertainty in crisis periods, *Journal of Accounting and Economics* **52**, 101-125.

Lee, Kuan-Hui (2011) The world price of liquidity risk, *Journal of Financial Economics* **99**, 136-161.

Liu, Weimin (2006) A liquidity-augmented capital asset pricing model, *Journal of Financial Economics* **82**, 631-671.

Lou, Xiaoxia, Ronnie Sadka (2011) Liquidity level or liquidity risk? Evidence from the financial crisis, *Financial Analysts Journal* **67**, 51-62.

Manconi, Alberto, Massa, Massimo, and Yasuda, Ayako (2012) The role of institutional investors in propagating the crisis of 2007-2008, *Journal of Financial Economics* **104**, 491-518.

Ng, Lilian, Fei Wu, Jing Yu, and Bohui Zhang (2011) Foreign investor heterogeneity and stock liquidity around the world, Working paper.

Pástor, Lubos, Robert F. Stambaugh (2003) Liquidity risk and expected stock returns, *Journal of Political Economy* **111**, 642-685.

Pedersen, Lasse Heje (2009) When everyone runs for the exit, *International Journal of Central Banking* **5**, 177-199.

Raddatz, Claudio and Sergio L. Schmukler (2012) On the international transmission of shocks: Micro-evidence from mutual fund portfolios, World Bank policy research working paper 6072.

Sadka, Ronnie (2006) Momentum and post-earnings-announcement drift anomalies: The role of liquidity risk, *Journal of Financial Economics* **80**, 309-349.

Sadka, Ronnie (2010) Liquidity and the cross-section of hedge fund returns, *Journal of Financial Economics* **98**, 54-71.

Shleifer, Andrei, and Robert W. Vishny (1997) The limits of arbitrage, *Journal of Finance* **52**, 35-55.

Teo, Melvyn (2011) The liquidity risk of liquid hedge funds, *Journal of Financial Economics* **100**, 24-44.

Tong, Hui and Shang-Jin Wei (2011) The composition matters: Capital inflows and liquidity crunch during a global economic crisis, *Review of Financial Studies* **24**, 2023-2052.

Wagner, Wolf (2010) Diversification at financial institutions and systemic crises, *Journal of Financial Intermediation* **19**, 373–386.

Watanabe, Akiko, Masahiro Watanabe (2008) Time-varying liquidity risk and the cross-section of stock returns, *Review of Financial Studies* **21**, 2449-2486.

Xiong, Wei (2001) Convergence trading with wealth effects: an amplification mechanism in financial markets, *Journal of Financial Economics* **62**, 247–292.

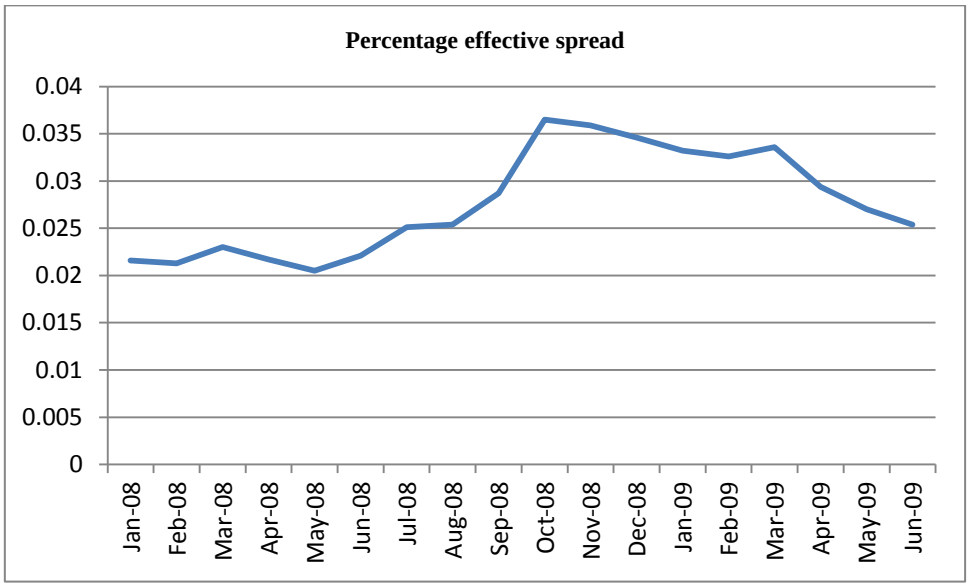
Appendix: Variable definitions

Variables	Acronym	Definition	Data Sources
(i) Institutional ownership			
Total institutional ownership	*IO*	The total institutional ownership as a percentage of shares outstanding in 2007	FactSet/Lionshares
Non-block institutional ownership	*NonBIO*	The non-block institutional ownership as a percentage of shares outstanding in 2007, in which non-block refers to holding less than 5%	FactSet/Lionshares
Block institutional ownership	*BIO*	The block institutional ownership as a percentage of shares outstanding in 2007, in which block refers to holding above 5% of total shares	FactSet/Lionshares
Independent institutional ownership	*INDIO*	The ownership by mutual fund managers and investment advisors as a percentage of shares outstanding in 2007	FactSet/Lionshares
Grey institutional ownership	*GREIO*	The ownership by bank trusts, insurance companies, pension funds, and other institutions as a percentage of shares outstanding in 2007	FactSet/Lionshares
Foreign institutional ownership	*FIO*	The ownership by institutions domiciled in a country other than that of the firm as a percentage of shares outstanding in 2007	FactSet/Lionshares
US foreign institutional ownership	*FIO_US*	The ownership by institutions domiciled in the U.S. as a percentage of shares outstanding in 2007	FactSet/Lionshares
Non-US foreign institutional ownership	*FIO_NUS*	The ownership by institutions domiciled in a non-U.S. based country other than that of the firm as a percentage of shares outstanding in 2007	FactSet/Lionshares
Domestic institutional ownership	*DIO*	The ownership by domestic institutions as a percentage of shares outstanding in 2007	FactSet/Lionshares
(ii) Liquidity measures			
Percentage-effective spread	*PESprd*	Twice the absolute value of the difference between the trading price and the midpoint of the bid and ask price, which is then divided by the midpoint of the bid and ask price	TRTH
Percentage-quoted spread	*PRSprd*	The absolute value of the difference between the ask and bid price, which is then divided by the midpoint of the bid and ask price	TRTH
(iii) Pre-crisis firm level controls			
Inclusion in country index	*MSCI*	An MSCI index member dummy that equals one if the firm is included in an MSCI country index at the end of 2007	Worldscope
Return on asset	*ROA*	Return on asset ratio in 2007	Worldscope
Book-to-market ratio	*BM*	Log of book-to-market equity ratio as of June 2007	Worldscope
Firm size	*MCap*	Log of market capitalization denominated in U.S. dollars at the end of 2007	Worldscope
Closely held ownership	*Closely-held*	Fraction of shares closely held by insiders and controlling shareholders in 2007	Worldscope
US cross-listing	*ADR*	An ADR dummy that equals one if the firm was cross-listed on a U.S. exchange at the end of 2007	Worldscope
Analyst coverage	*Analyst*	Number of financial analysts covering a firm in 2007	(I/B/E/S)
Pre-crisis liquidity level	*Liq*	The log of the average of the daily percentage effective (quoted) spread over 2007	TRTH
Annual stock returns	*Return*	Annual stock returns in 2007	Datastream
Stock return volatility	*STD*	Annualized standard deviation of monthly stock returns in 2007	Datastream
Stock price	*Price*	Log of stock price at the end of 2007	Datastream

Figure 1: Liquidity and cumulative stock returns for the global stock market during the crisis period

This graph shows the dynamics of liquidity as measured by the percentage-effective spread (Panel A) and the cumulative stock returns (Panel B) from January 2008 through each month of the crisis period of 2008-2009 for the global sample. The percentage-effective spread is defined as twice the absolute value of the difference between trading price and the midpoint of the bid and ask price, which is then divided by the midpoint of the bid and ask price.

Panel A



Panel B

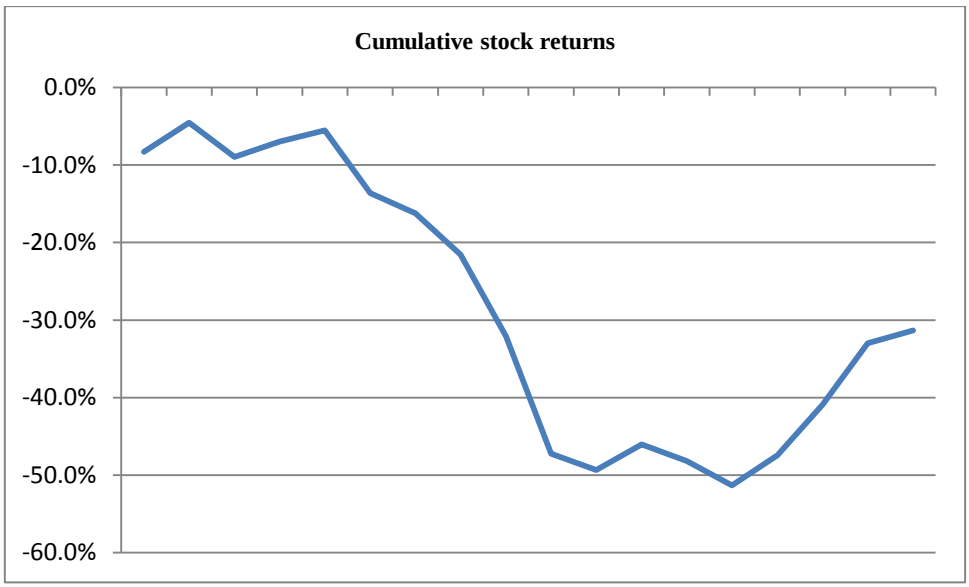


Table 1: Summary statistics

This table presents the average of the pre-crisis institutional ownership, stocks' pre-crisis sensitivity to the global market returns/liquidity (βs), and the cumulative stock returns during the crisis period for each of the 41 sample countries. N denotes the number of eligible stocks in 2007 (pre-crisis). Institutional ownership is grouped into total institutional ownership (IO), non-block (NonBIO), block (BIO), independent (INDIO), grey (GREIO), foreign (FIO), U.S. foreign (FIO_US), non-U.S. foreign (FIO_NUS), and domestic institutional ownership (DIO). Pre-crisis betas (βs) are estimated at the firm level using the monthly returns and innovations in illiquidity from January 2003 to December 2007 with respect to either the global market return or innovation in global market illiquidity, following Acharya and Pedersen (2005). Stocks must have at least 36 monthly observations over the five-year period. Cum.Ret is cumulative stock returns during the crisis period, defined from January 2008 to March 2009.

Panel A: Emerging markets

Country	N	IO	NonBIO	BIO	INDIO	GREIO	FIO	FIO_US	FIO_NUS	DIO	β2	β3	β4	β5	Cum.Ret
Argentina	64	0.2%	0.2%	0.0%	0.1%	0.0%	0.2%	0.1%	0.0%	0.0%	0.001	-0.013	-0.036	0.050	-52.7%
Brazil	24	4.6%	4.6%	0.0%	3.3%	1.3%	4.4%	2.2%	2.2%	0.2%	0.002	-0.021	-0.055	0.077	-59.6%
China	1329	0.3%	0.3%	0.0%	0.2%	0.1%	0.2%	0.0%	0.2%	0.1%	0.000	-0.004	-0.003	0.007	-32.1%
Chile	111	3.0%	1.3%	1.7%	0.6%	2.4%	0.6%	0.3%	0.3%	2.4%	0.001	-0.018	-0.016	0.036	-31.5%
Egypt	81	1.3%	1.2%	0.1%	1.1%	0.3%	1.2%	0.6%	0.6%	0.1%	0.000	-0.016	-0.020	0.036	-66.4%
Greece	257	3.6%	3.4%	0.2%	2.3%	1.3%	3.3%	1.0%	2.4%	0.3%	0.001	-0.022	-0.026	0.049	-63.2%
Indonesia	260	2.5%	2.2%	0.2%	2.0%	0.5%	2.5%	0.8%	1.7%	0.0%	0.002	-0.028	-0.088	0.118	-44.6%
India	826	6.4%	5.7%	0.7%	5.7%	0.7%	2.8%	0.9%	1.9%	3.6%	0.001	-0.029	-0.023	0.053	-73.8%
Israel	344	2.0%	1.6%	0.4%	1.8%	0.2%	2.0%	1.7%	0.3%	0.0%	0.001	-0.006	-0.042	0.049	-45.0%
South Korea	645	3.8%	3.2%	0.6%	2.9%	0.9%	3.7%	1.7%	2.0%	0.1%	0.000	-0.018	-0.013	0.031	-55.3%
Mexico	72	5.8%	5.4%	0.5%	4.7%	1.2%	5.5%	3.2%	2.3%	0.3%	0.000	-0.010	-0.017	0.027	-45.2%
Malaysia	846	1.8%	1.7%	0.1%	1.5%	0.3%	1.5%	0.5%	0.9%	0.3%	0.002	-0.016	-0.066	0.084	-43.1%
Peru	53	0.4%	0.4%	0.0%	0.3%	0.1%	0.4%	0.1%	0.3%	0.0%	0.001	-0.012	-0.038	0.051	-32.8%
Poland	190	19.7%	14.5%	5.1%	15.9%	3.8%	2.9%	0.9%	1.9%	16.8%	0.001	-0.023	-0.024	0.047	-67.4%
Philippines	148	2.7%	2.5%	0.2%	2.1%	0.6%	2.7%	1.3%	1.4%	0.1%	0.002	-0.019	-0.035	0.055	-50.6%
Russia	31	3.9%	3.8%	0.2%	2.1%	1.8%	3.9%	0.2%	3.7%	0.1%	0.001	-0.025	-0.026	0.053	-71.6%
South Africa	237	9.4%	9.2%	0.2%	7.9%	1.5%	3.7%	2.0%	1.7%	5.7%	0.001	-0.018	-0.040	0.059	-50.8%
Thailand	363	2.8%	2.4%	0.4%	2.5%	0.4%	2.1%	0.6%	1.5%	0.7%	0.001	-0.017	-0.031	0.049	-35.3%
Turkey	235	4.0%	3.8%	0.3%	2.8%	1.3%	4.0%	1.0%	3.0%	0.0%	0.000	-0.035	-0.011	0.046	-60.4%
Taiwan	653	3.6%	3.4%	0.2%	2.9%	0.7%	3.6%	1.7%	1.9%	0.0%	0.000	-0.011	-0.008	0.020	-35.1%
Emerging Average		3.5%	3.0%	0.4%	2.8%	0.7%	2.2%	0.9%	1.3%	1.2%	0.001	-0.016	-0.027	0.044	-47.1%

Panel B: Developed markets

Country	N	IO	NonBIO	BIO	INDIO	GREIO	FIO	FIO_US	FIO_NUS	DIO	β2	β3	β4	β5	Cum.Ret
Australia	1028	3.9%	3.2%	0.7%	2.9%	1.0%	2.8%	1.1%	1.7%	1.1%	0.001	-0.024	-0.046	0.071	-63.2%
Austria	36	14.3%	13.5%	0.8%	8.6%	5.7%	12.8%	2.8%	10.0%	1.5%	0.000	-0.011	-0.005	0.017	-57.6%
Belgium	121	7.4%	5.9%	1.5%	3.2%	4.2%	3.9%	0.8%	3.0%	3.5%	0.001	-0.008	-0.028	0.037	-42.2%
Canada	604	18.6%	14.6%	4.0%	14.6%	4.0%	7.4%	5.3%	2.1%	11.3%	0.001	-0.018	-0.041	0.060	-57.9%
Denmark	137	12.8%	7.6%	5.2%	8.2%	4.6%	3.7%	1.4%	2.3%	9.1%	0.001	-0.011	-0.020	0.032	-61.7%
Ireland	34	18.1%	15.3%	2.8%	12.5%	5.6%	17.0%	5.3%	11.7%	1.1%	0.001	-0.011	-0.047	0.059	-67.8%
Finland	101	19.6%	16.8%	2.8%	11.8%	7.8%	10.4%	2.6%	7.8%	9.2%	0.001	-0.013	-0.031	0.046	-50.5%
France	576	9.4%	8.2%	1.2%	6.6%	2.8%	5.1%	2.0%	3.1%	4.3%	0.000	-0.011	-0.020	0.031	-47.1%
Germany	625	9.7%	8.6%	1.2%	6.3%	3.5%	5.6%	1.7%	3.9%	4.1%	0.001	-0.014	-0.025	0.040	-47.6%
Hong Kong	783	4.7%	4.2%	0.5%	3.6%	1.1%	3.7%	1.7%	2.0%	1.0%	0.001	-0.018	-0.059	0.078	-57.0%
Italy	185	7.6%	7.4%	0.1%	4.9%	2.6%	5.9%	1.6%	4.2%	1.7%	0.000	-0.011	-0.012	0.024	-58.0%
Japan	2418	6.5%	6.2%	0.3%	3.4%	3.1%	3.3%	1.8%	1.6%	3.1%	0.000	-0.006	-0.008	0.015	-27.1%
Netherlands	111	19.2%	13.8%	5.4%	12.0%	7.2%	12.7%	4.5%	8.2%	6.6%	0.000	-0.011	-0.021	0.032	-52.9%
Norway	114	14.6%	11.1%	3.5%	10.3%	4.3%	7.5%	3.3%	4.2%	7.1%	0.001	-0.016	-0.046	0.063	-60.0%
New Zealand	67	3.8%	3.1%	0.6%	3.1%	0.7%	3.1%	1.7%	1.4%	0.6%	0.001	-0.018	-0.035	0.053	-51.8%
Singapore	467	4.0%	3.5%	0.5%	3.0%	1.0%	3.2%	1.3%	1.8%	0.9%	0.002	-0.021	-0.086	0.109	-59.9%
Spain	96	9.8%	9.7%	0.1%	5.7%	4.1%	6.1%	1.6%	4.5%	3.7%	0.000	-0.008	-0.005	0.013	-62.6%
Sweden	223	20.2%	16.8%	3.4%	14.6%	5.6%	6.1%	1.6%	4.5%	14.1%	0.001	-0.017	-0.032	0.050	-52.5%
Switzerland	189	14.8%	12.5%	2.3%	10.1%	4.7%	9.1%	3.2%	5.9%	5.8%	0.001	-0.009	-0.014	0.024	-39.3%
United Kingdom	1064	19.3%	15.8%	3.5%	13.7%	5.6%	4.7%	2.2%	2.6%	14.6%	0.001	-0.015	-0.037	0.053	-61.4%
United States	1745	67.6%	49.4%	18.1%	54.3%	13.2%	5.3%		5.3%	62.2%	0.000	-0.007	-0.005	0.013	-47.3%
Developed Average		18.6%	14.6%	4.2%	14.0%	4.7%	4.7%	2.0%	3.0%	13.9%	0.001	-0.013	-0.027	0.040	-47.7%
Global Average		12.6%	10.0%	2.7%	9.5%	3.1%	3.7%	1.5%	2.3%	8.9%	0.001	-0.014	-0.027	0.042	-47.4%
Global Standard Dev.		22.9%	17.5%	8.2%	18.7%	5.8%	7.2%	3.6%	5.4%	21.0%	0.002	0.016	0.075	0.080	30.6%

Table 2: Pearson correlation coefficients

This table presents Pearson correlation coefficients among variables used in the analyses of this paper. *Cum.Ret* is cumulative stock returns during the crisis period, defined from January 2008 to March 2009. The institutional ownership variables include total institutional ownership (*IO*), non-block (*NonBIO*), block (*BIO*), independent (*INDIO*), grey (*GREIO*), foreign (*FIO*), U.S. foreign (*FIO_US*), non-U.S. foreign (*FIO_NUS*), and domestic institutional ownership (*DIO*). The liquidity betas (*βs*) are measured with respect to the global market portfolio. Control variables are the MSCI index dummy (*MSCI*), returns on assets (*ROA*), the log of book-to-market ratio (*BM*), the log of market capitalization (*MCap*), the proportion of a firm's shares that are closely held (*Closely-held*), a dummy for whether a stock lists in the U.S. (*ADR*), the number of stock analysts following the firm (*Analyst*), the pre-crisis liquidity level of individual stocks (*PESprd*) (we take the log of *PESprd*, denoted by *Liq*, in the regression analyses), annual stock returns (*Return*), annualized standard deviation of monthly stock returns (*STD*), and the log of stock price at the end of 2007 (*Price*).

VARIABLES	*Cum.Ret*	*IO*	*NonBIO*	*BIO*	*INDIO*	*GREIO*	*FIO*	*FIO_US*	*FIO_NUS*	*DIO*	*βM*	*β2*	*β3*	*β4*	*β5*	*MSCI*	*ROA*	*BM*	*MCap*	*Closely-held*	*ADR*	*Analyst*	*PESprd*	*Return*	*STD*	*Price*
Cum.Ret	1.000																									
IO	-0.078	1.000																								
NonBIO	-0.069	0.961	1.000																							
BIO	-0.075	0.785	0.589	1.000																						
INDIO	-0.079	0.983	0.939	0.792	1.000																					
GREIO	-0.055	0.827	0.811	0.609	0.713	1.000																				
FIO	-0.093	0.414	0.456	0.184	0.374	0.431	1.000																			
FIO_US	-0.056	0.647	0.650	0.270	0.657	0.441	0.827	1.000																		
FIO_NUS	-0.092	0.430	0.460	0.223	0.392	0.441	0.889	0.448	1.000																	
DIO	-0.052	0.949	0.892	0.794	0.944	0.754	0.107	0.221	0.162	1.000																
βM	-0.283	-0.063	-0.064	-0.040	-0.057	-0.067	0.045	0.026	0.035	-0.085	1.000															
β2	-0.071	-0.121	-0.129	-0.067	-0.111	-0.125	-0.095	-0.080	-0.084	-0.100	0.099	1.000														
β3	0.274	0.091	0.093	0.054	0.081	0.096	-0.012	0.011	-0.012	0.103	-0.671	-0.136	1.000													
β4	0.081	0.126	0.134	0.069	0.116	0.129	0.102	0.086	0.089	0.103	-0.170	-0.599	0.144	1.000												
β5	-0.132	-0.138	-0.146	-0.077	-0.126	-0.142	-0.094	-0.083	-0.082	-0.118	0.295	0.618	-0.336	-0.980	1.000											
MSCI	0.068	0.339	0.379	0.148	0.310	0.351	0.312	0.290	0.259	0.263	-0.061	-0.198	0.115	0.216	-0.224	1.000										
ROA	0.061	0.087	0.107	0.012	0.077	0.095	0.102	0.084	0.088	0.060	-0.097	-0.089	0.086	0.097	-0.118	0.166	1.000									
BM	0.038	-0.088	-0.108	-0.011	-0.079	-0.092	-0.086	-0.059	-0.084	-0.066	0.003	0.082	-0.059	-0.098	0.099	-0.232	-0.039	1.000								
MCap	0.029	0.438	0.498	0.165	0.393	0.470	0.434	0.399	0.371	0.329	-0.165	-0.274	0.206	0.309	-0.326	0.695	0.253	-0.372	1.000							
Closely-held	0.027	-0.400	-0.439	-0.186	-0.372	-0.388	-0.238	-0.240	-0.209	-0.351	-0.017	0.123	-0.070	-0.107	0.115	-0.242	0.081	0.061	-0.219	1.000						
ADR	-0.015	0.062	0.079	0.003	0.047	0.093	0.227	0.317	0.098	-0.010	0.029	-0.024	-0.011	0.024	-0.019	0.113	0.002	-0.046	0.210	-0.091	1.000					
Analyst	-0.004	0.357	0.429	0.085	0.312	0.403	0.408	0.406	0.344	0.236	-0.105	-0.160	0.118	0.190	-0.208	0.332	0.117	-0.139	0.679	-0.249	0.243	1.000				
PESprd	-0.088	-0.255	-0.275	-0.131	-0.236	-0.254	-0.216	-0.192	-0.184	-0.204	0.095	0.346	-0.134	-0.369	0.384	-0.429	-0.259	0.134	-0.563	0.173	-0.062	-0.295	1.000			
Return	-0.043	-0.178	-0.162	-0.162	-0.168	-0.170	-0.077	-0.093	-0.060	-0.167	0.070	0.017	-0.026	-0.023	0.027	0.073	0.190	-0.351	0.101	0.160	-0.033	-0.089	-0.050	1.000		
STD	-0.158	-0.200	-0.215	-0.103	-0.181	-0.209	-0.162	-0.146	-0.138	-0.163	0.263	0.111	-0.201	-0.138	0.172	-0.135	-0.185	-0.191	-0.248	0.073	-0.052	-0.249	0.272	0.432	1.000	
Price	0.049	0.401	0.420	0.234	0.368	0.408	0.283	0.242	0.257	0.340	-0.223	-0.227	0.208	0.262	-0.293	0.328	0.245	-0.175	0.570	-0.142	0.082	0.347	-0.502	-0.027	-0.339	1.000

Table 3: Liquidity and returns for the global markets during the crisis period

This table presents the difference in means of the percentage-effective spread (PESprd) during the crisis versus before the crisis, the means of monthly stock returns (Monthly Returns), and the means of the cumulative stock returns (Cum.Ret) from January 2008 through each month of the 2008-2009 crisis period for the global, emerging, and developed samples. For the percentage-effective spread, *t*-statistics were performed for the difference in mean of the percentage-effective spread in each month of the crisis period versus the pre-crisis period 2007 (Diff. 2007).

Panel A: Global sample

		PESprd		Monthly Returns		Cum.Ret	
Year	Month	Diff. 2007	*t_Stat*	*Mean*	*STD*	*Mean*	*STD*
2008	1	0.006	18.1	-8.3%	13.8%	-8.3%	13.8%
2008	2	0.006	16.6	4.3%	14.5%	-4.5%	19.3%
2008	3	0.008	20.3	-5.0%	13.3%	-9.0%	23.5%
2008	4	0.006	17.1	2.8%	14.2%	-7.0%	27.2%
2008	5	0.005	14.4	1.4%	15.0%	-5.5%	32.3%
2008	6	0.007	18.3	-9.5%	14.1%	-13.6%	35.3%
2008	7	0.010	24.4	-1.8%	14.1%	-16.2%	33.1%
2008	8	0.010	24.4	-6.5%	13.6%	-21.5%	31.8%
2008	9	0.013	30.8	-13.9%	14.1%	-32.1%	29.8%
2008	10	0.021	43.6	-24.3%	17.6%	-47.2%	28.1%
2008	11	0.021	40.7	-4.2%	19.7%	-49.4%	28.9%
2008	12	0.019	37.8	7.7%	21.1%	-46.0%	31.4%
2009	1	0.018	36.0	-2.9%	18.6%	-48.2%	30.3%
2009	2	0.017	34.9	-5.5%	17.3%	-51.3%	28.8%
2009	3	0.018	36.0	10.2%	20.6%	-47.4%	30.6%

Panel B: Emerging markets

		PESprd		Monthly Returns		Cum.Ret	
Year	Month	Diff. 2007	*t_Stat*	*Mean*	*STD*	*Mean*	*STD*
2008	1	0.005	11.3	-9.5%	14.1%	-9.5%	14.1%
2008	2	0.006	11.2	5.2%	13.5%	-4.7%	19.5%
2008	3	0.007	13.7	-7.8%	13.4%	-11.7%	24.1%
2008	4	0.006	11.2	2.9%	14.1%	-9.6%	27.5%
2008	5	0.005	10.0	-1.8%	12.8%	-11.0%	30.3%
2008	6	0.007	13.4	-13.3%	13.9%	-22.0%	31.1%
2008	7	0.010	17.0	2.1%	13.9%	-21.6%	30.5%
2008	8	0.009	15.9	-8.7%	13.1%	-28.2%	29.8%
2008	9	0.012	19.7	-13.6%	13.0%	-37.9%	27.4%
2008	10	0.018	27.7	-26.4%	15.4%	-53.4%	24.7%
2008	11	0.016	25.5	-2.1%	18.6%	-54.8%	24.4%
2008	12	0.014	22.5	8.8%	18.0%	-51.6%	25.7%
2009	1	0.014	21.2	-0.6%	17.2%	-52.3%	25.3%
2009	2	0.013	20.2	-1.8%	15.4%	-53.0%	26.2%
2009	3	0.013	20.0	13.9%	18.2%	-47.1%	29.2%

Panel C: Developed markets

		PESprd		Monthly Returns		Cum.Ret	
Year	Month	Diff. 2007	*t_Stat*	*Mean*	*STD*	*Mean*	*STD*
2008	1	0.007	15.7	-7.5%	13.6%	-7.5%	13.6%
2008	2	0.006	13.7	3.7%	15.1%	-4.4%	19.2%
2008	3	0.008	16.7	-3.1%	12.9%	-7.2%	22.9%
2008	4	0.007	14.3	2.6%	14.3%	-5.3%	26.9%
2008	5	0.005	11.7	3.5%	16.0%	-1.9%	33.1%
2008	6	0.007	14.2	-7.0%	13.6%	-8.1%	36.8%
2008	7	0.010	19.3	-4.4%	13.7%	-12.6%	34.2%
2008	8	0.011	20.1	-5.1%	13.8%	-17.1%	32.4%
2008	9	0.015	25.4	-14.1%	14.8%	-28.2%	30.6%
2008	10	0.024	35.7	-22.8%	18.8%	-43.0%	29.5%
2008	11	0.024	33.5	-5.5%	20.3%	-45.7%	31.1%
2008	12	0.023	32.0	6.9%	22.9%	-42.3%	34.2%
2009	1	0.021	30.7	-4.4%	19.4%	-45.4%	33.0%
2009	2	0.021	30.0	-8.1%	18.1%	-50.2%	30.4%
2009	3	0.022	31.6	7.7%	21.7%	-47.7%	31.5%

Table 4: Effect of pre-crisis institutional ownership on the crisis performance of stocks

This table presents results from regressing the cumulative returns of stocks on their pre-crisis total institutional ownership, respective global liquidity betas, market beta, and firm-level control variables for the emerging, developed, and global samples. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i + \lambda_2 \beta_i^{LIQ} + \lambda_3 \beta_i^{M} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis total institutional ownership of stock *i*, $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*, and $\beta^{M}{}_i$ is the pre-crisis market beta of stock *i*. *Other controls* include the MSCI index dummy (*MSCI*), returns on assets (*ROA*), the log of book-to-market ratio (*BM*), the log of market capitalization (*MCap*), the proportion of a firm's shares that are closely held (*Closely-held*), a dummy for whether a stock lists in the U.S. (*ADR*), the number of stock analysts (*Analyst*), the log of the average of stock *i*'s daily percentage-effective spread over 2007 as a proxy for the pre-crisis liquidity levels of stock *i* (*Liq*), annual stock returns (*Return*), annualized standard deviation of monthly stock returns (*STD*), and the log of stock price at the end of 2007 (*Price*). ε_i is the firm-level error term. All models are estimated using robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

Variable	Emerging				Developed				Global			
	β2	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
IO	**-0.251*** **	**-0.250*** **	**-0.248*** **	**-0.246*** **	**-0.167*** **	**-0.166*** **	**-0.168*** **	**-0.168*** **	**-0.161*** **	**-0.160*** **	**-0.161*** **	**-0.160*** **
	(-5.70)	***(-5.70)***	***(-5.64)***	***(-5.62)***	***(-6.51)***	***(-6.46)***	***(-6.53)***	***(-6.52)***	***(-7.04)***	***(-7.01)***	***(-7.04)***	***(-7.01)***
β^{LIQ}	**-1.390**	**1.019*** **	**0.142** **	**-0.166*** **	**0.271**	**0.800** **	**-0.062**	**0.034**	**0.548**	**0.951*** **	**-0.006**	**-0.023**
	(-0.58)	***(3.35)***	***(2.51)***	**(-3.00)**	***(0.12)***	***(2.20)***	***(-0.96)***	**(0.55)**	***(0.33)***	***(3.81)***	***(-0.15)***	**(-0.54)**
βM	-0.057***	-0.042***	-0.056***	-0.053***	-0.080***	-0.068***	-0.081***	-0.081***	-0.073***	-0.059***	-0.073***	-0.072***
	(-8.44)	*(-5.00)*	*(-8.27)*	*(-7.69)*	*(-12.24)*	*(-8.07)*	*(-12.25)*	*(-11.92)*	*(-15.54)*	*(-9.63)*	*(-15.48)*	*(-14.98)*
MSCI	0.040***	0.039***	0.040***	0.040***	0.024**	0.024**	0.025**	0.025**	0.030***	0.030***	0.030***	0.030***
	(4.58)	*(4.55)*	*(4.59)*	*(4.59)*	*(2.47)*	*(2.44)*	*(2.50)*	*(2.49)*	*(4.44)*	*(4.39)*	*(4.43)*	*(4.41)*
ROA	0.149***	0.154***	0.149***	0.149***	0.103***	0.101***	0.103***	0.103***	0.114***	0.113***	0.114***	0.114***
	(3.81)	*(3.90)*	*(3.79)*	*(3.81)*	*(3.85)*	*(3.78)*	*(3.86)*	*(3.86)*	*(5.11)*	*(5.07)*	*(5.11)*	*(5.11)*
BM	-0.000	0.001	0.000	0.000	-0.000	0.000	-0.000	-0.000	-0.001	-0.000	-0.001	-0.001
	(-0.01)	*(0.19)*	*(0.01)*	*(0.05)*	*(-0.00)*	*(0.01)*	*(-0.00)*	*(-0.00)*	*(-0.17)*	*(-0.03)*	*(-0.17)*	*(-0.16)*
MCap	-0.023***	-0.023***	-0.023***	-0.023***	-0.018***	-0.018***	-0.018***	-0.018***	-0.020***	-0.020***	-0.020***	-0.020***
	(-5.51)	*(-5.57)*	*(-5.56)*	*(-5.58)*	*(-4.90)*	*(-4.93)*	*(-4.88)*	*(-4.89)*	*(-7.32)*	*(-7.40)*	*(-7.33)*	*(-7.36)*
Closely-held	0.038***	0.039***	0.039***	0.039***	0.032**	0.033***	0.032**	0.032**	0.033***	0.034***	0.033***	0.033***
	(3.04)	*(3.12)*	*(3.07)*	*(3.10)*	*(2.56)*	*(2.62)*	*(2.55)*	*(2.55)*	*(3.66)*	*(3.77)*	*(3.66)*	*(3.67)*
ADR	0.064***	0.061***	0.066***	0.067***	0.060***	0.060***	0.060***	0.060***	0.057***	0.057***	0.057***	0.057***
	(2.73)	*(2.64)*	*(2.84)*	*(2.85)*	*(3.55)*	*(3.54)*	*(3.56)*	*(3.56)*	*(4.17)*	*(4.12)*	*(4.17)*	*(4.18)*
Analyst	0.000	0.001	0.000	0.000	-0.002**	-0.002**	-0.002**	-0.002**	-0.001	-0.000	-0.001	-0.000
	(0.42)	*(0.46)*	*(0.41)*	*(0.41)*	*(-2.09)*	*(-2.02)*	*(-2.13)*	*(-2.11)*	*(-0.81)*	*(-0.72)*	*(-0.80)*	*(-0.77)*
Liq	0.015*	0.012*	0.018**	0.019**	-0.035***	-0.034***	-0.035***	-0.035***	-0.018***	-0.018***	-0.017***	-0.017***
	(1.93)	*(1.69)*	*(2.38)*	*(2.47)*	*(-6.26)*	*(-6.25)*	*(-6.36)*	*(-6.30)*	*(-4.09)*	*(-4.15)*	*(-4.03)*	*(-3.91)*
Return	-0.028***	-0.030***	-0.027***	-0.028***	0.034***	0.032***	0.033***	0.033***	0.011*	0.010	0.011*	0.011*
	(-2.96)	*(-3.13)*	*(-2.90)*	*(-2.92)*	*(3.91)*	*(3.76)*	*(3.85)*	*(3.88)*	*(1.67)*	*(1.48)*	*(1.67)*	*(1.70)*
STD	-0.095***	-0.093***	-0.094***	-0.093***	-0.075***	-0.074***	-0.075***	-0.075***	-0.084***	-0.083***	-0.084***	-0.084***
	(-5.14)	*(-5.03)*	*(-5.12)*	*(-5.09)*	*(-6.32)*	*(-6.32)*	*(-6.30)*	*(-6.31)*	*(-7.89)*	*(-7.84)*	*(-7.88)*	*(-7.88)*
Price	0.018***	0.018***	0.018***	0.018***	-0.004	-0.005	-0.004	-0.004	0.004*	0.004*	0.004*	0.004*
	(5.52)	*(5.45)*	*(5.53)*	*(5.51)*	*(-1.53)*	*(-1.58)*	*(-1.47)*	*(-1.50)*	*(1.89)*	*(1.81)*	*(1.89)*	*(1.86)*
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.2%	33.4%	33.3%	33.3%	25.0%	25.1%	25.0%	25.0%	27.2%	27.3%	27.2%	27.2%

Table 5: Institutions and the spread of the liquidity shock

This table presents results from regressing the cumulative returns of stocks on their pre-crisis total institutional ownership, respective global liquidity betas, market beta, the interaction between total institutional ownership and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis total institutional ownership of stock *i*, and $\beta^{LIQ}{}_i$ is the respective pre-crisis global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the market beta, other interaction terms, and firm-specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated using robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-126.829*** **	**8.779** **	**3.494*** **	**-3.567*** **	**-67.321** **	-0.420	0.744	-0.823	**-84.801*** **	1.003	**1.435** **	**-1.509*** **
	(-3.41)	***(2.19)***	***(2.99)***	***(-2.92)***	***(-2.57)***	*(-0.21)*	*(1.03)*	*(-1.23)*	***(-4.22)***	*(0.59)*	***(2.57)***	***(-2.85)***
IO	**-0.237** **	**-0.289*** **	**-0.206***	**-0.189***	**-0.189*** **	**-0.196*** **	**-0.193*** **	**-0.194*** **	**-0.144*** **	**-0.157*** **	**-0.150*** **	**-0.151*** **
	(-2.18)	***(-2.69)***	***(-1.88)***	***(-1.72)***	***(-5.47)***	***(-5.73)***	***(-5.61)***	***(-5.64)***	***(-4.52)***	***(-5.00)***	***(-4.73)***	***(-4.76)***
β^{LIQ}	-30.195	**11.478*** **	0.511	-0.805	-22.989	4.935	0.480	-0.525	**-28.510** **	**8.389*** **	0.380	-0.534
	(-1.45)	***(3.37)***	*(0.93)*	*(-1.47)*	*(-1.22)*	*(1.32)*	*(0.91)*	*(-1.05)*	***(-2.25)***	***(3.53)***	*(1.03)*	*(-1.51)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.8%	34.0%	33.8%	33.9%	27.4%	27.3%	27.4%	27.4%	28.6%	28.6%	28.6%	28.6%

Table 6: Institutions and the spread of the liquidity shock: Effects on Tobin's Q

This table presents results from regressing stocks' change in the log of Tobin's Q on their pre-crisis total institutional ownership, respective global liquidity betas, market beta, the interaction between total institutional ownership and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$\Delta Q_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where ΔQ is change in the log of Tobin's Q during versus before the crisis, IO_i is the fraction of pre-crisis total institutional ownership of stock *i*, and $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the market beta, other interaction terms, and firm-specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-153.504*** **	**13.905***	**5.309*** **	**-5.612*** **	**-183.604*** **	-2.264	**2.642***	-1.677	**-169.834*** **	-1.316	**3.379*** **	**-2.636*** **
	(-3.20)	***(1.71)***	***(3.90)***	***(-3.99)***	***(-3.58)***	*(-0.89)*	***(1.89)***	*(-1.36)*	***(-4.46)***	*(-0.61)*	***(3.11)***	***(-2.79)***
IO	0.232	0.070	0.269	0.288*	**-0.135*** **	**-0.154*** **	**-0.153*** **	**-0.157*** **	**-0.075***	**-0.106*** **	**-0.093** **	**-0.096** **
	(1.36)	*(0.33)*	*(1.56)*	*(1.66)*	***(-3.09)***	***(-3.56)***	***(-3.53)***	***(-3.65)***	***(-1.87)***	***(-2.63)***	***(-2.34)***	***(-2.42)***
β^{LIQ}	45.581	**14.345** **	-0.686	0.220	52.877	-5.237	-1.803	1.814	45.361	5.427	-1.461*	1.307
	(1.51)	***(2.51)***	*(-0.84)*	*(0.28)*	*(1.02)*	*(-0.68)*	*(-1.45)*	*(1.50)*	*(1.37)*	*(1.08)*	*(-1.68)*	*(1.56)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,523	5,523	5,523	5,523	8,143	8,143	8,143	8,143	13,666	13,666	13,666	13,666
Adj. R^2	28.0%	28.7%	28.0%	28.2%	23.5%	23.2%	23.9%	23.9%	24.6%	24.4%	24.8%	24.7%

Table 7: Institutions and the spread of the liquidity shock: Using local betas

This table presents results from regressing stocks' cumulative returns on their pre-crisis total institutional ownership, respective local liquidity betas, local market beta, the interaction between total institutional ownership and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis total institutional ownership of stock *i*, and $\beta^{LIQ}{}_i$ is the pre-crisis respective local liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the local market beta, other interaction terms, and firm specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-71.802*** **	**8.580*** **	**2.379** **	**-2.600** **	**-71.410*** **	1.043	0.669	-0.741	**-81.646*** **	1.826	**1.290*** **	**-1.273*** **
	(-2.93)	***(2.84)***	***(2.39)***	***(-2.44)***	***(-2.91)***	*(0.74)*	*(1.08)*	*(-1.30)*	***(-4.62)***	*(1.43)*	***(2.71)***	***(-2.82)***
IO	**-0.282*** **	**-0.310*** **	**-0.254*** **	**-0.240*** **	**-0.135*** **	**-0.149*** **	**-0.139*** **	**-0.138*** **	**-0.120*** **	**-0.139*** **	**-0.130*** **	**-0.129*** **
	(-3.13)	***(-3.53)***	***(-2.80)***	***(-2.63)***	***(-4.16)***	***(-4.65)***	***(-4.32)***	***(-4.25)***	***(-3.97)***	***(-4.68)***	***(-4.33)***	***(-4.28)***
β^{LIQ}	0.916	2.347	**1.710** **	-1.277	-21.344	-9.542***	0.737	-0.224	-15.749	-3.681*	**1.235** **	**-0.818***
	(0.06)	*(0.79)*	***(1.97)***	*(-1.60)*	*(-1.07)*	*(-3.11)*	*(0.97)*	*(-0.32)*	*(-1.32)*	*(-1.79)*	***(2.39)***	***(-1.71)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,556	5,556	5,556	5,556	8,315	8,315	8,315	8,315	13,871	13,871	13,871	13,871
Adj. R^2	35.1%	35.6%	35.2%	35.4%	27.0%	27.2%	27.0%	27.1%	28.9%	29.0%	28.9%	29.0%

Table 8: Institutions and the spread of the liquidity shock: Alternative spread-based liquidity measure

This table presents results from regressing stocks' cumulative returns on their pre-crisis total institutional ownership, respective global liquidity betas, market beta, the interaction between total institutional ownership and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis total institutional ownership of stock *i*, and $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4, except that the percentage-effective spread is substituted with the percentage-quoted spread (the market beta, other interaction terms, and firm specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-134.216*** **	**8.405** **	**3.883*** **	**-3.780*** **	**-69.627*** **	0.338	0.738	-0.835	**-86.724*** **	1.040	**1.346** **	**-1.398*** **
	(-3.44)	**(2.22)**	**(3.21)**	**(-3.06)**	**(-2.59)**	(0.17)	(1.07)	(-1.30)	**(-4.10)**	(0.62)	**(2.55)**	**(-2.78)**
IO	**-0.238** **	**-0.294*** **	**-0.198***	**-0.186***	**-0.189*** **	**-0.197*** **	**-0.194*** **	**-0.195*** **	**-0.144*** **	**-0.156*** **	**-0.150*** **	**-0.152*** **
	(-2.18)	**(-2.77)**	**(-1.80)**	**(-1.69)**	**(-5.48)**	**(-5.75)**	**(-5.66)**	**(-5.70)**	**(-4.55)**	**(-4.96)**	**(-4.75)**	**(-4.81)**
β^{LIQ}	-27.991	**11.168*** **	0.499	-0.789	-22.884	5.065	0.134	-0.194	**-24.520***	**7.646*** **	0.135	-0.268
	(-1.34)	**(3.34)**	(0.93)	(-1.50)	(-1.32)	(1.36)	(0.26)	(-0.40)	**(-1.87)**	**(3.25)**	(0.36)	(-0.76)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.9%	34.1%	33.8%	33.9%	27.4%	27.3%	27.4%	27.4%	28.6%	28.6%	28.5%	28.5%

Table 9: Institutions and the spread of the liquidity shock: Alternative definitions of the crisis period.

These tables present results from regressing stocks' cumulative returns on their pre-crisis total institutional ownership, respective global liquidity betas, market beta, the interaction between total institutional ownership and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* over two alternative crisis periods, from January 2008 to June 2009 (Panel A) and from September 2008 to March 2009 (Panel B); IO_i is the fraction of pre-crisis total institutional ownership for stock *i*; and $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the market beta, other interaction terms, and firm specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

Panel A: Cumulative returns from January 2008 to June 2009.

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-149.366***** ***(-3.77)***	6.751 *(1.26)*	**4.210***** ***(3.56)***	**-4.185***** ***(-3.44)***	**-104.755***** ***(-2.93)***	1.800 *(0.75)*	0.322 *(0.30)*	-0.691 *(-0.75)*	**-96.626***** ***(-3.73)***	1.083 *(0.53)*	1.016 *(1.32)*	**-1.250*** ***(-1.82)***
IO	-0.175 *(-1.21)*	-0.225 *(-1.58)*	-0.140 *(-0.97)*	-0.131 *(-0.91)*	**-0.117***** ***(-2.82)***	**-0.127***** ***(-3.08)***	**-0.125***** ***(-3.04)***	**-0.125***** ***(-3.05)***	**-0.099**** ***(-2.55)***	**-0.117***** ***(-3.03)***	**-0.109***** ***(-2.83)***	**-0.110***** ***(-2.86)***
β^{LIQ}	-23.363 *(-0.84)*	**15.077***** ***(3.43)***	0.594 *(0.89)*	-1.000 *(-1.48)*	-34.212 *(-1.20)*	7.549 *(1.31)*	0.907 *(1.21)*	-0.998 *(-1.39)*	**-41.319**** ***(-2.19)***	**11.288***** ***(3.20)***	0.891 *(1.64)*	**-1.091**** ***(-2.06)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,531	5,531	5,531	5,531	8,240	8,240	8,240	8,240	13,771	13,771	13,771	13,771
Adj. R^2	24.2%	24.7%	24.3%	24.4%	18.3%	17.9%	18.2%	18.3%	19.3%	19.2%	19.2%	19.2%

Panel B: Cumulative returns from September 2008 to March 2009.

	Emerging				**Developed**				**Global**			
Variable	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
$IO*\beta^{LIQ}$	**-109.935**** ***(-2.49)***	1.060 *(0.25)*	**2.518**** ***(2.12)***	**-2.190**** ***(-2.02)***	**-50.100**** ***(-1.96)***	1.348 *(0.73)*	0.879 *(1.33)*	**-1.094*** ***(-1.78)***	**-71.414***** ***(-3.31)***	1.206 *(0.75)*	**1.276**** ***(2.26)***	**-1.361***** ***(-2.62)***
IO	-0.073 *(-0.62)*	-0.117 *(-1.04)*	-0.050 *(-0.44)*	-0.051 *(-0.44)*	**-0.156***** ***(-4.77)***	**-0.163***** ***(-5.07)***	**-0.160***** ***(-4.91)***	**-0.160***** ***(-4.91)***	**-0.123***** ***(-4.04)***	**-0.131***** ***(-4.38)***	**-0.128***** ***(-4.23)***	**-0.128***** ***(-4.24)***
β^{LIQ}	-13.485 *(-0.67)*	-0.054 *(-0.02)*	0.083 *(0.15)*	-0.064 *(-0.12)*	**-43.348***** ***(-2.58)***	3.081 *(0.91)*	0.815 *(1.40)*	-0.874 *(-1.57)*	**-35.870***** ***(-2.93)***	3.575 *(1.54)*	0.483 *(1.19)*	-0.554 *(-1.41)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,562	5,562	5,562	5,562	8,325	8,325	8,325	8,325	13,887	13,887	13,887	13,887
Adj. R^2	65.7%	65.8%	65.6%	65.7%	20.2%	20.1%	20.1%	20.1%	45.8%	45.7%	45.7%	45.7%

Table 10: Heterogeneity of institutions and the spread of the liquidity shock

These tables present results from regressing stocks' cumulative returns on the different groups of pre-crisis institutional ownership, respective global liquidity betas, market beta, the interaction between the institutional ownership groups and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis institutional ownership for stock *i* that is classified into block and non-block institutions (Panel A), independent and grey institutional ownership (Panel B), foreign and domestic institutional ownership (Panel C), and $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the global market beta, other interaction terms, and firm specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

Panel A: Non-block institutional ownership versus block institutional ownership

Variable	Emerging				Developed				Global			
	β2	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***	***β2***	***β3***	***β4***	***β5***
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
*NonBIO*β^LIQ*	**-141.428****	**13.305*****	**4.820*****	**-4.769*****	**-114.881****	-0.375	0.863	-0.927	**-124.050*****	2.247	**2.276****	**-2.288*****
	(-2.31)	***(2.85)***	***(3.03)***	***(-3.07)***	***(-2.22)***	*(-0.12)*	*(0.66)*	*(-0.79)*	***(-3.48)***	*(0.85)*	***(2.37)***	***(-2.58)***
NonBIO	-0.108	-0.153	-0.081	-0.063	**-0.176*****	**-0.180*****	**-0.175*****	**-0.177*****	**-0.090****	**-0.100****	**-0.096****	**-0.096****
	(-0.80)	*(-1.17)*	*(-0.60)*	*(-0.46)*	***(-3.83)***	***(-3.92)***	***(-3.83)***	***(-3.85)***	***(-2.19)***	***(-2.43)***	***(-2.31)***	***(-2.33)***
*BIO*β^LIQ*	-77.521	-4.243	-1.214	0.777	-23.547	-0.191	0.585	-0.684	-29.812	-1.211	0.257	-0.333
	(-0.57)	*(-0.40)*	*(-0.34)*	*(0.22)*	*(-0.53)*	*(-0.04)*	*(0.53)*	*(-0.63)*	*(-0.72)*	*(-0.29)*	*(0.25)*	*(-0.34)*
BIO	**-0.681****	**-0.750****	**-0.667****	**-0.657****	**-0.191*****	**-0.201*****	**-0.201*****	**-0.200*****	**-0.231*****	**-0.246*****	**-0.237*****	**-0.236*****
	(-2.41)	***(-2.54)***	***(-2.33)***	***(-2.22)***	***(-2.77)***	***(-2.95)***	***(-2.94)***	***(-2.93)***	***(-3.48)***	***(-3.74)***	***(-3.60)***	***(-3.59)***
β^LIQ	-31.198	**11.724*****	0.546	-0.845	-24.648	4.976	0.489	-0.532	**-30.141****	**8.534*****	0.445	**-0.597***
	(-1.49)	***(3.43)***	*(0.99)*	*(-1.53)*	*(-1.30)*	*(1.33)*	*(0.92)*	*(-1.06)*	***(-2.37)***	***(3.59)***	*(1.20)*	***(-1.68)***
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.8%	34.1%	33.8%	33.9%	27.4%	27.3%	27.4%	27.4%	28.7%	28.6%	28.6%	28.6%

Panel B: Independent institutional ownership versus grey institutional ownership

Variable	Emerging				Developed				Global			
	β2 (1)	***β3*** (2)	***β4*** (3)	***β5*** (4)	***β2*** (5)	***β3*** (6)	***β4*** (7)	***β5*** (8)	***β2*** (9)	***β3*** (10)	***β4*** (11)	***β5*** (12)
*INDIO*β^LIQ*	**-145.375*** **	**9.410** **	**3.869*** **	**-3.818** **	**-87.637*** **	0.328	0.985	-1.066	**-100.020*** **	1.333	**1.809*** **	**-1.849*** **
	(-3.13)	***(2.01)***	***(2.64)***	***(-2.55)***	***(-2.84)***	*(0.13)*	*(1.14)*	*(-1.31)*	***(-4.09)***	*(0.58)*	***(2.73)***	***(-2.90)***
INDIO	0.031	-0.095	0.036	0.053	**-0.189*** **	**-0.196*** **	**-0.193*** **	**-0.194*** **	**-0.153*** **	**-0.169*** **	**-0.159*** **	**-0.160*** **
	(0.23)	*(-0.70)*	*(0.26)*	*(0.39)*	***(-4.37)***	***(-4.52)***	***(-4.48)***	***(-4.51)***	***(-3.72)***	***(-4.14)***	***(-3.89)***	***(-3.93)***
*GREIO*β^LIQ*	**-150.830** **	8.107	3.264	-4.200	16.494	-3.294	-0.473	0.324	-28.001	-0.421	-0.244	0.003
	(-2.48)	*(0.46)*	*(0.67)*	*(-0.92)*	*(0.16)*	*(-0.35)*	*(-0.21)*	*(0.15)*	*(-0.37)*	*(-0.06)*	*(-0.12)*	*(0.00)*
GREIO	**-1.281*** **	**-1.108*** **	**-1.171*** **	**-1.157*** **	-0.109	-0.121	-0.113	-0.112	-0.051	-0.055	-0.057	-0.055
	(-3.63)	***(-2.79)***	***(-3.20)***	***(-3.12)***	*(-1.04)*	*(-1.15)*	*(-1.07)*	*(-1.06)*	*(-0.53)*	*(-0.57)*	*(-0.59)*	*(-0.57)*
β^LIQ	-30.019	**11.298*** **	0.476	-0.774	-22.861	4.728	0.466	-0.511	**-28.538** **	**8.173*** **	0.370	-0.521
	(-1.44)	***(3.31)***	*(0.86)*	*(-1.41)*	*(-1.22)*	*(1.26)*	*(0.89)*	*(-1.03)*	***(-2.25)***	***(3.43)***	*(1.00)*	*(-1.47)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.9%	34.1%	33.9%	34.0%	27.4%	27.3%	27.5%	27.5%	28.7%	28.7%	28.6%	28.6%

Panel C: Foreign institutional ownership versus domestic institutional ownership

Variable	Emerging				Developed				Global			
	β2 (1)	***β3*** (2)	***β4*** (3)	***β5*** (4)	***β2*** (5)	***β3*** (6)	***β4*** (7)	***β5*** (8)	***β2*** (9)	***β3*** (10)	***β4*** (11)	***β5*** (12)
*FIO*β^LIQ*	**-77.776** **	**25.828*** **	**2.114** **	**-2.391** **	-57.012	-0.015	1.248	-1.313	**-56.057** **	**8.951**	**1.371** **	**-1.619** **
	(-2.27)	***(4.22)***	***(2.46)***	***(-2.44)***	*(-1.58)*	*(-0.00)*	*(1.23)*	*(-1.24)*	***(-2.46)***	***(1.86)***	***(1.97)***	***(-2.23)***
FIO	**-0.260**	**-0.371*** **	-0.234	-0.213	**-0.385*** **	**-0.393*** **	**-0.389*** **	**-0.392*** **	**-0.343*** **	**-0.363*** **	**-0.348*** **	**-0.349*** **
	(-1.77)	***(-2.64)***	*(-1.56)*	*(-1.43)*	***(-4.43)***	***(-4.57)***	***(-4.53)***	***(-4.56)***	***(-4.44)***	***(-4.75)***	***(-4.55)***	***(-4.56)***
*DIO*β^LIQ*	**-300.865*** **	-1.719	**8.750*** **	**-7.423*** **	**-71.215** **	-0.230	0.549	-0.703	**-104.285*** **	0.526	**1.322**	**-1.338** **
	(-4.55)	*(-0.34)*	***(4.48)***	***(-3.78)***	***(-2.15)***	*(-0.12)*	*(0.67)*	*(-0.96)*	***(-3.36)***	*(0.31)*	***(1.74)***	***(-1.98)***
DIO	-0.177	**-0.294**	-0.162	-0.147	**-0.170*** **	**-0.176*** **	**-0.173*** **	**-0.173*** **	**-0.119*** **	**-0.128*** **	**-0.124*** **	**-0.125*** **
	(-1.06)	***(-1.70)***	*(-0.99)*	*(-0.87)*	***(-4.80)***	***(-4.98)***	***(-4.89)***	***(-4.90)***	***(-3.59)***	***(-3.88)***	***(-3.76)***	***(-3.78)***
β^LIQ	-30.832	**12.056*** **	0.501	-0.797	-23.868	4.913	0.541	-0.581	**-27.764** **	**8.706*** **	0.385	-0.548
	(-1.49)	***(3.54)***	*(0.91)*	*(-1.45)*	*(-1.25)*	*(1.30)*	*(1.00)*	*(-1.14)*	***(-2.18)***	***(3.63)***	*(1.03)*	*(-1.53)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Observations	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.8%	34.1%	33.8%	33.9%	27.4%	27.3%	27.5%	27.5%	28.7%	28.7%	28.6%	28.6%

Table 11: Institutions and the spread of the liquidity shock: The effects of U.S. foreign, non-U.S. foreign, and domestic institutional ownership

This table presents results from regressing stocks' cumulative returns on their U.S. foreign, non-U.S. foreign, and domestic institutional ownership, respective global liquidity betas, market beta, the interaction between the institutional ownership groups and the betas, and firm-level control variables for the emerging, developed, and global samples. The regression also includes the interaction terms of the betas with the control variables. Country- and industry-fixed effects are included (unreported). The regression model is

$$R_i = \lambda_0 + \lambda_1 IO_i * \beta_i^{LIQ} + \lambda_2 IO_i + \lambda_3 \beta_i^{LIQ} + other\ controls + \varepsilon_i$$

where R_i is the cumulative return of stock *i* from January 2008 to March 2009, IO_i is the fraction of pre-crisis institutional ownership of stock *i* that is classified into U.S. foreign, non-U.S. foreign, and domestic institutional ownership, and $\beta^{LIQ}{}_i$ is the pre-crisis respective global liquidity betas of stock *i*. All control variables are the same as those defined in Table 4 (the global market beta, other interaction terms, and firm specific control variables are included in the *other controls* term for brevity). To save space, only the coefficients of the liquidity betas, institutional ownership, and the interaction terms between the liquidity betas and institutional ownership are reported. All models are estimated with robust standard errors to allow for heteroskedasticity in the firm-level error terms. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. For ease of presentation, the column header denotes which liquidity beta is being used as "β^{LIQ}".

Variable	Emerging				Developed				Global			
	β2 (1)	***β3*** (2)	***β4*** (3)	***β5*** (4)	***β2*** (5)	***β3*** (6)	***β4*** (7)	***β5*** (8)	***β2*** (9)	***β3*** (10)	***β4*** (11)	***β5*** (12)
*FIO_US*β^LIQ*	**-136.751*** **	6.998	**3.811*** **	**-3.466*** **	59.988	-4.097	-0.909	0.889	6.649	-0.301	0.076	-0.028
	(-3.30)	*(0.61)*	***(3.73)***	***(-3.51)***	*(1.51)*	*(-0.36)*	*(-0.75)*	*(0.68)*	*(0.23)*	*(-0.03)*	*(0.08)*	*(-0.03)*
FIO_US	0.541*	-0.015	0.530*	0.525*	**-1.035*** **	**-0.944*** **	**-1.016*** **	**-1.021*** **	**-0.820*** **	**-0.788*** **	**-0.810*** **	**-0.816*** **
	(1.73)	*(-0.05)*	*(1.68)*	*(1.68)*	***(-5.79)***	***(-5.67)***	***(-5.71)***	***(-5.76)***	***(-5.20)***	***(-5.60)***	***(-5.08)***	***(-5.12)***
*FIO_NUS*β^LIQ*	**-143.125** **	**33.069*** **	5.100	**-7.636** **	-76.409	4.508	0.454	-0.781	-103.992	**15.493** **	1.393	-2.494
	(-2.02)	***(3.54)***	*(1.59)*	***(-2.37)***	*(-0.85)*	*(0.54)*	*(0.24)*	*(-0.43)*	*(-1.58)*	***(2.32)***	*(0.84)*	*(-1.55)*
FIO_NUS	**-0.890*** **	**-0.719*** **	**-0.849*** **	**-0.841*** **	**-0.213** **	**-0.220** **	**-0.207** **	**-0.211** **	**-0.208** **	**-0.214** **	**-0.210** **	**-0.216** **
	(-4.23)	***(-3.37)***	***(-3.93)***	***(-3.86)***	***(-2.40)***	***(-2.49)***	***(-2.31)***	***(-2.35)***	***(-2.38)***	***(-2.50)***	***(-2.40)***	***(-2.46)***
*DIO*β^LIQ*	**-294.272*** **	-1.539	**8.636*** **	**-7.183*** **	**-71.603** **	-0.160	0.562	-0.718	**-105.396*** **	0.441	**1.347***	**-1.365** **
	(-4.42)	*(-0.30)*	***(4.41)***	***(-3.65)***	***(-2.17)***	*(-0.08)*	*(0.69)*	*(-0.99)*	***(-3.40)***	*(0.26)*	***(1.78)***	***(-2.03)***
DIO	-0.158	-0.279	-0.140	-0.127	**-0.181*** **	**-0.183*** **	**-0.183*** **	**-0.184*** **	**-0.127*** **	**-0.133*** **	**-0.133*** **	**-0.133*** **
	(-0.94)	*(-1.61)*	*(-0.85)*	*(-0.75)*	***(-5.08)***	***(-5.17)***	***(-5.18)***	***(-5.18)***	***(-3.83)***	***(-4.02)***	***(-4.00)***	***(-4.00)***
β^LIQ	-32.061	**11.993*** **	0.544	-0.860	-22.126	5.019	0.478	-0.531	**-28.058** **	**8.773*** **	0.381	-0.552
	(-1.54)	***(3.52)***	*(0.98)*	*(-1.56)*	*(-1.16)*	*(1.32)*	*(0.88)*	*(-1.04)*	***(-2.20)***	***(3.66)***	*(1.02)*	*(-1.54)*
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI	CI
Nobs	5,555	5,555	5,555	5,555	8,315	8,315	8,315	8,315	13,870	13,870	13,870	13,870
Adj. R^2	33.9%	34.1%	33.9%	34.0%	27.5%	27.5%	27.6%	27.6%	28.7%	28.8%	28.7%	28.7%