Financial Liberalization and Liquidity Commonality

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Abstract

The benefits and costs of international financial liberalization have been debated for decades. In this paper, I examine another dimension of this issue by investigating the impact of financial market liberalization on liquidity commonality among emerging economies. Using a sample of 20 emerging countries observed over 20 years, I find that opening up the local market to foreign investors increase commonality in liquidity and hence the liquidity risk .Further investigation shows that financial liberalization increase liquidity commonality through the channel of inventory risk.

Keywords: financial liberalization, liquidity commonality, information asymmetries, inventory risk

1. Introduction

The degree of liberalization of financial markets around the world has increased significantly in the last two decades. Equity market liberalization is a decision by a country's government to allow foreigners to purchase shares in that country's stock market. Equity market liberalizations, accompanied by more international capital flow into the young emerging countries are expected to benefit emerging economics. However, the risk of volatility and abrupt reversals in capital flows have been entailing emerging markets with a series of recent financial turmoil for the past 20 years, including the current global financial crisis originating from the credit crunch in US.

The empirical literature on market liberalization has investigated the correlation in price movements (synchronicity or contagion) and volatility (spillover) across markets. For example, a few studies find that stock market liberalizations lower the cost of capital (Bekaert and Harvey (2000); Henry (2003)) and increase the co-movements between emerging market and the world (Bekaert and Harvey (1997)). Karolyi, Lee and Dijk (2007) uncover similar cross-country and time-series patterns in commonality in stock returns, liquidity, and trading activity across 40 developed and emerging countries. Given the similar patterns in return and liquidity commonality, it is natural to ask whether stock market liberalizations also results in greater liquidity co-movements. In addition, Chari and Henry (2001) find that when counties open their stock markets to foreign investors, firms that become eligible for purchase by foreigners are repriced according to the difference in the covariance of their returns with the local and world market. Given that liquidity is a determinant of asset prices, is liquidity, as a systematic risk also repriced

when the markets become more integrated?

A few studies have been done to examine the impact of financial liberalization on liquidity. Levine and Zervos (1996) and De Nicolò and Ivaschenko (2008) find that stock markets become more liquid after controls on capital flows are liberalized. Bekaert, Harvey, and Lundblad (2005) model the effects of liquidity factors – both the country and the global (U.S.-based) factors, allowing for differences in the effects on expected return of segmented and integrated markets. The estimations show that the price of local liquidity risk is positive, but is significantly reduced with greater degrees of liberalization (but still positive). They also find that the price of global liquidity risk is positive but only marginally significant. This suggests that opening up the local market to foreign investors reduces the effect of liquidity on stock returns although not eliminate the local liquidity risk. However, their results fail to explain the world wide contemporaneously liquidity dry-up in recent financial crisis. It is therefore important to understand through what channels the liberalization process affects liquidity and liquidity risk. However, given the complication of their model, Bekaert, Harvey, and Lundblad (2005) claim that the various channels for risk compensation are extremely difficult to estimate with precision.

To the best of my knowledge, no other study has explicitly documented the impact of financial liberalization on liquidity risk and the channels through which the liberalization process affects liquidity risk. This paper fills this gap.

Most of the current research has confirmed the presence of commonality in liquidity (Chordia, Roll, and Subrahmanyam (2001), Brockman, Chung and Perignon (2006)) and the critical importance of liquidity risks (Eckbo and Norli (2002), Amihud and Mendelson (1986)). Pástor and Stambaugh (2003), Acharya and Pedersen (2005) and

Sadka (2006) provide evidence of a premium for systematic liquidity risk. However, although a major motivation for the commonality research has been concern about the shocks to commonality in emerging markets, to the best of my knowledge, the relationships between financial liberalization and stock market liquidity commonality, and the channel that liquidity shocks are transmitted, have not been the focus of previous literature.

It is important to understand the relationship between financial liberalization and commonality in liquidity for several reasons. First, liquidity commonality is a source of non-diversifiable priced liquidity risk. Understanding the impact of financial liberalization on commonality in liquidity helps us understand the impact of financial liberalization on liquidity risk. However, directly examining the relationship between financial liberalization and liquidity commonality allows us to investigate the channels through which the liberalization process affects liquidity and liquidity commonality.

Second, financial markets need to be integrated in order for any liquidity shock to be transmitted across markets. On the one hand, global investors may help arbitrage away liquidity pressure in some markets, thus reducing the liquidity co-variation in emerging markets. However, international investors are usually big institutional investors, who invest in portfolios rather than do stock-picking as most individual investors do. Their trading behavior usually affects more than single stock when they balance their portfolios. For example, when faced with an unexpected need to liquidate assets, big portfolio investors may choose to liquidate several assets from the portfolios, thus causing liquidity co-movement among these assets. Therefore, the international fund flows could intensify the liquidity pressure of emerging markets, causing greater commonality in liquidity. A

country that opens its financial markets to foreign portfolio investment might increase the liquidity commonality in the market and is exposed to greater liquidity risk.

Finally, understanding the impact of financial liberalization on liquidity commonality helps to identify an important issue for policy makers in making policy decisions that may allow countries to exploit the gains and minimize the risks associated with financial openness. More fundamentally, one might ask whether an optimal degree of financial integration exists, where an emerging market economy can reap the benefits of greater access to foreign capital without enduring the costs of financial crisis.

I begin the empirical analysis by examining the relationship of financial liberalization and local commonality in liquidity at the market level. I sort countries on the degree of financial liberalization, I find a strong, nearly monotonic relation between financial liberalization and liquidity commonality as well as liquidity level. Results suggest that countries open their financial market increase the liquidity level of the country at the cost of increasing liquidity commonality.

I further investigate the link between the relationship of financial liberalization and local commonality at the individual firm level by examining how the change in individual firms` responds to the market wide liquidity with the increase degree of financial liberalization. I denote the individual firm's responds to the market wide liquidity as liquidity beta, which captures the co-movement of individual firm with the market wide liquidity. The results show significant positive relationship between financial liberalization and national liquidity commonality. In addition, I construct global and regional systemic liquidity beta and document their evolution with increasing degree of financial liberalization. Consistent with findings in Bekaert, Harvey, and Lundblad (2005)

and Stahel (2005) , global liquidity risk as well as the regional liquidity risk are greater and increase with degree of financial openness, although the increase in coefficient is only marginally significant for the global liquidity factor.

I then examine why financial openness would increase liquidity and liquidity commonality at the same time. The market microstructure literature posits inventory risk and asymmetric information risk as the two major drivers of liquidity and liquidity risk. Chordia, Roll and Subrahmanyam (2000) reveal the existence of asymmetric information effects on liquidity, but provide no evidence that asymmetric information has common components. They also indentify that inventory risks are important driver of liquidity commonality. Hence, I hypothesize that the increase in liquidity level in emerging markets arise from reduce in information asymmetric, while the increase in liquidity commonality are caused by higher inventory risk associate with financial liberalization.

Pervious literatures have documented that financial liberalization increase price synchronicity. Morck, Yeung and Yu (2000) suggest that high price synchronicity could be caused by the insufficient informed trading from arbitrageurs. Since it is unlikely for foreign investors to have firm specific information, the participation of foreign investors would increase the proportion of noise trading in the market. Moreover, based on US market, Chan, Hameed and Kang (2008) find that stocks which co-move more with the market have higher liquidity. Combination of these relationships suggests an empirically testable hypothesis: financial liberalization increase liquidity level by reducing degree of information asymmetric in the market, which can be captured by price synchronicity beta or R^2 from the market model. I conduct time series regression of the beta and R^2 for each security on the Amihud liquidity measure. Evidence shows that stocks co-moving more

with the market also have higher liquidity in emerging market. This finding supports my hypothesis that financial linearization increases emerging countries` liquidity level by increasing the proportion of noise trading in the market and reducing information asymmetric in emerging countries.

Next I investigate whether inventory risk is the channel through which financial liberalization increases liquidity commonality. Inventory risk is one of the most important determinants of liquidity risk (Demsetz (1968), Stoll (1978) and Ho and Stoll (1981)). Since I have no access to inventory levels data, I am not able to fully test this relationship. I use the market volatility as a proxy for inventory risk. Bae, Chan and Ng (2002) identify a positive relation between return volatility and the investibility of emerging market portfolio. My estimation confirms their results by examining the relationship between market investibility and market return volatility. This finding along with the earlier results that liquidity commonality increase with market volatility support my hypothesis that financial liberalization increase liquidity commonality through increasing inventory risk.

The rest of the paper is organized as follows. Section 2 describes the data and construction of variables. Section 3 documents the empirical analysis in impact of financial integration on liquidity and liquidity commonality. Section 4 investigates how information asymmetry and inventory risk determine the impact of financial openness on liquidity and commonality in liquidity. Section 5 concludes.

2. Data and Construction of Variables

In this section, I describe the data sources, the screening procedures, and the variable definitions for liquidity, liquidity commonality and financial liberalization.

2.1 Liquidity and Commonality Measures

I collect the daily total return index, the daily trading volume, the daily adjusted price, number of shares outstanding, and the market capitalization for individual stocks from Datastream. To avoid problems related to differences in trading mechanisms and conventions, I restrict my analysis to common-ordinary stocks trading in the companies' home markets with prices quoted in local currency and exclude stocks with special features, such as depositary receipts (DRs), real estate investment trusts (REITs), and preferred stocks . The data for the U.S. market are obtained from the CRSP (with CRSP share code of 10 or 11).

Due to concern over data errors from DataStream, I ran the following return filters for daily returns in a procedure suggested by Ince and Porter (2006),

If $R_{i,d} \geq 1$ or $R_{i,d-1} \geq 1$ and $(1+R_{i,d})(1+R_{i,d-1}) \leq 0.5$, both $R_{i,d}$ and $R_{i,d-1}$ are set equal to a missing value. Where $R_{i,d}$ and $R_{i,d-1}$ are the stock returns of firm i on day d and d-1, respectively.

I also set daily returns to missing if $R_{i,d} \geq 2$ .Additionally, I drop a stock from the sample on a day when the return is missing and discard stock-day observations with a daily return in the top or the bottom 0.1% of the cross-sectional distribution within a country.

I select the countries that have at least 40 stocks in any year. The final sample includes 39075 stocks from 41 countries for the period January 1988 to December 2007. I use this data sample to construct the world index, which I will use to calculate the global and regional commonality in liquidity.

To measure firm-level liquidity, I construct Amihud's (2002) illiquidity measure. He suggests the daily ratio of absolute stock return to dollar volume as a proxy for the illiquidity of a stock. Lesmond (2005) shows that the Amihud measure has a high correlation with bid-ask spreads in 23 emerging markets. Many recent empirical studies rely on the Amihud liquidity measure to capture systematic liquidity risk and commonality in liquidity across stocks. Acharya and Pedersen (2005) employ the measure in their investigation of the role of liquidity risk in asset prices. Spiegel and Wang (2005) investigate the link between the idiosyncratic volatility and Amihud liquidity (as well as other liquidity measures) for individual stocks. Watanabe and Watanabe (2006) use Amihud liquidity to uncover time-variation in liquidity betas and the liquidity risk premium. Finally, Karolyi, Lee and Dijk(2007) use Amihud measure to investigate common patterns in commonality in returns, liquidity, and turnover round the world.

Following the approach by Karolyi, Lee and Dijk (2007), I add one to the Amihud price impact measure, take logs and multiply the result by −1 to arrive at a variable that is increasing in the liquidity of individual stocks:

$$LIQ_{i,d} = -\log\left(1 + \frac{\left|R_{i,d}\right|}{P_{i,d}VO_{i,d}}\right) \tag{1}$$

Where $R_{i,d}$ is the return in US dollar, $P_{i,d}$ is the price in US dollar, and $VO_{i,d}$ is the

trading volume of stock i on day d.

For comparison across countries, I transfer the price, return and market value variables into US$. Hence all the variables in later analysis are in US $. I discard stock-day observations with a *LIQ* in the top and bottom 0.1% of the cross-sectional distribution within a country to control for outliers. I construct the monthly *LIQ* by calculating the average of the daily *LIQ* in a given month.

For the commonality measure, I use two alternative approaches. The first measure follows Karolyi, Lee and Dijk (2007).Specifically, I obtain monthly measures of commonality in liquidity (R^2) for each stock by taking the (R^2) from the following regressions, based on daily observations within a month:

$$LIQ_{i,d} - LIQ_{i,d-1} = a_i + \sum_{j=-1}^{1} \beta_{i,j} (LIQ_{m,d+j} - LIQ_{m,d+j-1}) + \varepsilon_{i,d}, \qquad (2)$$

Where $LIQ_{m,d}$ denote the market liquidity in the country of stock i, obtained as the market-value weighted average of the corresponding variables for all stocks in the country (excluding stock i). I require that firms have a minimum of 15 daily observations within a month to compute the commonality measure. In line with Karolyi, Lee and Dijk (2007) use the logistic transformation of the R^2 measures, $\log(R^2/(1-R^2))$, in the time-series regressions. This measure reflects the proportion of variation in stock liquidity explained by market wide liquidity.

Another measure of liquidity commonality is the liquidity beta from regressing the daily percentage changes in liquidity variables for an individual stock on market wide liquidity.

$$LIQ_{i,d} - LIQ_{i,d-1} = a_i + \beta_i (LIQ_{m,d} - LIQ_{m,d-1}) + \varepsilon_{i,d} \quad (3)$$

This measure is originally developed by Chordia, Roll, and Subrahmanyam (2000). It captures the covariance between the asset's liquidity and the market liquidity. In computing the market liquidity measure $LIQ_{m,d}$, stock i is excluded.

Hameed, Kang and Viswanathan (2007) find that liquidity levels and commonality in liquidity respond asymmetrically to positive and negative market returns. Hence beta also taking account whether the stock commove in the same or opposite direction with the market.

Table 1 presents summary statistics of Amihud (2002) liquidity and commonality for the 43 countries. Countries are sorted on R^2. Results show that US is the most liquid market and present least commonality in liquidity, while China shows the highest commonality in liquidity. The world portfolio is dominated by the US market.

2.2 Measurement of Financial liberalization

To examine the impact of financial liberalization, I constrain my sample countries to those that underwent the financial liberalization under my sample period. Specifically, I focus on the countries that have the Monthly S&P Investable Indices in Emerging Markets Data Base (EMDB), which I use to construct the financial liberalization variable. The Monthly S&P Investable Indices starts from January 1988.

I define financial liberalization $MKLib_{i,t}$ as the ratio of the market capitalization underlying a country's Investable and Global indices as computed by the International Finance Corporation (IFC), which was proposed as a time-varying measure of market

integration by Bekaert (1995) and Edison and Warnock (2003). The Global Index represents the overall market portfolio for each country, whereas the Investable Index represents a portfolio of domestic equities that are available to foreign investors. The investability measure varies between 0 (closed market) and 1 (fully open market). Equity market liberalization takes place when a country first provides foreign investors access to the domestic equity market. $MKLib_{i,t}$ is a continuous measure of equity market openness designed to reflect the gradual nature of the increasing foreign 'investability' of these markets.

After matching with data from DataStream, I include countries with at least 40 stocks for any year in my sample period. This rule leaves me 20 sample countries and 11935 stocks : Argentina, Bangladesh, Brazil, China , Sri Lanka ,Chile, Greece, India, Indonesia Israel, Mexico, Portugal Malaysia ,Pakistan, Philippines, South Korea, South Africa ,Taiwan, Thailand and Turkey. Appendix Table A lists official liberalization dates of the countries included in the study documented by Bekaert Harvey and Lumsdaine (2002).

It should be noted that many of the countries was not included in Monthly S&P Investable Indices in the beginning of my sample year 1988, and different countries are included in the Monthly S&P Investable Indices from different year. However, all the countries in my sample year are included in the Global indices in the beginning of my sample year. Hence I set the $MKLib_{i,t}$ to be 0 during the sample years before a country is included in the Monthly S&P Investable Indices .

I partition the country month observations into three investibility groups for each country: noninvestible (*MKLib* = 0%), partially investible (0 < *MKLib* ≤ 0.5) and highly investible (*MKLib*> 0.5).

Table 2 provides the distribution of country-month observations in investibility groups with a breakdown by country, region, and year. The stock markets that are highly accessible to foreign investors are Argentina, Malaysia, South Africa, Mexico, Greece and Israel with 100% of the observations in the highly investible category. The stock markets that are least accessible to foreign investors are Bangladesh as the market is never investible to foreign investors. Stock markets in Latin America and Europe/Middle East/Africa (EMEA) are more open to foreign investors than the Asian markets. We can also see a clear time trend of financial market liberalization during the sample period, as evidenced by the gradual increase in the percentage of observations in the highly investible group over time. However, there is an increase in the number of observations in the non-investible group after 2001. One explanation is that the September 2001 terrorist attack causes some countries to close their financial market again. A detail check on the data shows that the Investable Indices of Pakistan and Sri Lanka declined sharply to zero in October 2001. Figure 1 shows the time series evolution of *MKLib* for China, Argentina, Pakistan and Sri Lanka.

3. Empirical Analysis

3.1 Market Level Analysis

In this section, I investigate how the financial liberalization affects the liquidity and comovement in liquidity at aggregate market level.

Table 3 tabulates the uni-variate relation between aggregate liquidity level/liquidity commonality and the degree of financial liberalization. Each month, I sort the sample of countries into quintiles based on the degree of financial liberalization. For each country, I calculate the average liquidity lever and liquidity commonality of all the stocks in a country. The results show that financial liberalization increases emerging markets` liquidity level, but at the cost of inducing higher commonality in liquidity within the market.

3.2 Financial liberalization and Liquidity beta at the individual security level

Hameed, Kang and Viswanathan (2007) find that liquidity levels and commonality in liquidity respond asymmetrically to positive and negative market returns. The average R^2 measure of commonality at the country level might not best capture the liquidity risk. Hence I also examine how the liquidity beta changes in different states for financial liberalization at the individual security level. I run the pool time series and cross section regression of the following model:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^C_{LIB} \Delta LIQ_{M,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size + Countrydum + yeardummy + inddummy + \varepsilon_{i,t} \quad (4)$$

Where $D_{highlib}$ is an indicator variables take the value of one when the financial liberalization measure of the firm's country at time t belongs to the highly investible ($0.5 < MkLib_t \leq 1.0$) groups, and zero otherwise. β^C_{LIB} captures the change in liquidity beta with higher degree of financial liberalization. I expect β^C_{LIB} to be positive.

Country, year and industry dummy are included to control for country, industry effect and time effect. I include firm size quintiles dummies as control variable because firm size can affect the liquidity of the stock but usually not directly affected by financial liberalization. Firm size is equal to the log of market capitalization at the beginning of the year. I rank the stocks into quintiles based on their market capitalization relative to stocks from the same market. This avoids loading too many stocks from the same country into a particular size category and makes size quintiles country-neutral.

The empirical literature on market integration provides evidence that risk premia are determined globally. Therefore, financial liberalization might also induce a global liquidity risk premia. If liquidity shocks are positively correlated across markets around the world or within the same region, unexpected changes in liquidity may not be diversifiable globally and global liquidity might constitute a risk factor for which investors demand a premium. In addition, foreign investors typically view, for instance, Brazil, Chile, and Argentina, as a bloc of investment opportunities in Latin America and will invest in such geographic region-oriented funds. Therefore, I also incorporate a global or regional liquidity beta into equation (4). In particular, I conduct estimation on the following two equations as well:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^G \Delta LIQ_{R,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} + \beta^G_{LIB} \Delta LIQ_{R,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + countrydum + yeardummy + inddummy + \varepsilon_{i,t} \quad (5)$$

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^R \Delta LIQ_{R,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} +$$

$$\beta^R_{LIB} \Delta LIQ_{R,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

(6)

The main findings for estimation of equation (4), (5) and (6) are presented in Table 4 model A, B,C respectively. Petersen (2008) suggests cluster standard errors by firm and time to determine the time series or cross-section correlation when dealing with panel data. Due to the large number of stocks in my sample, I am not able to conduct the two dimensions clustering by stocks and by year. Therefore I use a fix-firm effect controlling for country, year and industry dummies. However, Petersen also suggest that firm effects are less common in asset pricing application. Hence, I also run the regression with Fama-Macbeth procedure to only adjust the cross section correction. The estimation results (unreported by available upon request) have the similar signs and significant. To avoid the estimation results dominated by countries with large number of stocks in the sample, I weight the regression by invert of stock numbers in each country. I calculated the t-statistics, contained in parenthesis, using robust standard error.

Regression results indicate that the local liquidity beta associated with higher degree of financial liberalization β^C_{LIB} is positive and significant for all the three models. The global liquidity beta and the regional liquidity beta are positive as well. The global and regional liquidity betas associate with higher degree of financial liberalization are also positive, significant at 1% level for the regional beta β^R_{LIB} but only marginally significant for the global beta β^G_{LIB}.

I next estimate equation (5) on a country-by-country basis and estimate equation (6) by the three regions: Asia, EMEA and Latin America. However I replace the $D_{highlib}$ ($0.5 < MkLib_t \leq 1.0$) with time varying value of $MkLib_t$ to avoid that all the observations have a $D_{highlib}$ value of one for some countries. Table 5 shows the estimation results.

From table 5 Panel A country-by-country regression, we can see that the sign and significance of liquidity betas vary across countries. Argentina, Mexico and Philippines are less exposed to the local liquidity factor but more exposed to the world liquidity risks. Taiwan, Bangladesh, Brazil, China, Sri Lanka, Greece, Indonesia, Malaysia have significant local liquidity factor and insignificant world liquidity factor. India, Israel, South Korea, Portugal and Turkey are highly affected by both local and world liquidity commonality. Interestingly, Chile seems to be exempted from liquidity commonality. The impact of financial openness seems to increase the local liquidity beta for most of the countries, 15 out 20 countries have positive β_{LIB}^{C} and 11 are significant at 1% level. For the world liquidity beta with higher degree of liberalization, 12 out 20 have positive sign, but only 4 are significant.

In panel B, We can see that Asia on average has both positive and significant local and regional liquidity betas and they both increase with financial openness. EMEA seems to be more affected by the local market than the region-wide liquidity. Latin America has insignificant liquidity beta for both local and regional factors.

Taken all results together, although the impact of financial liberation differ for different emerging economics, on average, financial liberalization increase local liquidity beta significantly and marginally increase the world liquidity beta. Evidence shows that,

Asian countries dependents more on each other for liquidity provisions with higher degree of financial liberalization. These results strongly suggest that local market liquidity risk is still most important in emerging markets, and that the liberalization process has strengthened instead of eliminated its impact.

4. Asymmetric information, inventory risk and financial liberation

Although the evidence shows significant positive relationship between financial liberation and commonality in liquidity as well as liquidity level, the determinants of these relationships remain to be exploited.

Microstructure literature suggests inventory risk and asymmetric information as the determinants of liquidity risk. Froot, O'Connell and Seasholes (2001) suggest that foreign investors are feed-back traders – buying following positive returns and selling following negative returns. Intuitively, it is unlikely for foreigner investors to possess privileged information of a specific firm. Hence the participation of foreign investors would increase the proportion of trading that based on market-wide information, which suggests that financial liberalization would induce even higher price synchronicity in emerging market. Chan Hameed and Kang (2008) argue that adverse information risk is negatively related to the proportion of market-wide information and positively related to the proportion of firm-specific information. Using stock return synchronicity (*SYNCH)* and beta (β) as the measure for the amount of systematic information in stock returns, they conduct empirical test on the US market and evidence shows that stocks which co-move more with the market have higher liquidity. To see whether the same patter exists in the

emerging markets, I test the relation between liquidity and market-wide information following their approach.

$$LIQ_{i,t} = a + b \cdot SYN_{i,t} + c \cdot IdioVol_{i,t} + \sum_{k=1}^{5} \delta_k size_{k,i} + turnover_{i,t} + \varepsilon_{i,t} \quad (7)$$

$$LIQ_{i,t} = a + b \cdot beta_{i,t} + c \cdot IdioVol_{i,t} + \sum_{k=1}^{5} \delta_k size_{k,i} + turnover_{i,t} + \varepsilon_{i,t} \quad (8)$$

Where $SYN_{i,t} = \log\left(\frac{R_{i,t}^{\ 2}}{1 - R_{i,t}^{\ 2}}\right)$, $R_{i,t}^{\ 2}$ and beta are from regression of the market model for each security i . They measure the amount of market-wide information relative to firm-specific information.

The results are present in table 6 Panel A. The results indicate that in emerging country, a firm's liquidity will be improved with a higher proportion of market-wide information just as firms in US market, suggesting that higher price synchronicity are associated with lower price impact and lower asymmetric information.

Next I do a simple test on the relationship between financial liberalization and $SYN_{i,t}$. I test the following equation:

$$SYN_{i,t} = a + b \cdot MkLib_{i,t} + c \cdot Mkret_{i,t} + d \cdot Mkto_{i,t} + e \cdot Mk\sigma^{2}{}_{i,t} + \sum_{k=1}^{5} \delta_k size_k + countrydum + yeardummy + inddummy + \varepsilon_{i,t} \quad (9)$$

Where $Mkret_{i,t}$ is the market return at month t, $Mkto_{i,t}$ is the logistic transformation of market turnover at month t and $Mk\sigma^{2}{}_{i,t}$ is the market volatility at month t. Results are presented in table 6 Panel B. As expected, $SYN_{i,t}$ do increase with higher degree of financial openness.

It is noteworthy that the coefficients of the size dummies increase monotonically from small to large capitalization categories for both regressions. This indicates that liquidity level and price synchronicity are positively related to firm size and is consistent with the conjectures that large firms has higher liquidity , their prices reflect more market-wide information relative to firm-specific information and foreign investors are more interested in large firms.

It is easy to understand liquidity increase with financial openness. However, as evident in Karolyi, Lee and Dijk (2007) that commonality decreases when international capital flow increases, commonality is supposed to be reduced since financial openness would bring in international fund flows. So what determined the increase in liquidity commonality?

Since the increase in liquidity commonality is unlikely to arise from asymmetric information. I focus on how financial liberalization affects inventory risk. The risk of maintaining inventory depends on volatility, which could have a market component. If the market is very volatile, the probability that the value of the illiquid security falls increases. Thus liquidity providers are less willing to hold illiquid asset when they expect a high volatility. Whenever there is co-variation in inventory risk, there will be co-variation in liquidity provision, and thus co-variation in liquidity. Consequently, increase in stock volatility with financial liberalization, which causes co-movement in inventory risk and thus liquidity provision, could be a source of increased commonality in liquidity. Since I have no access to inventory levels data nor do I have sign trades frequency data, I am not able to fully test the link between inventory risk and financial

liberalization. I do, however, conduct a test with the available data. Because volatility should influence liquidity through its effect on inventory risk, I use the market volatility as a proxy for inventory risk.

Evidence in section 3 already shows that commonality has strong positive relationship with market volatility. Bae Chan and Ng (2002) identify a positive relation between return volatility and the investibility of emerging market portfolio. It is natural to conjecture that there might be positive relation between market return volatility and investibility of a country

Previous academic studies have investigated how stock market liberalization affects the volatility of emerging market returns. Bekaert and Harvey (1997) find that liberalizations do not drive up emerging market volatility. However, they used stock market capitalization to GDP as the measure of time varying financial integration, which not be a good measure. Moreover, their data sample is from 1976-1992. Many of the emerging countries start to open up their financial market from late 80s and early 90. Hence their conclusion can only apply to lower degree of financial openness. As emerging countries open up their financial market gradually, it is more interesting to know whether return volatility would increase sharply when emerging market gradually open up their financial market to certain degree.

I test the relationship between market return volatility and investibility of the market for my sample period with the following specification.

$$\log(\sigma^2{}_{j,t}) = a + \sum_{k=1}^{3} \beta_k * DMKLib_{j,k} + yeardummy + countrydummy + \varepsilon_{j,t} \qquad (10)$$

Where $\sigma^2{}_{j,t}$ is the monthly market return volatility for country j and $DMKLib_j$

are dummy variables for the non-investible ($MKLib_{j,k}$ =0), partially investible ($0< MKLib_{j,k} \leq 0.5$) and highly investible ($0.5 < MKLib_{j,k} \leq 1.0$) groups.

Bekaert and Harvey (2002) has dated the official liberalization dates based on chronology of important financial, economic, and political events in many developing countries. The official liberalization dates falls into 1988-1993 periods. Therefore, I estimated equation (10) for the two subsamples: year 1988-1993 and year 1994-2007. The results are present in table 7.

The estimation result shows the positive relationship between market investibility and return volatility for the whole sample period and for the subsample period 1994~2007 .However, for the sample period 1988~1993, we actually see a monotonic decrease in return volatility. This is consistent with previous literature that emerging market return volatility was not driving up subsequent to the official market liberalization. In the early period of financial liberalization, International fund flow might not be large enough to cause the emerging market more volatile. However, when emerging countries open up their financial markets gradually, international fund flow would increase to an amount that is large enough to have a destabilizing impact on stock prices. Karolyi (2002)shows that foreign investors tend to pursue positive-feedback trading (buying when prices have increased and selling when prices have declined) , therefore, foreign portfolio flows may flock to emerging markets when these markets are doing well and pull out in mass when the markets plump, resulting in higher volatility of the market price.

The finding of positive relationship between emerging market return volatility and financial liberalization, along with the evidence in literature that liquidity commonality

increase with market volatility support my hypothesis that financial liberalization increase liquidity commonality by increasing volatility which influences liquidity through its effect on inventory risk.

In addition, institutional funds with similar investing styles might exhibit correlated trading patterns, thereby inducing changes in inventory pressure across broad markets and induce international commonalities in liquidity through correlations in the supply of immediacy, which explain why global and regional liquidity commonality also increase after financial liberalization.

5. Conclusion

This paper examines the effect of financial market liberalizations on liquidity and commonality in liquidity in 20 emerging countries. Liquidity and liquidity risk are ought to be particularly important for investors in emerging markets. Countries open up their financial market aims at reaping the benefit of greater liquidity in the financial market associate with international fund flows. Along with benefits of greater liquidity, we also observe more financial crises and liquidity dry-ups. This motivates me to examine whether a country opening its financial markets to foreign portfolio investments entails stronger co-movements in liquidity, and hence, more incidence of systemic liquidity shocks.

Results show that financial liberalization is positively related to the level of liquidity as well as commonality in liquidity both in intra-market and in the global and regional context. Further investigations of two sources of liquidity risk in microstructure uncover the determinants of this seemingly self contradicted relationship. By examining the

relationship between price synchronicity and liquidity, I find that financial liberalization increase liquidity by reducing degree of information asymmetry in emerging market. Furthermore, through the analysis of the impact of market liberalization on emerging market volatility, I conclude that financial liberalization incurs higher liquidity commonality by entailing emerging market more volatile and thus increasing inventory risk.

Finally, Watanabe and Watanabe (2006) find that liquidity risk varies over time across identifiable states. Specifically, their results show that both liquidity betas and liquidity premium are higher in states when volume is abnormally high. Higher co-movements in liquidity associate with higher financial liberalization might suggest that liquidity risk shall be priced differently in segmented and integrated states for emerging markets. It would be an interesting direction to further investigate how liquidity risk premium in emerging market varies over time with time varying financial liberalization.

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Figure 1 Time series evolution of equity market liberalization

This figure depicts the time variation of financial liberalization measure for four countries during the sample period 1988:01-2007:12. The construction of financial liberalization is described section 2.

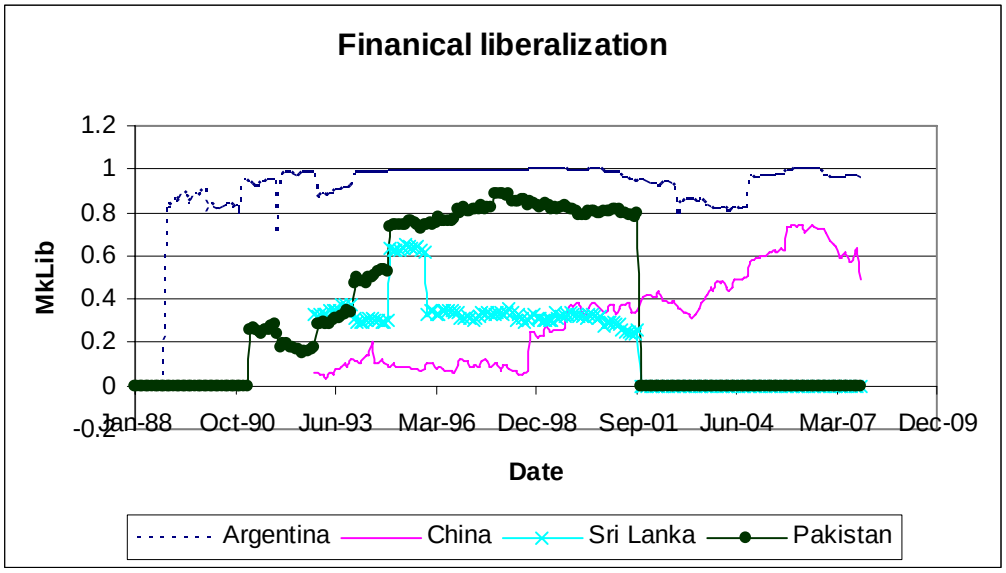

Table 1: Summary statistics for country lever liquidity and liquidity Commonality

This table reports the time-series average and the time-series standard deviation of the equally-weighted average of Amihud liquidity, and commonality in liquidity across the individual stocks for 41 countries. Amihud measure is multiplied by 10,000. By construction, Amihud liquidity is negative, with larger value indicating greater liquidity. Commonality for individual stocks is measured by the R^2 of monthly regressions of change in daily values of Amihud liquidity for individual stocks on the (lead, lag and contemporaneous) aggregate values of change in Amihud liquidity at the country level.

Countries	#stocks	R^2 (%)		Liquidity	
		means	St.dev	means	St.dev
United States	11956	18.52%	2.26%	0.00	0.00
Netherlands	246	18.93%	4.41%	-0.61	0.61
Finland	170	18.98%	5.07%	-17.06	58.46
Ireland	54	19.01%	4.48%	-1.14	0.85
Germany	1053	19.08%	2.70%	-0.85	0.77
Sweden	558	19.13%	2.46%	-0.92	0.68
Australia	1008	19.21%	3.28%	-3.57	2.93
Austria	136	19.32%	3.27%	-1.14	1.17
Canada	3586	19.40%	1.63%	-3.11	1.03
Hong Kong	794	19.42%	3.24%	-1.26	1.44
Norway	339	19.46%	2.83%	-1.55	1.05
France	1541	19.46%	3.46%	-1.39	1.92
Brazil	283	19.49%	9.52%	-7.11	7.35
Belgium	187	19.60%	3.85%	-0.50	0.38
Philippines	172	19.61%	3.12%	-13.91	8.49
Chile	171	19.62%	4.07%	-6.96	5.35
Mexico	102	19.73%	8.61%	-3.51	6.42
Singapore	313	19.90%	5.47%	-16.32	78.57
Indonesia	336	19.94%	9.92%	-32.50	45.48
Portugal	154	19.99%	6.79%	-13.51	19.95
South Africa	672	20.06%	3.68%	-5.73	3.58
New Zealand	156	20.13%	4.75%	-7.21	10.35
Denmark	262	20.30%	3.61%	-0.86	0.50
Argentina	96	20.34%	5.32%	-5.66	7.08
Thailand	512	20.50%	5.13%	-9.62	9.14
Switzerland	319	20.56%	5.41%	-0.13	0.09
Italy	395	20.75%	4.89%	-0.30	0.30
India	1249	20.91%	4.52%	-39.31	38.80
Sri Lank	231	21.11%	5.86%	-149.46	156.85
Pakistan	278	21.12%	6.03%	-29.59	43.30
Israel	402	21.21%	4.08%	-24.16	35.51

Japan	4197	22.10%	4.31%	-0.65	0.73
South Korea	1876	22.37%	7.67%	-2.17	2.84
Spain	180	22.56%	8.39%	-0.45	0.38
Greece	377	22.58%	7.06%	-3.78	3.71
Malaysia	862	22.89%	7.57%	-6.84	5.82
Taiwan	1272	23.18%	12.43%	-0.70	0.75
Bangladesh	236	23.53%	8.33%	-85.13	104.09
Turkey	297	23.96%	8.97%	-18.38	40.37
United Kingdom	638	25.39%	7.65%	-0.11	0.09
China	1343	37.04%	14.15%	-2.17	9.38
Total	39075	20.95%	6.97%	-13.93	49.17

Table 2: Frequency distribution of financial liberalization

Financial liberalization *MKLib* is the ratio of the capitalization of the International Finance Corporation (IFC) investable to the global stocks in each country from Standard & Poor's Emerging Markets Database. A ratio of one means that all of the stocks are available to foreign investors while zero means no stock is available to foreign investors. Panel A, B and C presents the distribution of month observations by different groups of *MKLib* factor by country, by region and by year respectively. Each country-month observation is assigned to one of the three investible groups: (1) non-investible group where *MKLib* equals zero; (2) partially investible group where *MKLib* between zero and 0.50; and (3) highly investible group where *MKLib* is above 0.50.

Panel A	Non-investible		Partially investible		Highly investible	
	$MKLib = 0$		$0 < MKLib \leq 0.5$		$0.5 < MKLib \leq 1.0$	
By Country	Counts	Percentage	Counts	Percentage	Counts	Percentage
Argentina	0	0%	0	0%	171	100%
Bangladesh	136	100%	0	0%	0	0%
Brazil	0	0%	2	1%	180	99%
China	0	0%	135	78%	37	22%
Chile	0	0%	78	35%	143	65%
Sri Lanka	73	41%	94	53%	12	7%
Greece	0	0%	0	0%	96	100%
Indonesia	0	0%	24	13%	156	87%
India	0	0%	94	61%	61	39%
Israel	0	0%	0	0%	130	100%
South Korea	48	20%	71	30%	120	50%
Mexico	0	0%	0	0%	167	100%
Malaysia	0	0%	0	0%	204	100%
Philippines	0	0%	90	54%	77	46%
Pakistan	75	38%	34	17%	86	44%
Portugal	11	8%	0	0%	124	92%
South Africa	0	0%	0	0%	180	100%
Taiwan	0	0%	92	48%	101	52%
Thailand	11	5%	120	50%	108	45%
Turkey	19	8%	1	0%	217	92%
Total	373	10%	835	23%	2370	66%
Panel B						
By Region						
Asia	343	17%	754	37%	962	47%
EMEA	30	4%	1	0%	747	96%
Latin America	0	0%	80	11%	663	89%

Panel C	Non-investible		Partially investible		Highly investible	
	$MKLib$ =0		0< $MKLib$ ≤0.5		0.5< $MKLib$ =1.0	
By Year	Counts	Percentage	Counts	By Region	Counts	Percentage
1988	46	96%	1	2%	1	2%
1989	19	35%	18	33%	17	31%
1990	12	20%	25	41%	24	39%
1991	14	15%	44	46%	38	40%
1992	0	0%	64	60%	42	40%
1993	0	0%	88	57%	67	43%
1994	0	0%	95	48%	102	52%
1995	1	0%	72	33%	144	66%
1996	10	4%	81	36%	134	60%
1997	12	5%	82	34%	144	61%
1998	12	5%	60	25%	167	70%
1999	10	4%	51	23%	165	73%
2000	11	5%	47	21%	168	74%
2001	14	6%	44	20%	167	74%
2002	36	17%	33	16%	143	67%
2003	36	17%	22	10%	157	73%
2004	36	17%	7	3%	172	80%
2005	35	17%	0	0%	177	83%
2006	36	17%	0	0%	180	83%
2007	33	17%	1	1%	163	83%

Table 3: Financial liberalization and liquidity commonality: Uni-variate Sorts

This table reports liquidity and liquidity commonality for each quintile of countries sorted by the degree of financial liberalization. ***, **, * indicates statistical significance at the 1%, 5%, and 10% levels, respectively.

	Low *MKLib*	Quintile 2	Quintile 3	Quintile 4	High *MKLib*	High-Low
Liquidity						
	-0.0057	-0.0023	-0.0016	-0.0012	-0.0009	0.0048***
	(-13.26)	(-10.71)	(-15.63)	(-12.71)	(-11.45)	(3.32)
Commonality						
	0.2072	0.2119	0.2129	0.2247	0.2560	0.0488***
	(61.05)	(53.5)	(60.81)	(67.45)	(45.55)	(2.69)

Table 4 Liquidity beta and financial liberalization

This table shows estimation results of pool time series and cross-sectional regression for the following three models:
Model A:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^C_{LIB} \Delta LIQ_{M,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + Countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

Model B:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^G \Delta LIQ_{G,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} + \beta^G_{LIB} \Delta LIQ_{G,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

Model C:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^R \Delta LIQ_{R,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} + \beta^R_{LIB} \Delta LIQ_{R,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

$\Delta LIQ_{i,t}$ is the change in monthly Amihud liquidity measure for each stock, $LIQ_{M,t}$ is the value weighted monthly Amihud liquidity measure across individual stocks in the same country, with stock i excluded. $LIQ_{G,t}$ is the value weighted Amihud liquidity measure across individual stocks in the whole sample of 43 countries, excluding the stock 's home country sample. $LIQ_{R,t}$ is the value weighted Amihud liquidity measure across individual stocks in the same geological region , excluding stock i `s home country sample. $D_{highlib}$ is an indicator variables take the value of one when the financial integration measure of the firm's country at time t belongs to the highly investible ($0.5 < MkLib_t \leq 1.0$) groups. $size_{k,i}$ takes the value of one if stock i at time t is from size quintile group k and zero otherwise. The regression has controlled for fixed firm effect and country, year and industry dummies as well. T-statistics, contained in parenthesis, are calculated based on robust standard error.

Model	A	B	C
β^C	1.78***	1.76***	1.77***
	(14.14)	(14.04)	(14.07)
β^G		20.66***	
		(4.61)	
β^R			4.21***
			(5.78)
β^C_{LIB}	1.12***	1.08***	1.09***
	(4.21)	(4.06)	(4.11)
β^G_{LIB}		9.28 *	
		(1.72)	
β^R_{LIB}			2.76***
			(2.7)

Table 5 Liquidity beta and financial liberalization by country and region

This table shows estimation results of pool time series and cross-sectional regression of model B in table 3 by country and model C in table 3 by region.

B:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^G \Delta LIQ_{G,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} + \beta^G_{LIB} \Delta LIQ_{G,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + yeardummy + inddummy + \varepsilon_{i,t}$$

C:

$$\Delta LIQ_{i,t} = a_i + \beta^C \Delta LIQ_{M,t} + \beta^R \Delta LIQ_{R,t} + \beta^C_{LIB} \Delta LIQ_{C,t} * D_{highlib} + \beta^R_{LIB} \Delta LIQ_{R,t} * D_{highlib} + \sum_{k=1}^{5} \delta_k size_{k,i} + countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

$\Delta LIQ_{i,t}$ is the change in monthly Amihud liquidity measure for each stock, $LIQ_{M,t}$ is the value weighted monthly Amihud liquidity measure across individual stocks in the same country, with stock i excluded. $LIQ_{G,t}$ is the value weighted Amihud liquidity measure across individual stocks in the whole sample of 43 countries ,excluding the stock 's home country sample. $LIQ_{R,t}$ is the value weighted Amihud liquidity measure across individual stocks in the same geological region , excluding stock i `s home country sample. $D_{highlib}$ is an indicator variables take the value of one when the financial integration measure of the firm's country at time t belongs to the highly investible ($0.5 < MkLib_t \leq 1.0$) groups. $size_{k,i}$ takes the value of one if stock i at time t is from size quintile group k and zero otherwise. The regression has controlled for fixed firm effect and year and industry dummies as well. T-statistics, contained in parenthesis, are calculated based on robust standard error.

Panel A: Liquidity beta and financial liberalization by country				
Country	β^C	β^G	β^C_{LIB}	β^G_{LIB}
Argentina	-1.04	128.72***	1.70	-127.43***
	(-0.97)	(3.55)	(1.45)	(-3.44)
Bangladesh	0.34***	10.09	0.00	0.00
	(4.07)	(0.58)		
Brazil	-3.67***	-68.46	5.23***	88.06
	(-2.69)	(-1.13)	(3.18)	(1.25)
China	1.18***	-0.02	0.49***	0.12
	(26.56)	(-0.23)	(3.95)	(0.47)
Chile	0.19	17.13	0.43	-14.75
	(0.44)	(1.62)	(0.84)	(-1.28)
Sri Lank	2.45***	-61.11	-4.03***	530.98
	(14.99)	(-0.60)	(-6.41)	(1.63)
Greece	-66.3***	-125.39	71.46***	128.04
	(-8.58)	(-1.42)	(8.83)	(1.43)

Table 5 Panel A, continued

Country	β^C	β^G	β^C_{LIB}	β^G_{LIB}
Indonesia	-20.22***	-46.41	26.49***	119.85
	(-9.50)	(-0.33)	(10.58)	(0.64)
India	-10.10***	320.71***	47.06***	-393.00**
	(-11.73)	(3.51)	(14.53)	(-1.88)
Israel	336.39***	-1911.16***	-332.61***	1966.65***
	(4.64)	(-2.50)	(-4.57)	(2.55)
South Korea	2.81***	-10.05***	6.86***	53.39***
	(5.09)	(-2.90)	(7.60)	(9.99)
Mexico	6.17	1714.82***	-5.55	-1852.05***
	(0.34)	(4.29)	(-0.29)	(-4.35)
Malaysia	-15.47***	-2.20	23.85***	1.06
	(-3.34)	(-0.06)	(4.82)	(0.02)
Philippines	-3.59	-494.12***	8.49	1054.27***
	(-1.12)	(-4.66)	(1.31)	(4.83)
Pakistan	1.91***	130.70***	-0.91	-108.56
	(4.34)	(2.69)	(-1.00)	(-1.50)
Portugal	0.81***	-155.10**	-1.96***	206.16**
	(2.76)	(-2.20)	(-4.10)	(2.38)
South Africa	-326.94***	990.78	331.04***	-986.26
	(-5.15)	(1.06)	(5.19)	(-1.05)
Taiwan	-2.00**	0.69	25.75***	2.99
	(-2.09)	(0.17)	(10.71)	(0.34)
Thailand	-1.37	75.75	22.26***	-245.62**
	(-0.84)	(1.56)	(6.49)	(-2.09)
Turkey	0.34***	520.83***	0.93***	-529.64***
	(4.54)	(5.32)	(8.54)	(-5.39)

Panel B: Liquidity beta and financial liberalization by region

Region	β^C	β^R	β^C_{LIB}	β^R_{LIB}
Asia	1.77***	4.57***	1.09***	9.58***
	(50.60)	(4.71)	(12.59)	(5.61)
EMEA	0.43***	7.70	2.12***	-1.03
	(4.45)	(0.20)	(17.95)	(-0.03)
Latin America	0.42	-0.07	0.25	0.47
	(0.68)	(-0.13)	(0.40)	(0.79)

Table 6 Liquidity, price synchronicity and financial liberalization

For each month, I estimate the following market model regression for each stock i:

$$R_{i,d} = \alpha + \beta \cdot R_{M,d} + \varepsilon_{i,d}$$

Where $R_{i,d}$ and $R_{M,d}$ is the daily return for stock i and its local market M, respectively. The above regression generates beta and R^2 for each stock i in each month t. I denote stock price synchronicity as $SYN_{i,t} = \log\left(\frac{{R_{i,t}}^2}{1-{R_{i,t}}^2}\right)$, which is used in the second stage monthly regression in Panel A:

$$LIQ_{i,t} = a + b \cdot SYN_{i,t} + c \cdot IdioVol_{i,t} + \sum_{k=1}^{5} \delta_k size_{k,i} + turnover_{i,t} + \varepsilon_{i,t}$$

$$LIQ_{i,t} = a + b \cdot beta_{i,t} + c \cdot IdioVol_{i,t} + \sum_{k=1}^{5} \delta_k size_{k,i} + turnover_{i,t} + \varepsilon_{i,t}$$

IdioVol is the volatility of the residual returns from the market model regression. Turnover is the log of monthly turnover for each stock. $size_{k,i}$ takes the value of one if stock i at time t is from quintile size group k and zero otherwise.

Panel B presents the pool time series and cross sectional regression for the following specification:

$$SYN_{i,t} = a + b \cdot MkLib_{i,t} + c \cdot Mkret_{i,t} + d \cdot Mkto_{i,t} + e \cdot Mk\sigma^2{}_{i,t} + \sum_{k=1}^{5} \delta_k size_k$$

$$+ countrydum + yeardummy + inddummy + \varepsilon_{i,t}$$

Where $Mkret_{i,t}$, $Mkto_{i,t}$ and $Mk\sigma^2{}_{i,t}$ is the market return, log of market turnover and market volatility at month t, respectively.

Panel A	Dependent variable = $LIQ_{i,t}$							
SYN	Beta	*IdioVol*	Turnover	Size 1 Small	Size 2	Size 3	Size 4	Size 5 Large
9.12E-05***		-1.04***	7.07E-08***	-0.015***	-0.004***	0.001***	0.002***	0.039***
(2.97)		(-290.48)	(4.30)	(-71.22)	(-19.44)	(6.88)	(10.10)	(100.91)
	0.004***	-1.06***	7.22E-08***	-0.014***	-0.003***	0.002***	0.002***	0.036***
	(55.45)	(-300.93)	(4.40)	(-67.02)	(-16.33)	(9.57)	(12.13)	(93.23)

Panel B	Dependent variable = $SYN_{i,t}$							
MkLiB	*Mkret*	$Mkto$	$Mk\sigma^2{}_{i,t}$	Size 1 Small	Size 2	Size 3	Size 4	Size 5 Large
0.06***	-2.12***	-2.22E-06***	623***	-5.63***	0.33***	0.56***	0.81***	1.27***
(4.45)	(-100.53)	(-2.94)	(189)	(-4.07)	(45.72)	(78.81)	(114.21)	(175.19)

Table 7 Pooled regression of monthly market return volatility on financial liberalization

In this table, I estimate the following time-series and cross-sectional regression model:

$$\log(\sigma^2{}_{j,t}) = a + \sum_{k=1}^{3} \beta_k * DMKLib_{j,k} + yeardummy + \varepsilon_{j,t}$$

The dependent variable $\log(\sigma^2{}_{j,t})$ is the log of monthly market return volatility for country j and $DMKLib_j$ are dummy variables for the non-investible ($MKLib_{j,k}$ =0), partially investible (0< $MKLib_{j,k}$ $\leq$0.5) and highly investible (0.5 < $MKLib_{j,k}$ $\leq$1.0) groups. The regression results are based on the full sample period (1988 to 2007) and two sub-periods:1988-1993 and 1994-2007.

	$MKLib$ =0	0< $MKLib$ $\leq$0.5	0.5 < $MKLib$ $\leq$1.0	F- test for $\beta_1 = \beta_2 = \beta_3$	Adjusted R^2
Sample Period: 1988~2007	0.54*** (10.33)	0.60*** (16.17)	0.68*** (27.85)	306 (p<0.0001)	20%
Sample Period: 1988~1993	1.00*** (8.21)	0.87*** (11.29)	0.64*** (7.70)	70 (p<0.0001)	14%
Sample Period: 1994~2007	0.41*** (7.14)	0.49*** (11.63)	0.67*** (26.57)	248 (p<0.0001)	22%

Appendix

Table A: Official liberalization date of emerging countries

Country	Official liberalization date
Argentina	11,1989
Bangladesh	6, 1991
Brazil	5, 1991
China	1, 1991
Chile	1, 1990
Sri Lanka	10,1990
Greece	12,1987
Indonesia	9,1989
India	11,1992
Israel	11,1993
South Korea	1,1992
Mexico	5,1989
Malaysia	12,1988
Philippines	6,1991
Pakistan	2,1991
Portugal	11,1986
South Africa	1,1996
Taiwan	1,1991
Thailand	9,1987
Turkey	8,1989