International Capital Flows and Liquidity

Dimitrios Vagias and Mathijs A. van Dijk*

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Abstract

This paper analyzes how international capital flows interact with market liquidity. We estimate vector autoregressive models for monthly equity portfolio flows and local stock market liquidity and returns for 46 countries in six regions over 1995-2008. We find a positive impact of local market liquidity on future capital inflows for developed countries in Europe and Asia/Pacific. U.S. market liquidity positively predicts capital flows to developed and emerging Europe and emerging Asia. Capital flows to various regions thus respond to home and host market liquidity. For developed America, Europe, and Asia/Pacific, and for emerging Asia, capital inflows are associated with an improvement in local market liquidity, which suggests that foreign investors tend to provide rather than consume liquidity on local markets. This effect is stronger for countries with greater transparency and less developed financial markets. Our analysis lends little support to the view that foreign investors destabilize local equity markets through an adverse impact on liquidity.

* Both authors are at the Rotterdam School of Management, Erasmus University. Emails: dvagias@rsm.nl and madijk@rsm.nl. We thank Dion Bongaerts, Hans Dewachter, Uli Hege, Robin Lumsdaine, Dick van Dijk, and seminar participants at Erasmus University for helpful comments and discussion. Mathijs van Dijk is grateful to the Netherlands Organisation for Scientific Research (NWO) for financial support through a "Vidi" grant.

How do foreign investors affect local capital markets? This question has been the subject of intense debate in both academic and policy circles. Research to date provides mixed evidence on the impact of capital flows on local financial markets. On the one hand, foreign investors are often alleged to exacerbate financial crises on local markets (e.g., Radelet and Sachs, 1998; Kim and Wei, 2002; Kaminsky, Lyons, and Schmukler, 2004). In line with this argument, a recent paper by the IMF (2010) argues that controls on capital inflows may reduce a country's financial fragility. On the other hand, several studies show that an increase in foreign portfolio flows is associated with a decrease in local systematic risk (Chari and Henry, 2004) and a reduction in the local cost of equity capital (Bekaert, Harvey, and Lumsdaine, 1999, 2002; Kim and Singal, 2000). Choe, Kho, and Stulz (1999) provide evidence that the actions of foreign investors did not contribute to destabilizing the Korean stock market during the Asian financial crisis.

In this paper, we assess the impact of foreign investors on local financial markets from a perspective that – to the best of our knowledge – has not been investigated to date: we study how cross-border capital flows interact with local market liquidity. Our purpose is to address the following questions. Do foreign investors provide or consume liquidity in local financial markets? Do cross-border capital flows exacerbate liquidity crises? Simultaneously, we examine whether capital flows respond to the liquidity in the host and/or the home market. We also investigate whether the interaction between capital flows and liquidity varies across different regions or countries, across different categories of stocks, and across crisis and "normal" periods.

There are at least three different channels through which foreign investors could affect local market liquidity. First, market microstructure research emphasizes the importance of asymmetric information as a determinant of liquidity. If foreign investors are on average better informed than local investors, extensive foreign presence can be associated with increased adverse selection costs for local traders, undermining market liquidity. On the other hand, if foreign investors are less well informed, they may act as liquidity (or "noise") traders that improve market liquidity. Empirical evidence on whether foreign investors have an informational advantage is mixed. On one side, Seasholes (2004) shows that foreign investors in Taiwan tend to buy (sell) before positive (negative) earnings surprises. Grinblatt and Keloharju (2000) find that foreign investors are better informed than domestic investors in Finland. Froot and Ramadorai (2008) use data on closed-end country fund flows for 25 countries to provide evidence that is also supportive of the hypothesis that foreign investors are better informed. On the opposite side, Brennan and Cao (1997) argue that U.S. investors, because they are at an informational disadvantage, extrapolate past performance when investing abroad. Kang and Stulz (1997), Choe, Kho, and Stulz (2005), and Dvorak (2005) find that local investors have an informational advantage in Japan, Korea, and Indonesia, respectively.

Second, even in the absence of systematic differences in how well foreign and local investors are informed, the trading behavior of foreign investors can diminish local market liquidity to the extent that it is associated with increased order imbalances and/or market volatility. If market makers and other providers of liquidity face capital constraints (as suggested by, e.g., Brunnermeier and Pedersen, 2009), excess buying or selling initiated by foreign investors can exert substantial pressure on inventory limits and therefore adversely affect liquidity. Blume, MacKinlay, and Terker (1989) show that S&P stocks declined more compared to non-S&P stocks on "Black Monday" because the market was not able to absorb the selling pressure on the former. More generally, Chordia, Roll, and Subrahmanyam (2002) show that market-wide order imbalances on the NYSE are associated with reduced liquidity, although the effect seems to be short-lived on this market. Furthermore, if foreign investors tend to be positive feedback traders and if their trades move prices (as suggested by, e.g., Froot, O'Connell, and Seasholes, 2001), their actions can influence volatility and (perceived) inventory risk for market makers and thus the costs of providing liquidity. Boyer, Kumagai, and Yuan (2006) report evidence that the presence of foreign investors in local stock markets contributes to the global spreading of stock market crises – with likely consequences for local market liquidity.

Third, sophisticated institutional investors may enhance liquidity when their trading strategies are designed to provide liquidity in foreign markets and reap liquidity premia. For example, it is widely believed that hedge funds provide liquidity to financial markets (see, e.g., Fung, Hsieh, and Tsatsaronis, 2000; Agarwal, Fung, Loon, and Naik, 2007; Stulz, 2007, Brophy, Paige, and Sialm, 2009). Hendershott, Jones, and Menkveld (2010) show that algorithmic trading, which is generally done by sophisticated investors, enhances liquidity on the NYSE. Cao, Chen, Liang, and Lo (2009) find that emerging markets hedge funds invest in relatively illiquid securities and display significant liquidity timing ability. However, Stulz (2007) argues that hedge funds may withdraw liquidity in the presence of a systemic shock. In line with this view, Ben-David, Franzoni, and Moussawi (2010) provide evidence that hedge funds withdrew from the U.S. equity market during the crisis in 2008. It is thus possible that foreign investors tend to provide liquidity during normal times but consume liquidity during crises.

Conversely, there are good reasons to believe that liquidity affects capital flows. It is well-documented that equity flows respond positively to (past) local market returns (e.g., Clark and Berko, 1996; Brennan and Cao, 1997; Choe et al., 1999; Froot, O'Connell, and Seasholes, 2001; Kim and Wei, 2002; Griffin, Nardari, and Stulz, 2004). It seems plausible that foreign investors are also attracted by favorable local liquidity conditions. Poor liquidity not only impedes efficient pricing, but also undermines investors' ability to materialize potential gains quickly and at low cost. Alternatively, foreign investors could be drawn to markets with relatively low market liquidity with the intention to exploit the higher expected returns of securities with a low level of liquidity and/or a high level of liquidity risk This effect is likely to be stronger during times when financial markets at home are flush with liquidity and investors have an incentive to seek return in other markets.

Our empirical approach is to construct monthly time-series of capital flows (equity portfolio flows from and to the U.S. obtained from Treasury International Capital), local stock market liquidity (Amihud, 2002, liquidity computed based on Datastream data for 42,905 different individual stocks), and local stock returns (total returns in local currency from Datastream) for 46 countries from January 1995 to December 2008. Our baseline model is an unrestricted vector autoregression (VAR) with three endogenous variables: flows, liquidity, and returns. We estimate the VAR at four different levels of aggregation: all countries, developed vs. emerging countries, six different regions, and country-by-country. We also estimate the VARs separately for small and large cap stocks, for liquidity crisis periods and "normal" periods, and with a variety of exogenous variables.

Consistent with previous studies, we find that foreign investors are positive feedback traders. Capital inflows strongly respond to past local market returns for both developed and emerging markets, for all six regions, and for many individual countries. We also confirm prior evidence that capital inflows are associated with higher future local market returns. Both of these effects are economically and statistically significant for many regions and countries.

Even after controlling for the interaction between flows and returns, market liquidity is an important determinant of cross-border portfolio flows. Local market liquidity positively predicts future capital inflows for developed countries, especially in Europe and Asia/Pacific. Moreover, capital flows to developed and emerging Europe and emerging Asia increase when U.S. market liquidity improves. The economic magnitude of these effects is substantial. Foreign investors thus condition their decision to invest in stocks in various regions not only on local liquidity, but also on the liquidity in the home market. In particular, they tend to invest in local markets that have seen their liquidity improve, in periods when there is ample liquidity in the home market. We interpret these findings as evidence that foreign investors seek return in other markets when their home market is flush with liquidity, but they are careful to avoid investing in these markets when they are illiquid.

We present evidence that is consistent with the view that foreign investors have an impact on local market liquidity. Liquidity shows a positive and significant response to an increase in capital inflows for the group of developed countries, for four of the six regions (developed America, developed Europe, and developed and emerging Asia/Pacific), and for a substantial number of individual countries. A one standard deviation (1SD) shock in flows is associated with an increase in local market liquidity of on average around 0.30SD over the next six months. Although we do not provide direct evidence that foreign investors provide instead of consume liquidity on local markets, these findings suggest that an increased presence of foreign investors helps rather than hurts local liquidity.

As several studies (e.g., Kang and Stulz, 1997; Van Nieuwerburgh and Veldkamp, 2009) argue that foreign investors face constraints in trading small stocks, we run a separate analysis that distinguishes between small and large cap stocks. Although capital flows respond more strongly to large cap returns than to small cap returns, there is little indication that they are more sensitive to large cap liquidity than to small cap liquidity. And the positive response of liquidity to capital inflows over the next six months (discussed above) is mainly driven by small cap stocks. This finding indicates that the liquidity of small caps is more sensitive to capital flows than the liquidity of large caps and/or that foreign investors (for example, hedge funds in the later part of our sample period) are more active in small caps than previous studies suggest.

An important policy issue concerns the extent to which foreign investors exacerbate financial crises on local markets. If foreign investors destabilize markets, policy makers should reassess the net benefits of opening up local markets to investors from other countries. We investigate this issue by analyzing the magnitude and direction of flows as well as the relation between flows and liquidity separately for liquidity crisis periods and normal periods. We find no convincing evidence that foreign investors destabilize local stock markets by undermining market liquidity. First, the data show little systematic tendency of foreign investors to actively withdraw from local markets during crises. Second, there is no significant short-term response of liquidity to flows during crises.

We try to identify the determinants of the variation in the impact of flows on liquidity across individual countries by running cross-sectional regressions on proxies for a country's economic and financial development, regulatory and information environment, openness, and market risk. We find that the response of liquidity to flows is significantly more positive in countries with greater transparency and in countries with less developed financial markets. The first effect suggests that in transparent countries it is less likely that foreign investors aggravate adverse selection problems on local financial markets. In other words, they are more likely to act as noise traders that provide liquidity. The second effect is consistent with the view that more developed financial markets are more resilient to the trading behavior of foreign investors. The economic magnitude of both of these effects is large.

1. Data description

In this section, we describe the data sources and the screening procedures we use to construct our sample. We also discuss the summary statistics of the main variables in our analysis.

1.1 Data sources and variable definitions

Since information on bilateral portfolio flows among countries is not publicly available at a high frequency, we restrict our analysis to U.S. transactions in foreign stocks. We obtain monthly data on cross-border equity portfolio flows (expressed in million US$) from the U.S. Treasury International Capital (TIC) reporting system for 46 countries for the period starting in January 1995 until December 2008. These data consist of financial transactions of at least $50 million (gross purchases and sales of foreign stocks) between U.S and foreign residents. U.S. residents include branches or subsidiaries of foreign entities that are located in the U.S. Branches of U.S. companies incorporated outside the U.S. are considered foreign residents. Consequently, transactions that are initiated by foreign-based firms on behalf of domestic investors are not recorded by the TIC database (Tesar and Werner, 1994, 1995). Additionally, direct cross-border investment activities are not included in the data. A limitation of the TIC data is that they only include transactions in which U.S. investors are involved. However, U.S. investors constitute by far the most important group of investors worldwide. Portes and Rey (2005) report that almost 60% of the aggregate equity transactions in their dataset of annual bilateral equity flow data between 14 major developed countries over 1989-1996 involve U.S. investors. Ferreira and Matos (2008) document that foreign institutions held on average 13.5% of the local equity market capitalization in 26 developed and emerging countries outside the U.S. at the end of 2005, and that U.S. institutions accounted for 7.4%, or over half of this fraction. Another potential drawback is that the TIC equity flow data are only available at a monthly frequency. It is possible that the impact of foreign investors on local market liquidity can only be observed at a higher frequency. At the same time, regulators that want to assess whether foreign investors help or hurt local market liquidity are probably interested in the long-term effects. From that perspective, any relation between capital flows and liquidity that does not show up in an analysis of monthly data may be considered immaterial.

We calculate net equity portfolio inflows by subtracting gross sales of foreign equity by U.S. investors from gross U.S. purchases of foreign equity for each country in our sample. Consistent with the approach adopted in Froot et al. (2001), Bekaert et al. (2002), and Griffin et al. (2004), we scale net portfolio flows by the aggregate local market capitalization (taken from Datastream):

$$FLOW_{k,t} = \frac{F_{k,t}^{buy} - F_{k,t}^{sell}}{MCAP_{k,t}}, \tag{1}$$

where $FLOW_{k,t}$ is the (scaled) net equity inflow from the U.S. to country k in month t, $F^{buy}_{k,t}$ denotes the gross purchases by U.S. investors of equity in country k in month t, $F^{sell}_{k,t}$ denotes the gross sales by U.S. investors of equity in country k in month t, and $MCAP_{k,t}$ is the aggregate market capitalization of all stocks in country k at the beginning of month t. For the U.S., we calculate the net equity inflow as aggregate gross purchases of U.S. equity by foreigners from U.S. investors minus gross sales of U.S. equity by foreigners from the remaining 45 countries, scaled by aggregate U.S. market capitalization.

We use Datastream to collect the daily adjusted price (*P;* closing price in local currency, which is adjusted for splits and dividends), the daily total return index (*RI*), trading volume at a monthly frequency (*VO*; expressed in 1,000 shares), the monthly market capitalization (*MV*; expressed in millions of local currency), the monthly market dividend yield index (*DY*), and the daily number of shares outstanding (*NOSH*; expressed in thousands of shares) for all individual stocks in the 46 countries. In line with Karolyi, Lee, and van Dijk (2009) we restrict our sample to stocks from major exchanges. These are the exchanges on which the majority of each country's stocks are listed. In the case of U.S., we only use data from the NYSE, since trading volume definitions are different for NASDAQ. Countries for which we collect data from more than one stock exchange are China (Shenzen and Shanghai), Japan (Osaka and Tokyo), and Germany (Frankfurt and Xetra). Datastream reports that the volume definitions applied by the different exchanges in these countries are the same. We exclude stocks with special features such as depository receipts (DRs), real estate investment trusts (REITs), closed-end funds, and preferred stocks (following Chordia, Roll, and Subrahmanyam, 2001; Pastor and Stambaugh, 2003). To avoid survivorship bias, we include dead and delisted stocks in our sample.

We collect monthly exchange rates of domestic currencies against the U.S. dollar (from WM/Reuters) from Datastream. Interest rate data are also from Datastream. Following Bekaert et al. (2002), we construct the world interest rate as the average of the short-term interest rates of the *G-7* countries weighted by each country's GDP in the previous year.

Using the classification by the International Finance Corporation (IFC), we categorize the 46 countries in our sample into different groups based on their economic development and their geographic location. 22 countries are classified as developed, whereas 24 are emerging. Our final sample includes 42,905 stocks from markets in developed Europe (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Norway, Spain, Sweden, Switzerland, and the U.K.), emerging Europe (Cyprus, Czech Republic, Greece, Hungary, Israel, Poland, Portugal, and Turkey), developed Asia/Pacific (Australia, Hong Kong, Japan, New Zealand, and Singapore), emerging Asia (China, India, Indonesia, Malaysia, Pakistan, Philippines, South Korea, Taiwan, and Thailand), developed America (Canada and the U.S.), and emerging America (Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela).

1.2 Liquidity measure and data screens

The literature has developed a number of different measures of liquidity. However, there is no consensus on which is the most appropriate, in part because different measures capture different aspects of liquidity. Since arguably the most refined of these measures (e.g., the quoted and effective bid-ask spread and the transaction-by-transaction market impact) are based on detailed microstructure data that are generally not available for markets outside the U.S., we adopt the Amihud (2002) price impact measure as a proxy for liquidity. The Amihud proxy is designed to capture the marginal impact of a unit of trading volume (in local currency) on the stock price. It is computed as the daily ratio of the absolute stock return over the local currency volume of the stock. This measure stays close to the intuitive description of liquid markets as those that accommodate trading with the least effect on price. Amihud (2002) shows that this measure is strongly positively related to microstructure estimates of illiquidity for the U.S. stock market. Hasbrouck (2006) and Goyenko, Holden, and Trzcinka (2009) show that the Amihud measure performs well relative to other proxies in capturing high-frequency measures of transaction costs based on U.S. data. Lesmond (2005) reports a high correlation between the Amihud measure and bid-ask spreads in 23 emerging markets. Many recent empirical studies use the Amihud proxy to measure stock market liquidity, both for the U.S. and for other countries. Examples include Acharya and Pedersen (2005), Spiegel and Wang (2005), Avramov, Chordia, and Goyal (2006), Kamara, Lou, and Sadka (2008), Watanabe and Watanabe (2008), and Karolyi et al. (2009).[1]

We follow other studies (e.g., Karolyi et al., 2009) and take the logarithm of one plus the Amihud liquidity proxy. We multiply the result by -1 to obtain a measure that is increasing with liquidity. The liquidity of stock *i* on day *d* is thus defined as follows:

$$LIQ_{i,d} \equiv -\log\left(1+\frac{\left|R_{i,d}\right|}{P_{i,d}VO_{i,d}}\right), \tag{2}$$

where $LIQ_{i,d}$ is the Amihud liquidity measure, $R_{i,d}$ is the return, $P_{i,d}$ is the adjusted closing price, and $VO_{i,d}$ is the trading volume of stock *i* on day *d*.

To mitigate the effect of reporting errors, we perform several screens. First, we discard non-trading days. We follow Karolyi et al. (2009) and identify these as days on which 90% or more of the stocks listed on a given exchange have a zero return. Second, we exclude stocks for which the number of zero-return days is more than 80% in a given month. Third, we follow Ince and Porter (2006) and set daily returns to missing if the following condition is satisfied:

$$(1+R_{i,d})(1+R_{i,d-1}) \leq 1.5\,, \tag{3}$$

where $R_{i,d}$ and $R_{i,d-1}$ are the stock returns of firm *i* on day *d* and *d-1*, respectively, with at least one being greater than or equal to 100%. Fourth, we set daily returns to missing if the value of

[1] We refer to Hasbrouck (2006), Korajczyk and Sadka (2008), and Goyenko, Holden, and Trzcinka (2009) for a detailed discussion of different liquidity measures.

the total return index for either the previous or the current day is below 0.01. Fifth, we discard stock-day observations with a daily return or liquidity in the top or bottom 0.1% of the cross-sectional distribution within a country and with daily trading volume ($VO_{i,d}$) greater than the corresponding number of shares outstanding ($NOSH_{i,d}$).

We construct monthly liquidity time-series for individual stocks by calculating the equally-weighted average of the daily stock liquidity. We create monthly return index and price series by taking the end-of-month values for the return index and the adjusted price from our daily data. For monthly returns, we again adopt the screen proposed by Ince and Porter (2006), and thus exclude stock-month observations that satisfy the following condition:

$$\left(1+R_{i,t}\right)\left(1+R_{i,t-1}\right) \leq 1.5\,, \tag{4}$$

where $R_{i,t}$ and $R_{i,t-1}$ are the stock returns of firm i in months t and $t-1$, respectively, and at least one is greater than or equal to 300%. We also set monthly returns to missing if the total return index for either the previous month or the current month is smaller than 0.01. We exclude stock-month observations with a monthly stock price or return in the top or bottom 2.5% or liquidity in the top or bottom 2.5% of the cross-sectional distribution within a country. Finally, we limit the effect of outliers in our monthly time-series by winsorizing the values that fall below the bottom 1% and above the top 99% of the distribution to the aforementioned percentiles, respectively.

We construct monthly time-series of market-wide liquidity ($LIQ_{k,t}$) and returns ($R_{k,t}$; in local currency) for each country by taking the value-weighted average across all stocks in that country for that month. We carry out robustness checks with equally-weighted liquidity and return series as well as with U.S. dollar instead of local currency returns.

1.3 Descriptive statistics

Table 1 provides summary statistics on our time series of net portfolio inflows, Amihud liquidity, market returns, EGARCH(1,1) volatility, and aggregate market capitalization for each of the 46 countries in our sample, grouped by region. Returns are expressed as a percentage per month. By construction, Amihud liquidity is negative, with greater values (i.e., negative values closer to zero) indicating greater liquidity. Flows are expressed as a percentage of local stock market capitalization at the beginning of the month. A positive number for the mean flow in Table 1 indicates that the country on average experienced capital inflows from the U.S. over our sample period. The table also reports the time period that our sample covers and the total number of distinct individual stocks for each country. For several countries, the sample period starts later than 1995. For Brazil, the sample period starts in February 1999 due to a change in trading volume definitions. For Belgium, Cyprus, Czech Republic, Ireland, and Luxembourg, the sample period is shorter because of insufficient observations for one of the time-series.

On average, emerging countries have higher and more volatile market returns than developed countries. We note that a direct comparison between the liquidity levels of different countries is not possible due to differences in trading volume definitions and currency units across countries. However, this measurement issue does not affect our empirical analysis, since we first standardize all the country time-series to have zero mean and unit standard deviation (as described below).

Many markets, especially in emerging economies, experience positive net capital inflows over the sample period. The most striking example is China, with mean flows of 1.65%. Colombia and the Czech Republic are the only emerging markets that saw U.S. investors recede over the sample period. During our sample period, we observe a total of $632.8bn. of net equity portfolio flows from the U.S. to the remaining 45 countries. Emerging markets received $136.2bn., whereas the remaining $496.6bn. went to developed markets. U.S. gross purchases of equity in emerging markets peaked in 2007, reaching a total of approximately $237.2bn. In 2008, the direction of aggregate net flows reversed with $52.7bn. ($7.3bn.) worth of net equity flows fleeing developed (emerging) markets to the U.S. Figure 1 shows the cumulative net portfolio inflows for each of the six regions (where the countries within each region are equally-weighted). Emerging Asia (plotted using the secondary y-axis on the right) is by far the leading region in terms of monthly net inflows, with developed America, emerging America, and developed Europe competing for second place. Aggregate net inflows into emerging America turn negative during the period 1998-1999 (currency crisis in Brazil), and remain at relatively low levels during 2001-2005 (economic crisis in Argentina). However, in 2006 and 2007 we observe a boom in net stock purchases by U.S. investors in the region. The same applies for developed Asia/Pacific. Aggregate flows into Europe, both developed and emerging, remain stable for most of the sample period. Unreported results show that capital flows exhibit significant persistence in 40 out of the 46 countries. Average first-order autocorrelations of net flows within each region range from 0.15 to 0.25.

Figure 2 displays the local currency equity market returns for each of the six regions (where the countries within each region are equally-weighted). After stellar returns from 2003 to early 2007, stock markets in all regions show a steep decline from the second half of 2007 and onwards. The effects of the 1997-1998 Asian crisis are clearly visible for emerging Asia, and to a lesser extent for the other regions. Two distinctive dates on which markets across almost all regions display significant drops are August/September 1998 (LTCM collapse) and September 2001 (terrorist attacks in the U.S.).

Figures 3 shows the aggregate market liquidity series for each of the six regions (where the countries within each region are equally-weighted). Since the level of Amihud liquidity is not comparable across countries, we standardize the series before we aggregate within each region. As with the return series, there are some clear common patterns in the liquidity series for the different regions. This is not surprising, as previous research (Brockman, Chung, and Perignon, 2009) documents the importance of global commonality in liquidity across different countries. Periods of widespread liquidity declines tend to accompany dramatic market events with global implications. In our sample, such periods include 1997 and 1998 (Asian and LTCM crises, respectively), 2001 until 2003 (terrorist attacks and burst of the "dot-com" bubble in the U.S.; Argentinean crisis), and the 2007-2008 global financial crisis. With respect to the latter crisis, it is noteworthy that its impact on equity market liquidity in America and emerging Asia appears to be relatively minor, in contrast to the dramatic effect that is evident in Europe and in developed Asia/Pacific.[2] Our liquidity time-series exhibit significant persistence in almost all the countries in our sample. Unreported results indicate that average first-order autocorrelations of market liquidity within each region range from 0.51 to 0.92.

To save space, we do not report correlation matrices for flows, liquidity, and returns. Correlations between flows are generally negligible across regions, whereas within regions they range from -0.31 to 0.30. With respect to market returns and liquidity, correlations are also generally higher within regions than across regions (consistent with Bae, Karolyi, and Stulz, 2003). Return correlations are especially high between countries in developed Europe.

Because many of our time-series display long-term trends, we formally test for stationarity by performing the augmented Dickey-Fuller test for each of the series, at the

[2] In the case of developed America, the substantial decline in market liquidity we observe in the U.S. is counterweighted by the much lesser drop observed in Canada. As a result, the aggregate effect is modest.

country-level. We allow both for an intercept and a time trend under the alternative hypothesis, and use the Hannan-Quinn information criterion to decide for the appropriate augmentation lags. In unreported analyses, we find that for a substantial number of countries we cannot reject the null hypothesis of a unit root at conventional significance levels for the time-series of market liquidity, dividend yield, volatility, and turnover, as well as for the world interest rate. To eliminate non-stationarity, we adjust these time-series by following the example of other papers (e.g., Baker and Stein, 2004; Griffin et al., 2007) and stochastically detrend them for all the countries. We carry out the detrending by subtracting the moving average over the previous six months from the current value.

2. Methodology

Our goal is to investigate the interaction between capital flows and market liquidity. Since previous studies identify an important relation of both variables with market returns, we control for any endogenous interaction with returns in all our analyses. Several papers document that past market performance is an important determinant of portfolio flows. Brennan and Cao (1997) attribute this trend chasing behavior to differences in the information endowments between domestic and foreign investors. Choe et al. (2005) show that foreign investors buy (sell) from domestic individuals before an abnormal drop (increase) in the price of a stock. In turn, flows may affect returns. Froot et al. (2001) and Griffin et al. (2004) provide evidence that flows into emerging markets predict local returns. Possible explanations for this finding include informed trading and transitory price pressure. Griffin et al. (2004) find no evidence for the view that informed trading can explain the predictability. Froot and Ramadorai (2008) use data on closed-end country fund flows to distinguish between both explanations and conclude that their evidence is most consistent with the information hypothesis.

The relation between market returns and liquidity is also the subject of a large body of research. Amihud and Mendelson (1986) show that illiquid stocks on average have higher returns. Pastor and Stambaugh (2003) and Acharya and Pedersen (2005) find that market liquidity is a priced risk factor. Bekaert et al. (2007) and Lee (2010) provide international evidence. Among others, Chordia, Huh, and Subrahmanyam (2006) document a relation between absolute returns and trading activity in the U.S. Griffin et al. (2007) establish a link between past returns and trading activity in 24 out of the 46 countries in their sample. In addition, market microstructure research suggests a direct link between trading activity and liquidity, so these patterns may result in an effect of market returns on liquidity. More directly, Chordia, Roll, and Subrahmanyam (2001) and Hameed, Kang, and Viswanathan (2008) report evidence that market liquidity declines during down markets.

Since we want to avoid imposing a priori restrictions on the dynamic interaction of flows, liquidity, and returns, we adopt a vector autoregression (VAR) methodology. The general form of an unrestricted VAR model of order p with m endogenous variables and n exogenous factors can expressed as follows:

$$Y_t = A + \sum_{l=1}^{p} \Phi_l Y_{t-l} + \Psi X_t + \varepsilon_t, \qquad t = 1,2,...,T \tag{5}$$

where $Y_t=(y_{1,t,}, y_{2,t}, \ldots, y_{m,t})'$ is an $m\times T$ matrix of jointly determined dependent variables assumed to be covariance stationary, $X_t=(x_{1,t}, x_{2,t}, \ldots, x_{n,t})'$ is an $n\times T$ vector of exogenous variables, A is an $m\times 1$ vector of intercepts, and Φ_l $(l=1,2,\ldots,p)$ and Ψ are the $m\times m$ and $m\times n$ coefficient matrices to be estimated. In our case, Y_t consists of three variables (defined for each country k): monthly net flows as a percentage of market capitalization ($FLOW_{k,t}$), monthly market returns ($R_{k,t}$), and stochastically detrended monthly Amihud liquidity ($LIQ_{k,t}$). Suppressing exogenous factors, our country-specific VAR model can be expressed as follows:

$$\begin{bmatrix} FLOW_{k,t} \\ LIQ_{k,t} \\ R_{k,t} \end{bmatrix} = \begin{bmatrix} \alpha_k^{FLOW} \\ \alpha_k^{LIQ} \\ \alpha_k^{R} \end{bmatrix} + \sum_{l=1}^{p} \begin{bmatrix} \phi_{11}^l & \phi_{12}^l & \phi_{13}^l \\ \phi_{21}^l & \phi_{22}^l & \phi_{23}^l \\ \phi_{31}^l & \phi_{32}^l & \phi_{33}^l \end{bmatrix} \begin{bmatrix} FLOW_{k,t-l} \\ LIQ_{k,t-l} \\ R_{k,t-l} \end{bmatrix} + \begin{bmatrix} \varepsilon_{k,t}^{FLOW} \\ \varepsilon_{k,t}^{LIQ} \\ \varepsilon_{k,t}^{R} \end{bmatrix},$$
$$\begin{bmatrix} \varepsilon_k^{FLOW} \\ \varepsilon_k^{LIQ} \\ \varepsilon_k^{R} \end{bmatrix} \sim N[0, \Sigma_k], \qquad \Sigma_k = \begin{bmatrix} \left(\sigma_k^{FLOW}\right)^2 & \sigma_k^{FLOW,LIQ} & \sigma_k^{FLOW,R} \\ \sigma_k^{LIQ,FLOW} & \left(\sigma_k^{LIQ}\right)^2 & \sigma_k^{LIQ,R} \\ \sigma_k^{R,FLOW} & \sigma_k^{R,LIQ} & \left(\sigma_k^{R}\right)^2 \end{bmatrix}. \tag{6}$$

The diagonal elements φ^l_{11}, φ^l_{22}, φ^l_{33} of the coefficient matrix Φ_l represent the conditional persistence in flows, liquidity, and returns for country i.

Besides our endogenous variables, we take several external factors into consideration. We include market volatility (using the EGARCH specification of Nelson, 1991, to account for asymmetries between positive and negative returns) because of its relation to stock returns (e.g., Whitelaw, 1994) and liquidity (e.g., Chordia et al., 2002; Chordia, Sarkar, and Subrahmanyam, 2005). Given the substantial correlations of capital flows within regions, we account for spillover effects by including regional flows (*FLOW_REG*; the equally-weighted average of monthly flows for the remaining countries within the region). Following Bekaert et al. (2002), we include the local market dividend yield (*DY*; the ratio of the total dividend payments to aggregate market capitalization) as a proxy for the domestic cost of capital, changes in which affect a country's attractiveness for foreign investment. We also account for changes in global macroeconomic conditions by including the world interest rate (*WIR*). For example, a drop in the world interest rate can spur cross-country portfolio flows as foreign investors from developed countries can borrow at low cost in their home currency and invest in riskier and potentially higher yielding assets abroad. We also include U.S. market returns (*R_US*) and market liquidity (*LIQ_US*) as exogenous factors in our VAR specifications. U.S. investors may well condition their cross-border investment decisions on domestic returns or liquidity conditions. Finally, we directly control for trading activity by including aggregate local market turnover (*TURN*; the number of shares traded divided by the total number of shares outstanding) as an exogenous factor.

Prior research identifies differences in the behavior of capital flows, market returns, and market liquidity that depend on geographic location and economic development (e.g., Froot et al., 2001; Bekaert et al., 2002, 2007; Griffin et al., 2007; Brockman et al., 2009). To infer how these attributes affect the interaction among our endogenous variables, we use a top-down approach by estimating the VARs at four different levels of aggregation: all countries simultaneously, developed and emerging countries separately, six regions defined based on geographic location and economic development (see section 1.1), and country-by-country.

We follow Froot et al. (2001) and Froot and Ramadorai (2001) and constrain the parameters in equation (6) to be equal for all countries within each group. Before estimation, we standardize all country-level variables to have zero mean and unit standard deviation. In that way, we allow for country fixed effects, while eliminating the disparity in liquidity and turnover across countries due to differences in trading volume definitions and/or currency units. In line with Griffin et al. (2004), we restrict the variance-covariance and coefficient matrices to be block diagonal. To decide upon the optimal lag length p, we use the Hannan-Quinn Information Criterion (HQC) for the country-specific VARs. Consistent with previous studies, we find an optimal lag length equal to one month for the majority of the countries.[3] Consequently, for the sake of parsimony we use a lag length of one month in all VARs. We use a pooled feasible

[3] Griffin et al. (2007) find an optimal lag length between 2 and 5 weeks in a model that describes the relation between turnover and market return for 46 countries. Froot et al. (2001) use 40 daily lags in a bivariate VAR of capital flows and returns for 44 countries.

generalized least squares (FGLS) procedure to estimate the variance-covariance and coefficient matrices. That is, we first estimate the coefficient matrices using maximum likelihood, then compute the residuals' variance-covariance matrix and repeat this procedure until convergence. The results are identical when we use GMM.

In line with Griffin et al. (2007), we use the generalized impulse response functions (GIRs) proposed by Koop, Pesaran, and Potter (1996) and Pesaran and Shin (1998) to measure the long-term response of our endogenous variables to innovations in these variables and to evaluate the economic significance. The typical approach in calculating impulse responses (IRs) involves orthogonalizing the endogenous shocks based on a Cholesky decomposition of the cross-equation covariance matrix Σ. However, this approach imposes an arbitrary structure on the contemporaneous correlations between the endogenous variables and it makes the IRs depend on the ordering of the variables in the VAR. GIRs do not suffer from these drawbacks. It is important to note that they do not only reflect the isolated impact of an innovation in a single variable, but rather the accumulated effect implied by the contemporaneous interaction between the endogenous variables. Pesharan and Shin (1998) define the GIR of y_t at horizon n as follows:

$$GIR^{y}\left(n, \delta_j, \Omega_{t-1}\right) = E\left(y_{t+n} \mid \varepsilon_{jt} = \delta_j, \Omega_{t-1}\right) - E\left(y_{t+n} \mid \Omega_{t-1}\right), \tag{7}$$

where Ω_{t-1} denotes the known economic history up to time $t-1$ and δ_j a shock to the j^{th} factor. To evaluate the statistical significance of the GIRs we compute upper and lower 95% confidence bounds using standard Monte Carlo simulations.

3. Empirical results

3.1 VARs for all countries and for developed vs. emerging countries

Table 2 reports the results of our baseline VAR estimated for all countries (Panel A) and for developed and emerging countries separately (Panel B and C, respectively). The table presents results based on both equally-weighted and value-weighted liquidity and return series and based on both local currency and U.S. dollar returns. As all series in the VARs are standardized to have zero mean and unit standard variation, the coefficients can be interpreted as the effect (after one month) of a one standard deviation (1SD) shock in the right hand side variable expressed as a fraction of one SD of the left hand side variable. As in Griffin et al. (2007), we assess the long-term impact of a 1SD shock to one of the endogenous variables in the baseline VAR on the other variables using the generalized impulse response functions (GIRs). We focus on the cumulative response after six months, as most GIRs level off after that horizon. To save space, we only present the GIRs for the regional and country-by-country VARs in the paper, but we discuss some of the other GIR results in the text. The full set of GIRs is available from the authors.

Consistent with the large body of research on positive feedback trading by foreign investors (e.g., Clark and Berko, 1996; Brennan and Cao, 1997; Choe et al., 1999; Froot et al., 2001; Kim and Wei, 2002; Griffin et al., 2004), we find that local returns in the current month positively and significantly predict next month's net equity inflows for both developed and emerging markets. The effect is somewhat weaker for emerging markets, and insignificant in the emerging markets specification with the equally-weighted series and local currency returns. This finding suggests that positive feedback trading by foreign investors in emerging markets is driven by large cap stocks. We find no evidence of an effect of flows on future local currency returns at the monthly horizon when we use value-weighted series. There is a significant effect (at the 10% level) for the equally-weighted series for developed markets, which suggests that price pressure or informed trading has a greater impact on small cap stocks in those markets. In developed markets, there is also a significantly positive relation (at the 1% level) between current flows and next month's U.S. dollar returns, an effect that can potentially be explained by the effect of a currency appreciation driven by portfolio inflows. The long-term effects of returns on flows and flows on returns are remarkably similar across developed and emerging markets. The (unreported) GIRs suggest that a 1SD shock to current returns (flows) is associated with a cumulative response in flows (returns) of close to 0.15SD (0.23SD) over the next six months. These effects are significant at any conventional confidence level.

The coefficients in the aggregate VARs indicate that liquidity positively predicts capital flows (with the exception of the equally-weighted specification for emerging markets). The coefficient is only statistically significant for developed countries (where it is a bit stronger when we use dollar returns and/or equally-weighted variables). A 1SD shock to current liquidity predicts a change in future flows of up to 4.6% of the SD of flows, an effect that is relatively small. However, the GIRs suggest that the long-term effects can be substantial. A 1SD shock to current liquidity is associated with a cumulative response of capital flows of up to 0.29SD over the next six months, which is statistically significant at the 1% level in all specifications for both developed and emerging countries. The coefficients on flows in the liquidity equations in Table 2 are not significant. But for developed markets, the GIRs show a significant cumulative impact of flows on liquidity after six months (close to 0.30SD as a response to a 1SD shock to flows). The long-term effect of flows on liquidity in emerging markets is also statistically significant, but small in economic terms (around 0.03SD).

Future liquidity is positively and significantly associated with current returns at the 1% level in all specifications and both at the one-month and the six-month horizon, consistent with Bekaert et al. (2007). The relation between future returns and current liquidity is less clear-cut. There is a negative relation in the equally-weighted local currency returns specification for emerging markets, but a positive relation in both the value-weighted and the equally-weighted dollar returns specification for developed markets.

In all three panels and in all four specifications in each panel, the endogenous variables show strong persistence. The VARs do a much better job in capturing the dynamics of liquidity (R^2 of 18% to 47%) than of flows and returns (R^2 of around 5%).

An advantage of the aggregate VARs in Table 2 is their potentially large statistical power. However, the drawback of aggregating over many different countries is that we ignore cross-country heterogeneity and that contrasting interactions among the endogenous variables in the VARs for different countries may cancel out. We therefore turn to VARs estimated at lower level of aggregations in the next subsections.

3.2 VARs for six different regions

Table 3 presents the results of VARs estimated for six different groups of countries based on their economic development and their geographic location: developed Europe (Panel A), emerging Europe (Panel B), developed Asia/Pacific (Panel C), emerging Asia (Panel D), developed America (Panel E), and emerging America (Panel F). The table presents only the results for the value-weighted liquidity and return series and only for local currency returns. Next to the baseline VAR specification results (presented in the first row of the flows, liquidity, and returns equations), Table 3 also includes the results of VARs that include the following exogenous variables: regional flows (*FLOW_REG*), local market volatility (*VOL*), the local market dividend yield (*DY*), the world interest rate (*WIR*), U.S. market returns and liquidity (*R_US* and *LIQ_US*), and local market turnover (*TURN*). We present the regional GIRs in Figure 4 (developed and emerging Europe), Figure 5 (developed and emerging Asia/Pacific), and Figure

6 (developed and emerging America). To conserve space, we only present GIRs of flows to a shock in returns and liquidity, and GIRs of returns and liquidity to a shock in flows.

For developed Europe (see Panel A), future flows are positively related to current liquidity and returns in the baseline VAR and in the majority of other specifications. Figure 4 suggests that the long-term effects are substantial. A 1SD shock in liquidity (returns) is associated with an increase in flows of around 0.25SD (0.18SD) during the next six months (both are statistically significant). The flows equation also shows a significant effect of regional flows, and of market liquidity in the U.S. The latter effect seems to dominate the effect of local market liquidity, with a 1SD increase in U.S. liquidity predicting a 0.16SD increase in flows to developed Europe in the next month (significant at the 1% level). This finding is consistent with the view that U.S. investors seek return in developed Europe in times of abundant liquidity in the U.S. market. Future liquidity is positively related to current local returns, local liquidity, U.S. returns, and local turnover, and negatively to local volatility and the local dividend yield. The VAR coefficients show no significant effect of last month's flows on current liquidity, but the GIRs in Figure 4 suggest that there is a significant long-term effect; the cumulative response to a 1SD shock in flows amounts to almost 0.20SD after 6 months. Local returns in developed Europe are also strongly persistent, and are significantly related to regional flows, the dividend yield, the world interest rate, U.S. returns, and turnover. Capital inflows do not have a direct effect on returns after 1 month, but a 1SD shock in flows leads to an increase of 0.10SD in cumulative market returns after half a year.

The most striking result in the flows equation for emerging Europe is the strong effect of U.S. market liquidity (see Panel B of Table 3). A positive shock to current U.S. liquidity equal to 1SD is associated with 0.16SD greater capital flows to emerging Europe in the next month. There is no evidence of a significant short-term or long-term response of flows to local market liquidity, as reflected in the GIRs in Figure 4. Conversely, we also find no effect of flows on liquidity for emerging Europe. However, regional flows are a strong predictor of future liquidity in the domestic market, as a 1SD shock to regional flows is associated with 0.18SD change in future liquidity. Consistent with, e.g., Froot et al. (2001), we find that flows respond positively to local returns (a 0.18SD effect after six months) and future returns are positively related to current flows (a 0.21SD effect after six months).

For developed countries in Asia/Pacific, only the coefficients on past flows and past returns are significant in the flows equation (see Panel C). The positive feedback trading effect is strong both at the monthly horizon and in the long-term. The GIRs in Figure 5 show a cumulative effect of flows of no less than 0.40SD in response to a 1SD shock in returns. Interestingly, the long-term effect of local liquidity on capital inflows is almost as large, and also statistically significant. The positive effects of flows on liquidity and returns can also only be observed at the longer horizons, but the GIRs indicate that these effects are economically large and statistically significant.

Panel D reports our findings for emerging Asia. Again, we find a strong interaction between flows and returns, especially at longer horizons. There is no impact of local market liquidity on flows at either the one-month or the longer horizons. However, in line with the results for developed and emerging Europe, an improvement in U.S. market liquidity is associated with greater subsequent capital flows to the region. A 1SD increase in U.S. liquidity is associated with a ceteris paribus increase of 0.05SD in next months' capital flows. The long-term response of local market liquidity to capital inflows is positive and significant, although the economic magnitude of the effect (around 0.10SD after six months) is smaller than for developed Europe and developed Asia/Pacific. Regional flows have an impact on local liquidity that is at least as big, with a 0.09SD liquidity response after one month.

The VAR estimation results for developed America are in Panel E.[4] Flows respond significantly to returns and returns to flows – although the latter effect is only significant for longer horizons. The coefficients on flows in the liquidity equations are not significant, but the long-term effect in Figure 7 is large. A 1SD shock to flows is associated with a 0.40SD increase in liquidity over the next six months. Flows do not significantly respond to local liquidity at any horizon.

For emerging America (Panel F), we once more find a strong and significant long-term response of flows to returns, and vice versa. There is no significant interaction between flows and liquidity. And with one exception, none of the exogenous factors show up significantly.

Overall, we find that future flows respond significantly to a shock in current returns and current flows significantly affect future returns in all six regions. Local liquidity positively

[4] For the VAR specification that includes U.S. returns and U.S. liquidity, we exclude the U.S and only keep Canada in the sample for this region.

affects future flows in developed countries in Europe and Asia/Pacific. In addition, we find evidence that the liquidity conditions in the U.S. market have an effect on flows to developed and emerging Europe and to emerging Asia. Flows to all of these regions increase when U.S. liquidity improves. Local liquidity in developed Europe, developed and emerging Asia/Pacific, and developed America shows a positive long-term response to an increase in capital inflows. This result suggests that foreign investors tend to provide rather than consume local market liquidity in these regions.

3.2.1 VARs for six different regions: Small cap vs. large cap stocks

Our analysis thus far considers the interaction of capital flows with market-wide liquidity for all the stocks in our sample, irrespective of firm size. However, previous studies suggest that foreign investors tend to refrain from trading small capitalization stocks due to, among other things, liquidity constraints, information costs, or client mandates. For example, Kang and Stulz (1997) and Van Nieuwerburgh and Veldkamp (2009) argue that foreign investors overweight large stocks to reduce the impact of information asymmetries associated with less visible stocks. Dvorak (2005) shows that foreign trading is more pronounced among the largest stocks in Indonesia. Ferreira and Matos (2008) document that foreign investors have a strong preference for large companies with a dispersed investor base. Evidence provided by Seasholes (2004) suggests that foreign investors in Taiwan outperform local investors in the trading of large caps. The interaction of capital flows with market liquidity may thus differ across large cap and small cap stocks. Table 4 presents the results of a VAR estimated with the average market liquidity and returns of large cap stocks and of a VAR with the liquidity and returns of small cap stocks. We classify stocks in the top 35% (bottom 35%) of the cross-sectional market capitalization distribution by country as large caps (small caps). Table 4 also contains the six-month cumulative GIRs of flows (liquidity) to a 1SD shock in liquidity (flows), expressed as a fraction of 1SD of flows (liquidity). For brevity, we do not report the other GIRs.

Consistent with the view that foreign investors primarily trade large caps, we find that flows are more strongly related to large cap returns than to small cap returns. The VAR coefficients suggest that flows respond significantly to large cap returns for developed Europe, Asia/pacific, and America, and emerging Asia. There are no such effects for small cap returns.

The coefficient on returns in the liquidity equation is significantly positive for all six regions in the large cap VAR, and for five of the six regions in the small cap VAR.

For large cap stocks, the coefficient on liquidity in the flows equation is positive and significant for developed Europe. The six-month GIR of flows to a shock in large cap liquidity is also significant for this region, consistent with the result in Figure 4 for large and small caps combined. For small cap stocks, there is no significant coefficient on liquidity in the flows equation, but again we find a significantly positive GIR for developed Europe. The long-term effect of liquidity on capital flows to developed Europe is actually stronger for small caps than for large caps (0.33SD vs. 0.20SD).

The coefficient on flows in the liquidity equation is positive for the majority of the regions, and significantly so for large caps in developed America and small caps in emerging Asia. However, the significant six-month GIRs are concentrated in the small cap VARs. The GIRs indicate a significantly positive long-term effect of flows on small cap liquidity for developed America, Europe, and Asia/Pacific, and emerging Asia. The economic magnitudes of these effects are substantial, at 0.22SD to 0.42SD of liquidity. The significance of the GIRs of liquidity to a shock in flows for these regions in Figures 4-6 for large and small caps combined is thus driven by small caps. Hence, the liquidity of small cap stocks seems to be more sensitive to the behavior of foreign investors than the liquidity of large caps.

Somewhat surprisingly, we thus find little indication that flows respond more strongly to large cap liquidity than to small cap liquidity. A potential explanation is that even though foreign investors primarily invest in large and liquid stocks, they are relatively more concerned about the liquidity of any small cap investments they make. It could also be that foreign investors are more active in small stocks than the studies discussed above suggest. For example, Cao et al. (2009) provide evidence that hedge funds – at least those investing in emerging markets – focus on relatively illiquid securities. Hedge funds have become more prominent in the later part of our sample period. An alternative reason might be that capital inflows and the liquidity of small cap stocks share a business cycle component (Naes, Skjeltorp, Ødegaard, 2010, show that the liquidity of U.S. small caps is procyclical) that is not captured by our baseline VAR model. At the same time, Table 3 suggests that the inclusion of business cycle variables such as the local dividend yield and the world interest to the baseline model do not considerably alter our findings.

3.2.2 VARs for six different regions: Liquidity crises vs. "normal periods"

In this subsection, we investigate whether the interaction between flows and liquidity is different during liquidity crisis periods than during "normal" periods. We are especially interested in whether domestic markets become more responsive to flows – and thus more vulnerable to foreign trading – when market liquidity evaporates. We define liquidity crises as the months in the bottom 30% of the liquidity distribution within each country. (We obtain qualitatively similar results when we define market crises based on the bottom 30% of the return distribution.)

Before we analyze the interaction between flows and liquidity during crises, we examine whether the magnitude and direction of flows differs across crisis and normal periods. Do foreign investors withdraw from local markets during crises? Stulz (2007) argues that hedge funds may withdraw liquidity under adverse market conditions. Ben-David et al. (2010) and Cao et al. (2009) show that hedge funds (especially global macro funds) adjust their equity holdings in favor of more liquid stocks during periods of low market liquidity. Anand, Irvine, Puckett, and Venkataraman (2010) report similar findings for institutional investors on the NYSE. We compute the average dollar flows and the fraction of months with net outflows for all six regions for crisis months versus all other months. The results are not tabulated, but they are available from the authors. As shown in Figure 1, all regions experience substantial capital inflows over our sample period. But the descriptive statistics of flows across crisis and normal periods suggest that inflows are considerably attenuated during crises for most regions. For example, emerging America sees average capital inflows of $56.7m. per month in normal periods and only $10.7m. during liquidity crises. Similarly, average monthly inflows during normal periods (liquidity crisis periods) are equal to $94.5m. ($73.2m.) for developed Europe, $15.6m. ($7.9m.) for emerging Europe, $408.6m. (-$12.5m.) for developed Asia/Pacific, $56.9m. ($44.2m.) for emerging Asia, and $3237.0m. ($2508.1m.) for developed America. The number of months with outflows is also greater during crisis periods as compared to normal periods for most regions, but the difference is relatively small. Averaged across regions, 44.7% of the crisis months show outflows, versus 39.8% of the normal months. (Differences between crisis and normal periods are somewhat more pronounced when we base our crisis definition on returns rather than liquidity.) There is thus some indication that foreign investors tend to reduce their investments in local stock markets during financial crises. But, with the possible exception of developed Asia/Pacific, we do not observe a significant amount of capital leaving local markets.

Even though we do not observe large capital outflows during crisis periods for any region (for developed Asia/Pacific, the number is negative but small relative to inflows in normal months), it is still possible that foreign investors destabilize markets if their trading behavior has a different impact on local markets during crises than during normal periods. Local market conditions are likely to be more fragile during crisis periods, which may imply that local liquidity is more responsive to changes in asymmetric information, order imbalances, and/or inventory risk as a result of the trading behavior of foreign investors. Hence, the response of liquidity to a given shock to capital flows could differ across crisis and normal periods. We investigate this possibility by estimating models of flows and liquidity in which the independent variables are interacted with dummy variables for liquidity crisis periods and normal periods. These interactions force us to abandon the VAR framework, as VARs cannot handle endogenous variables that are interacted with a dummy variable. Instead, we estimate separate panel models for the flows and liquidity equations. We also include the liquidity and returns on the U.S. market as independent variables, as they show up significantly in a number of the specifications in Table 3. As in the VARs, we constrain all coefficients to be the same for all countries within each region and assume independence across regions.

The results are in Table 5. The main conclusion is that there is no significant response of liquidity to flows during crisis periods. A drawback of the panel models is that we cannot construct impulse response functions. On the other hand, for foreign investors to destabilize local markets during crisis, we would expect a strong short-term effect of flows on liquidity during crisis periods. Table 5 suggests that the short-term effects are small and statistically insignificant. In sum, no convincing case can be made that foreign investors destabilize local equity markets through an adverse impact on liquidity.

Table 5 shows a number of other results. Both flows and liquidity tend to be highly persistent during both crisis and normal periods. For developed America, we find a positive short-term effect of local liquidity on inflows, but only during normal periods. Consistent with Table 3, U.S. liquidity tends to have a positive effect on flows to other regions. These effects are even stronger once we allow for differences across crisis and normal periods. Interestingly, the impact of U.S. liquidity on flows is somewhat more pronounced during local liquidity crises.

3.3 VARs for individual countries

We now turn to the results of our baseline VAR estimated at the individual country-level. An advantage of this approach is that we can fully explore the heterogeneity in the relation between flows, liquidity, and returns across countries. A drawback is that explaining time-series variation in flows, liquidity, and returns is challenging, so the loss of power may be an important concern. To save space, we do not present the estimation results of the VARs, but we present the 3, 6, and 12-month cumulative GIRs of flows to liquidity (and vice versa) in Figures 7 and 8. (Black bars indicate GIRs that are statistically significant at the 5% level.) The other GIRs are available on request. Unreported results show a GIR of flows to returns that is positive for 39 out of 46 countries, and significant for 13 of these countries (for at least one of the horizons). The GIR of returns to flows is positive for 39 countries, and significantly so for 16 countries.

Figure 7 shows the cumulative GIRs of flows after 3, 6, and 12 months to a 1SD shock in liquidity. We find a positive response for 30 countries, of which 11 show an effect that is significant at the 5% level (for at least one of the horizons). None of the GIRs is significantly negative. For most of these countries, the effect is also economically significant. The effect is especially large for Canada, Denmark, Japan, Malaysia, the Netherlands, Sweden, and the U.K, each of which show a response of inflows to local liquidity that is greater than 0.50SD. We carry out Granger causality tests (not tabulated) and find that local market liquidity Granger causes capital inflows (at the 10% level) in nine countries. Interestingly, flows to the US respond negatively to local market liquidity, an effect that could reflect the role of the U.S. as a safe haven during global financial crises. The effect is quite large, but not statistically significant.

Figure 8 shows the cumulative GIRs of liquidity to a 1SD shock in flows. The response is positive for 30 countries, and significantly so for 12 countries. There is some heterogeneity across countries, but none of the GIRs is significantly negative. Most markets experience a substantial improvement in liquidity following capital inflows. We observe responses greater than 0.20SD for many countries and greater than 0.50SD in several cases. Unreported Granger causality tests show that capital inflows Granger cause local market liquidity in eight countries.

Lack of power may prevent us from making statistically reliable statements for some of the individual countries. But, overall, the results confirm our findings at higher levels of aggregations that more liquid equity markets tend to be associated with greater capital inflows and that capital inflows tend to help rather than hurt local market liquidity.

3.4 Why does the impact of flows on liquidity differ across countries?

Our results thus far suggest that capital flows tend to positively affect local market liquidity in most regions and countries. In this subsection, we try to identify the cross-country determinants of the impact of flows on liquidity by regressing the six-month cumulative GIR of liquidity to a 1SD shock in flows on several country characteristics. This analysis is not only interesting from a policy perspective, but can also shed light on the relative importance of the different channels through which foreign investors can affect local market liquidity (discussed in the introduction).

We use proxies that account for a country's economic and financial development, regulatory environment, information environment, openness, and market risk. We measure financial/economic development using the logarithm of stock market capitalization to GDP (*MKTCAP_GDP*), GDP per capita (*GDP_CAPITA*), and a dummy variable for emerging markets (*EMERGING*). The ratio of domestic credit provided by commercial banks over GDP (*BANK_CREDIT_GDP*) is a proxy for the development of the banking sector, which illustrates the importance of financial intermediation as a driver of domestic growth (Levine, and Zervos, 1998). *TURNOVER* proxies for the intensity of trading on each market. We expect the impact of flows on liquidity to be smaller in countries with more developed economies and a more sophisticated financial sector, as the capacity of domestic intermediaries and investors to absorb foreign order imbalances (the second channel through which foreign investors can affect liquidity, as discussed in the introduction) is larger in these countries.

We use anti-director rights (*AD_RIGHTS*), rule of law (*RULE_OF_LAW*), corruption in government (*CORRUPTION*), and a dummy variable that indicates whether shorting is common practice (*SHORT_SALES*) as proxies for a country's regulatory environment. We expect that a stronger regulatory environment increases a country's resilience to capital inflows. Also, Morck, Yeung, and Yu (2000) argue that better investor protection is associated with more informed stock prices, so foreign investors are arguably less likely to have superior information in countries with better investor protection (the first channel through which foreign investors can affect liquidity, as discussed in the introduction).

Accounting standards (*ACCOUNT_STAND*), the average number of analysts following large firms (*ANALYST*), and the extent of media penetration in a country (*MEDIA_DEVELOP*) are our measures of a country's information environment. These variables are most closely related to the first channel through which foreign investors can affect local liquidity, which is through their impact on information asymmetries in the local market. We expect that the greater the transparency of the information environment, the less likely it is that foreign investors possess superior information and therefore the less adverse their impact on liquidity.

In addition, it seems reasonable to assume that foreign investors have better access to information in more open economies. To control for market openness, we use indices for international capital controls (*CAP_CONTROLS*), as well as for the freedom to trade internationally (*TRADE_FREEDOM*). We also include a measure of the presence of foreign banks in the local market (*FOREIGN_BANKS*). Following Kaniel, Li, and Starks (2009), we use the average monthly volatility (*VOL*) of market returns within each country as a measure of risk in equity markets. We expect the impact of the trading behavior of foreign investors to be greater in more volatile equity markets.

Table 6 reports the result of the regressions of the GIR of liquidity to a shock in flows on various combinations of these country characteristics. We limit the number of explanatory variables in each regression, because many of the characteristics are related to each other and because the number of degrees of freedom is limited.

The most prominent result in Table 6 is the effect of accounting standards (*ACCOUNT_STAND*). The coefficient on this variable is positive and significant at the 1% level in all specifications. This result suggests that the impact of foreign investors on local market liquidity is more positive in countries with greater transparency, consistent with the argument that foreign investors are more likely to act as liquidity or noise traders that improve market liquidity in these countries – as opposed to informed traders that worsen adverse selection problems (first channel). The economic magnitude of the effect of accounting standards is large. A 1SD improvement in accounting standards is associated with an increase of approximately 0.65SD in the response of liquidity to flows.

In four of the nine specifications, we find evidence that the impact of flows on liquidity is smaller in countries with more developed financial markets (as proxied by *MKTCAP_GDP*). Again, the economic effect is substantial. A 1SD increase in *MKTCAP_GDP* is associated with a reduction of the impact of flows on liquidity of around 0.40SD. This finding is in line with our hypothesis that the trading behavior of foreign investors (second channel) has a smaller impact in more developed markets. We find no significant effects for the variables related to a country's regulatory environment, openness, and market risk

4. Conclusions

This paper investigates the interaction of international capital flows with local and U.S. market liquidity for 46 countries from January 1995 to December 2008. We estimate unrestricted vector autoregressions (VARs) – with flows, liquidity, and returns as endogenous variables – at four different levels of aggregation: all countries, developed vs. emerging countries, six different regions, and country-by country.

We present evidence of significant interactions between capital flows and liquidity, although there are important differences across regions and countries. For two of the three developed regions (Europe and Asia/Pacific), capital inflows respond positively to local market liquidity. For three regions (developed and emerging Europe and emerging Asia), there is a positive response of inflows to U.S. market liquidity. Foreign investors thus seem to have a preference for favorable liquidity conditions on the host market, but they are inclined to seek return in other markets when the home market is flush with liquidity.

For four out of the six regions (developed America, Europe, and Asia/Pacific, and emerging Asia), capital inflows positively predict local market liquidity. Establishing causality in the interaction between flows and liquidity is hard, but it seems implausible that foreign investors systematically time their purchases of local securities before an improvement in local market liquidity. Hence, our interpretation of these results is that foreign investors tend to provide rather than consume liquidity on local markets.

The interaction between flows and liquidity is stronger for small cap stocks than for large cap stocks. When we examine liquidity crises separately, we find little support for the view that foreign investors destabilize local financial markets through an adverse impact on liquidity. We do not observe systematic and large capital outflows during liquidity crises, and there is also no significant short-term impact of capital flows on local market liquidity during these periods.

The response of local liquidity to capital inflows is more positive in countries with greater transparency and less developed financial markets. In more transparent countries, foreign investors are more likely to act as noise traders than as traders with superior information. In less developed financial markets, the impact of the trading behavior of foreign investors is greater.

Our results should help investors to develop trading strategies that take into account the interaction of capital flows with market liquidity and regulators to assess and affect the impact of foreign investors on local markets.

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Table 1: Summary statistics

This table reports summary statistics of our monthly time-series of equity portfolio flows, local stock market liquidity, and local stock returns for each of the 46 countries in our sample over the period 1995-2008. The countries are organized in six groups based on their economic development and geographic location: developed Europe, emerging Europe, developed Asia/Pacific, emerging Asia, developed America, and emerging America. The first three columns present the country name, the time period, and the total number of distinct individual stocks in the sample. The next three columns contain the time-series average, median, and standard deviation of aggregate net equity portfolio flows scaled by local market capitalization at the beginning of each month (expressed as %). The following three columns contain the time-series average, median, and standard deviation of monthly market liquidity. We construct monthly liquidity time-series for individual stocks as the average of the daily Amihud (2002) measures; aggregate market liquidity is the value-weighted average of monthly liquidity across individual stocks, with weights are based on the market value at the beginning of each month. The next three columns contain the time-series average, median, and standard deviation of market returns (expressed as % per month). We construct market returns as the value-weighted average of monthly total returns (in local currency) across individual stocks, again with weights based on the market value at the beginning of the month. The last two columns report the time-series average of market volatility (based on an EGARCH(1,1) specification fit to monthly market returns and expressed as % per month), and the aggregate market capitalization of each country (in millions of U.S. dollars).

Country	**Dates**	**# Stocks**		**Flows**			**Liquidity (x10^7)**			**Returns**		**Volatility**	**Mcap ($m.)**
			mean	median	st.dev.	mean	median	st.dev.	mean	median	st.dev.	mean	mean
						PANEL A: DEVELOPED EUROPE							
Austria	1995:2008	208	-0.022	0.003	0.125	-41.023	-26.379	41.495	0.620	1.106	5.613	5.383	67,191
Belgium	2001:2008	307	-0.017	-0.019	0.228	-484.372	-210.290	482.866	0.102	1.380	4.815	4.755	226,107
Denmark	1995:2008	360	0.009	0.012	0.100	-2.157	-1.839	1.954	0.891	1.568	4.566	4.472	108,887
Finland	1995:2008	232	0.021	0.016	0.125	-34.893	-32.368	20.420	1.294	1.433	7.681	7.774	165,389
France	1995:2008	1,891	0.018	0.013	0.053	-50.521	-39.781	31.836	0.709	1.392	5.049	4.901	1,200,130
Germany	1995:2008	2,859	0.003	0.004	0.072	-167.095	-87.337	215.494	0.581	1.491	5.792	5.737	1,003,035
Ireland	2000:2008	90	-0.022	0.075	0.344	-237.158	-100.658	451.560	-0.198	1.444	6.254	5.522	93,938
Italy	1995:2008	643	0.008	0.006	0.064	-6.841	-5.489	4.881	1.200	1.198	6.622	6.377	579,600
Luxembourg	2001:2008	28	-0.079	-0.095	0.892	-17.170	-13.070	14.153	0.185	1.242	6.312	5.534	30,323
Netherlands	1995:2008	306	-0.021	-0.020	0.080	-12.969	-6.044	18.843	0.699	1.748	5.212	5.022	542,878
Norway	1995:2008	483	-0.002	-0.003	0.158	-3.709	-2.290	3.764	0.979	1.824	6.213	6.027	109,541
Spain	1995:2008	285	-0.003	-0.004	0.090	-3.452	-2.744	2.576	0.578	0.947	4.904	4.879	447,968
Sweden	1995:2008	903	0.011	0.005	0.220	-9.946	-5.195	11.197	0.790	1.216	6.036	5.877	272,733
Switzerland	1995:2008	438	0.010	0.007	0.075	-3.579	-2.333	3.194	0.798	1.274	4.133	4.060	695,308
U.K.	1995:2008	3,921	0.053	0.066	0.158	-0.140	-0.105	0.163	0.736	1.031	4.190	4.125	2,323,410

Table 1, continued

Country	Dates	# Stocks	Flows			Liquidity ($x10^7$)			Returns			Volatility	Mcap ($m.)
			mean	median	st.dev.	mean	median	st.dev.	mean	median	st.dev.	mean	mean
PANEL B: EMERGING EUROPE													
Cyprus	2006:2008	121	0.185	0.192	0.935	-1145.616	-242.270	995.908	-0.648	0.375	10.867	10.829	18,929
Czech Republic	1995:2002	146	-0.049	0.002	0.554	-8.399	-6.781	7.436	0.153	0.951	7.945	5.949	11,525
Greece	1995:2008	476	0.015	0.004	0.094	-55.332	-49.012	46.986	0.814	0.868	9.258	9.102	82,228
Hungary	1995:2008	86	0.027	0.000	0.194	-0.884	-0.681	0.829	1.565	2.124	8.888	9.272	18,474
Israel	1995:2008	866	0.106	0.083	0.280	-36.851	-36.190	16.826	0.979	1.480	5.973	5.953	54,432
Poland	1995:2008	579	0.053	0.010	0.154	-59.209	-15.429	104.126	0.640	0.893	7.619	7.617	46,509
Portugal	1995:2008	179	0.042	0.010	0.275	-138.815	-106.195	106.246	0.680	0.524	5.548	5.731	63,060
Turkey	1995:2008	369	0.071	0.018	0.265	-82.274	-10.513	196.013	3.949	3.869	14.099	14.675	70,773
PANEL C: DEVELOPED ASIA/PACIFIC													
Australia	1995:2008	2,677	0.029	0.024	0.081	-87.325	-65.717	52.539	2.795	3.492	3.725	3.691	495,587
Hong Kong	1995:2008	1,238	0.034	0.018	0.195	-7.436	-6.211	6.156	0.625	1.268	8.226	8.077	603,908
Japan	1995:2008	2,800	0.038	0.023	0.082	-0.061	-0.049	0.043	-0.158	-0.271	4.718	4.792	3,284,467
New Zealand	2001:2008	232	0.013	-0.032	0.261	-70.503	-49.846	33.252	0.609	0.943	3.658	3.971	16,086
Singapore	1995:2008	935	0.007	0.020	0.304	-88.672	-62.720	86.744	0.172	0.720	5.184	5.394	162,986
PANEL D: EMERGING ASIA													
China	1995:2008	1,666	1.651	0.269	4.913	-0.054	-0.035	0.065	0.798	0.128	8.866	8.800	14,052
India	1995:2008	2,199	0.028	0.022	0.066	-133.466	-65.685	149.170	0.862	1.666	8.286	8.422	253,417
Indonesia	1995:2008	474	0.017	0.011	0.134	-0.237	-0.098	0.310	0.923	1.792	9.879	9.626	57,100
Malaysia	1995:2008	1,134	0.013	0.007	0.089	-32.638	-20.958	46.763	0.267	0.327	8.386	7.488	128,133
Pakistan	1995:2008	359	0.008	0.000	0.200	-22.926	-18.494	18.258	1.250	0.534	10.522	10.749	16,788
South Korea	1995:2008	1,125	0.086	0.048	0.201	-0.010	-0.004	0.021	0.404	-0.186	9.244	9.249	286,184
Philippines	1995:2008	303	0.019	0.014	0.085	-10.025	-8.560	6.436	0.069	-0.025	7.586	7.603	37,807
Taiwan	1995:2008	1,536	0.094	0.030	0.374	-0.247	-0.184	0.261	-0.097	0.201	7.507	7.554	267,261
Thailand	1995:2008	901	0.011	0.012	0.077	-13.150	-5.481	18.918	0.105	0.351	10.036	9.467	67,201

Table 1, continued

Country	Dates	# Stocks	Flows			Liquidity ($x10^7$)			Returns			Volatility	Mcap ($m.)
			mean	median	st.dev.	mean	median	st.dev.	mean	median	st.dev.	mean	mean
PANEL E: DEVELOPED AMERICA													
Canada	1995:2008	3,351	0.017	0.025	0.118	-123.664	-103.163	101.957	0.831	1.387	4.000	3.845	751,868
U.S.	1995:2008	4,427	0.049	0.050	0.051	-0.916	-0.577	1.295	2.745	3.586	4.059	4.035	11,075,816
PANEL F: EMERGING AMERICA													
Argentina	1995:2008	115	0.009	0.007	0.314	-11.112	-9.310	6.548	1.101	1.454	9.042	9.482	31,752
Brazil	1999:2008	649	0.069	0.080	0.130	-98.768	-84.544	58.049	2.266	2.753	7.185	7.304	378,378
Chile	1995:2008	260	0.009	-0.004	0.087	-0.066	-0.057	0.049	1.058	0.799	4.676	5.014	76,576
Colombia	1995:2008	85	-0.007	0.000	0.125	-0.007	-0.008	0.008	3.087	1.534	7.217	7.864	31,560
Mexico	1995:2008	391	-0.021	-0.022	0.202	-5.731	-3.844	5.025	0.702	1.032	5.748	5.796	156,886
Peru	1995:2008	234	0.039	0.047	0.394	-62.138	-29.345	186.917	1.478	1.960	6.212	6.290	18,211
Venezuela	1995:2002	38	0.046	-0.055	1.287	-233.421	-70.156	614.836	2.591	0.795	10.218	9.820	4,874

Table 2: VAR results for all countries and for developed and emerging countries separately

This table presents the results of vector autoregressive (VAR) models of order 1 with monthly net capital inflows, market liquidity, and market returns as endogenous variables. Panel A presents the results of VARs estimated for all 46 countries in our sample jointly, and Panel B and C present the results of VARs estimated for 22 developed countries and 24 emerging countries separately, using the classification of the International Finance Corporation (IFC) of the World Bank Group. Each panel reports the results of four different VAR specifications, based on the time-series of value-weighted or equally-weighted average returns and liquidity across individual stocks by country and based on local currency returns (Return) or U.S. dollar returns ($Return) from January 1995 to December 2008. We standardize all variables to have zero mean and unit standard deviation at the country-level, thus accounting for country fixed effects. Before the standardization, we stochastically detrend liquidity at the country-level by subtracting a six-month moving average. Following Froot et al. (2001), we constrain coefficients to be the same for all countries within the groups of developed and emerging countries in Panels B and C. In line with Griffin et al. (2004), we restrict the variance-covariance and coefficient matrices to be block diagonal. We use iterative maximum likelihood to estimate the VARs. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	Value-weighted series						Equally-weighted series					
	Flows	**Liquidity**	**Returns**	**$Returns**	**Intercept**	**R2**	**Flows**	**Liquidity**	**Returns**	**$Returns**	**Intercept**	**R2**
					PANEL A: ALL COUNTRIES							
Flows equation	0.2133[a]	0.0173	0.0507[a]		-0.0196[c]	0.05	0.2208[a]	0.0190	0.0205[c]		-0.0164	0.05
	0.2148[a]	0.0197		0.0390[a]	-0.0196[c]	0.05	0.2180[a]	0.0167		0.0388[a]	-0.0162	0.05
Liquidity equation	-0.0033	0.4406[a]	0.2134[a]		-0.0035	0.27	0.0092	0.4889[a]	0.2483[a]		-0.0094	0.36
	-0.0001	0.4445[a]		0.1915[a]	-0.0031	0.26	0.0060	0.5159[a]		0.1975[a]	-0.0078	0.34
Return equation	0.0189	0.0074	0.1349[a]		-0.0048	0.02	0.0223[c]	-0.0277[b]	0.2860[a]		0.0011	0.08
	0.0380[a]	0.0179		0.1498[a]	-0.0082	0.03	0.0380[a]	0.0133		0.1504[a]	-0.0079	0.03
					PANEL B: DEVELOPED COUNTRIES							
Flows equation	0.2155[a]	0.0308[c]	0.0738[a]		-0.0165	0.06	0.2177[a]	0.0385[b]	0.0522[a]		-0.0171	0.06
	0.2171[a]	0.0379[b]		0.0500[a]	-0.0170	0.06	0.2161[a]	0.0465[a]		0.0474[a]	-0.0169	0.06
Liquidity equation	0.0014	0.5208[a]	0.2577[a]		-0.0047	0.39	-0.0007	0.5385[a]	0.2795[a]		-0.0097	0.47
	0.0020	0.5308[a]		0.2318[a]	-0.0056	0.38	-0.0072	0.5875[a]		0.2276[a]	-0.0092	0.44
Return equation	0.0237	0.0116	0.1630[a]		-0.0101	0.03	0.0332[c]	-0.0067	0.3162[a]		-0.0023	0.10
	0.0482[a]	0.0337[c]		0.1324[a]	-0.0099	0.03	0.0475[a]	0.0399[b]		0.1304[a]	-0.0099	0.03
					PANEL C: EMERGING COUNTRIES							
Flows equation	0.2110[a]	0.0029	0.0282[c]		-0.0224	0.05	0.2222[a]	-0.0030	-0.0123		-0.0158	0.05
	0.2112[a]	0.0024		0.0286[c]	-0.0222	0.05	0.2171[a]	-0.0103		0.0295[c]	-0.0158	0.05
Liquidity equation	-0.0129	0.3651[a]	0.1658[a]		-0.0029	0.18	0.0142	0.4415[a]	0.2106[a]		-0.0092	0.27
	-0.0092	0.3649[a]		0.1514[a]	-0.0019	0.18	0.0117	0.4514[a]		0.1664[a]	-0.0070	0.26
Return equation	0.0153	0.0006	0.1086[a]		0.0003	0.01	0.0110	-0.0523[a]	0.2547[a]		0.0042	0.06
	0.0268	0.0039		0.1646[a]	-0.0069	0.03	0.0266	-0.0098		0.1666[a]	-0.0064	0.03

Table 3: VAR results for six different regions separately

This table presents the results of VAR(1) models (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) estimated by six different regions: developed Europe (Panel A), emerging Europe (Panel B), developed Asia/Pacific (Panel C), emerging Asia (Panel D), developed America (Panel E), and emerging America (Panel F). The time-series of liquidity and (local currency) returns are the value-weighted average returns and liquidity across individual stocks by country. The first line of each panel contains the baseline VAR results with the three endogenous variables only. Subsequent lines contain the results of VARs that include the following exogenous factors: regional flows (*FLOW_REG*), local market volatility (*VOL*), the local market dividend yield (*DY*), the world interest rate (*WIR*), U.S. market returns and liquidity (*R_US* and *LIQ_US*), and local market turnover (*TURN*) We standardize all variables to have zero mean and unit standard deviation at the country-level, thus accounting for country fixed effects. Before the standardization, we stochastically detrend liquidity, *VOL*, *DY*, and *TURN* at the country-level, as well as *WIR*, by subtracting a six-month moving average. We constrain the coefficients to be the same for all countries within each region and we restrict the variance-covariance and coefficient matrices to be block diagonal. We use iterative maximum likelihood to estimate the VARs. We suppress intercepts to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

Flows	Liquidity	Returns	*FLOW_REG*	*VOL*	*DY*	*WIR*	*R_US*	*LIQ_US*	*TURN*	R^2
PANEL A: DEVELOPED EUROPE										
Flows equation										
0.2084[a]	0.0420[c]	0.0445[b]								0.05
0.1849[a]	0.0334	0.0414[b]	0.2873[a]							0.06
0.2082[a]	0.0458[b]	0.0523[b]		0.0167						0.05
0.2170[a]	0.0360	0.0226			-0.0309					0.06
0.2084[a]	0.0424[c]	0.0450[b]				-0.0055				0.05
0.1804[a]	0.0232	-0.0021					0.0403	0.1642[a]		0.08
0.2075[a]	0.0422[c]	0.0447[b]							0.0168	0.05
Liquidity equation										
0.0088	0.4791[a]	0.2582[a]								0.34
0.0033	0.4771[a]	0.2575[a]	0.0682							0.35
0.0096	0.4642[a]	0.2278[a]		-0.0647[a]						0.35
0.0025	0.4430[a]	0.2051[a]			-0.1225[a]					0.35
0.0088	0.4793[a]	0.2584[a]				-0.0017				0.34
0.0100	0.4730[a]	0.1931[a]					0.0932[a]	0.0227		0.35
0.0062	0.4796[a]	0.2588[a]							0.0472[a]	0.35
Returns equation										
0.0142	0.0221	0.1824[a]								0.04
0.0062	0.0192	0.1813[a]	0.0990[c]							0.04
0.0140	0.0263	0.1908[a]		0.0179						0.04
0.0166	-0.0114	0.1152[a]			-0.1203[a]					0.04
0.0159	0.0112	0.1700[a]				0.1240[a]				0.05
0.0266	0.0176	0.0829[a]					0.1520[a]	-0.0195		0.05
0.0076	0.0236	0.1842[a]							0.1217[a]	0.05

Table 3, continued

Flows	Liquidity	Returns	*FLOW_REG*	*VOL*	*DY*	*WIR*	*R_US*	*LIQ_US*	*TURN*	R^2
					PANEL B: EMERGING EUROPE					
Flows equation										
0.2700[a]	0.0005	0.0209								0.08
0.2674[a]	-0.0028	0.0115	0.1193[c]							0.08
0.2692[a]	0.0003	0.0182		0.0226						0.08
0.2700[a]	0.0015	0.0250			0.0099					0.08
0.2695[a]	0.0003	0.0224				-0.0225				0.08
0.2384[a]	-0.0319	-0.0230					0.0526	0.1637[a]		0.10
0.2670[a]	0.0029	0.0063							0.0617[b]	0.08
Liquidity equation										
-0.0236	0.3231[a]	0.1545[a]								0.14
-0.0276	0.3178[a]	0.1401[a]	0.1843[a]							0.15
-0.0234	0.3232[a]	0.1551[a]		-0.0049						0.14
-0.0233	0.3188[a]	0.1355[a]			-0.0463					0.15
-0.0240	0.3229[a]	0.1554[a]				-0.0137				0.15
-0.0514c	0.2970[a]	0.0970[a]					0.0926[a]	0.1333[a]		0.17
-0.0194	0.3201[a]	0.1743[a]							-0.0827[a]	0.15
Returns equation										
0.0479	0.0351	0.1115[a]								0.02
0.0467	0.0336	0.1075[a]	0.0519							0.02
0.0458	0.0344	0.1049[a]		0.0564[c]						0.02
0.0482	0.0280	0.0805[b]			-0.0747[b]					0.02
0.0501	0.0362	0.1054[a]				0.0928[a]				0.03
0.0305	0.0220	0.0489					0.1214[a]	0.0655[c]		0.03
0.0443	0.0378	0.0943[a]							0.0728[b]	0.02
					PANEL C: DEVELOPED ASIA/PACIFIC					
Flows equation										
0.2495[a]	0.0119	0.1461[a]								0.10
0.2506[a]	0.0138	0.1489[a]	-0.0301							0.10
0.2469[a]	0.0131	0.1631[a]		0.0362						0.10
0.2484[a]	0.0037	0.1374[a]			-0.0228					0.10
0.2493[a]	0.0104	0.1462[a]				0.0158				0.10
0.2458[a]	0.0060	0.1483[a]					-0.0096	0.0500		0.10
0.2451[a]	0.0124	0.1451[a]							0.0345	0.10

Table 3, continued

Flows	Liquidity	Returns	*FLOW_REG*	*VOL*	*DY*	*WIR*	*R_US*	*LIQ_US*	*TURN*	R^2
PANEL C: DEVELOPED ASIA/PACIFIC, CONTINUED										
Liquidity equation										
-0.0328	0.5308[a]	0.2996[a]								0.45
-0.0372	0.5231[a]	0.2886[a]	0.1204[b]							0.45
-0.0322	0.5305[a]	0.2957[a]		-0.0084						0.45
-0.0370	0.5013[a]	0.2683[a]			-0.0819[b]					0.45
-0.0325	0.5335[a]	0.2994[a]				-0.0276				0.45
-0.0350	0.5277[a]	0.2975[a]					0.0009	0.0200		0.45
-0.0401	0.5316[a]	0.2978[a]							0.0571[b]	0.45
Returns equation										
0.0672[c]	0.0032	0.0972[b]								0.02
0.0617[c]	-0.0066	0.0832[b]	0.1531[b]							0.02
0.0607[c]	0.0061	0.1405[a]		0.0919[b]						0.02
0.0658[c]	-0.0074	0.0860[b]			-0.0293					0.02
0.0667[c]	-0.0018	0.0975[b]				0.0503				0.02
0.0687[c]	0.0089	0.0700					0.0554	-0.056		0.02
0.0541	0.0047	0.0941[b]							0.1025[a]	0.03
PANEL D: EMERGING ASIA										
Flows equation										
0.2279[a]	-0.0094	0.0469[c]								0.06
0.2192[a]	-0.0119	0.0365	0.1221[b]							0.06
0.2279[a]	-0.0128	0.0481[c]		0.0114						0.06
0.2235[a]	-0.0251	0.0264			-0.0545[c]					0.06
0.2264[a]	-0.0105	0.0478[c]				0.0448[c]				0.06
0.2170[a]	-0.0113	0.0136					0.0814[a]	0.0503[c]		0.07
0.2280[a]	-0.0092	0.0565[b]							-0.0243	0.06
Liquidity equation										
0.0008	0.4640[a]	0.2243[a]								0.31
-0.0055	0.4622[a]	0.2167[a]	0.0885[c]							0.31
-0.0002	0.4561[a]	0.2064[a]		-0.0401[c]						0.31
-0.0087	0.4292[a]	0.1790[a]			-0.1212[a]					0.32
0.0011	0.4642[a]	0.2241[a]				-0.0100				0.31
-0.0021	0.4648[a]	0.2034[a]					0.0594[b]	-0.0100		0.32
0.0007	0.4638[a]	0.2162[a]							0.0203	0.31

Table 3, continued

Flows	Liquidity	Returns	*FLOW_REG*	*VOL*	*DY*	*WIR*	*R_US*	*LIQ_US*	*TURN*	R^2
					PANEL D: EMERGING ASIA, CONTINUED					
Returns equation										
0.0267	-0.0366	0.1044[a]								0.01
0.0159	-0.0397	0.0915[a]	0.1526[b]							0.02
0.0270	-0.0354	0.1099[a]		0.0100						0.01
0.0252	-0.0421	0.0973[a]			-0.0191					0.01
0.0267	-0.0367	0.1045[a]				0.0024				0.01
0.0233	-0.0354	0.0779[a]					0.0759[a]	-0.0105		0.02
0.0266	-0.0368	0.0905[a]							0.0350	0.01
					PANEL E: DEVELOPED AMERICA					
Flows equation										
0.1575[a]	-0.0194	0.1283[b]								0.05
0.1550[a]	-0.0252	0.1222[b]	0.0364							0.05
0.1590[a]	-0.0153	0.1633[c]		0.0500						0.05
0.1588[a]	-0.0111	0.1441[b]			0.0284					0.05
0.0023	0.1735[b]	0.2304[a]				0.0600				0.11
-0.0139	0.1296	0.2333[b]					-0.0099	0.1200		0.12
0.1562[a]	-0.0185	0.1412[b]							0.0598	0.05
Liquidity equation										
0.0416	0.7549[a]	0.1725[a]								0.68
0.0420	0.7559[a]	0.1735[a]	-0.0060							0.68
0.0398	0.7501[a]	0.1305[a]		-0.0600						0.68
0.0390	0.7382[a]	0.1406[a]			-0.0574					0.68
0.0578	0.6980[a]	0.2253[a]				-0.0300				0.63
0.0508	0.6699[a]	0.2983[a]					-0.1007	0.0600		0.64
0.0396	0.7562[a]	0.1910[a]							0.0863[a]	0.69
Returns equation										
0.0013	-0.0303	0.1620[a]								0.03
0.0012	-0.0305	0.1617[a]	0.0015							0.03
0.0038	-0.0232	0.2228[a]		0.0827						0.03
-0.0068	-0.0824	0.0627			-0.1785[b]					0.04
0.0661	-0.0620	0.1749[b]				0.0713				0.04
0.0618	-0.0474	0.0294					0.1914	-0.0063		0.05
0.0003	-0.0296	0.1712[a]							0.043	0.03

Table 3, continued

Flows	Liquidity	Returns	*FLOW_REG*	*VOL*	*DY*	*WIR*	*R_US*	*LIQ_US*	*TURN*	R^2
PANEL F: EMERGING AMERICA										
Flows equation										
0.1210[a]	0.0181	0.0141								0.02
0.1163[a]	0.0182	0.0099	0.0547							0.02
0.1196[a]	0.0165	0.0153		-0.0400						0.02
0.1193[a]	0.0151	-0.0010			-0.0492					0.02
0.1208[a]	0.0166	0.0144				0.0200				0.02
0.1201[a]	0.0170	0.0021					0.0267	0.0100		0.02
0.1229[a]	0.0104	0.0082							-0.0174	0.02
Liquidity equation										
-0.0223	0.2610[a]	0.0776[b]								0.08
-0.0248	0.2611[a]	0.0753[b]	0.0298							0.08
-0.0228	0.2604[a]	0.0780[a]		-0.0200						0.08
-0.0237	0.2584[a]	0.0646[b]			-0.0422					0.08
-0.0225	0.2588[a]	0.0780[a]				0.0300				0.08
-0.0232	0.2599[a]	0.0666[b]					0.0238	0.0100		0.08
-0.0313	0.2443[a]	0.0581[c]							0.0624[c]	0.07
Returns equation										
-0.0366	0.0175	0.1171[a]								0.01
-0.0319	0.0174	0.1213[a]	-0.0548							0.02
-0.0374	0.0165	0.1179[a]		-0.0249						0.02
-0.0383	0.0143	0.1010[a]			-0.0525					0.02
-0.0365	0.0182	0.1170[a]				-0.0098				0.01
-0.0354	0.0177	0.0838[b]					0.0864[b]	-0.0114		0.02
-0.0339	0.0140	0.1124[a]							-0.0257	0.01

Table 4: VAR results for small cap and large cap stocks separately

This table presents the results of VAR(1) models (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) estimated for small cap and large cap stocks separately. We also report the six-month cumulative generalized impulse response (GIR) of flows (liquidity) to a one standard deviation (1SD) shock in liquidity (flows), expressed as a fraction of 1SD of flows (liquidity). We estimate the VARs by six different regions from January 1995 to December 2008. We define small cap (large cap) stocks as those with a market value in the bottom (top) 35% of the cross-sectional distribution of all stocks in a given country, at the beginning of each month. We construct separate liquidity and (local currency) returns time-series for small cap and large cap stocks as the value-weighted average returns and liquidity across individual stocks in each category by country. We standardize all variables to have zero mean and unit standard deviation at the country-level, thus accounting for country fixed effects. Before the standardization, we stochastically detrend the liquidity time-series at the country-level by subtracting a six-month moving average. We constrain the coefficients to be the same for all countries within each region and we restrict the variance-covariance and coefficient matrices to be block diagonal. We use iterative maximum likelihood to estimate the VARs. We suppress intercepts to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	Large cap stocks						Small cap stocks					
	Flows	**Liquidity**	**Returns**	**R^2**	**6m GIR to flows shock**	**6m GIR to liq. shock**	**Flows**	**Liquidity**	**Returns**	**R^2**	**6m GIR to flows shock**	**6m GIR to liq. shock**
			Flows equation						***Flows equation***			
Developed Europe	0.2089[a]	0.0453[b]	0.0423[b]	0.05		0.20[c]	0.2184[a]	0.0320	0.0614[a]	0.06		0.33[b]
Emerging Europe	0.2695[a]	-0.0084	0.0253	0.08		0.03	0.2837[a]	-0.0034	-0.0029	0.08		0.07
Developed Asia/Pacific	0.2392[a]	0.0629	0.1353[a]	0.10		0.48	0.2612[a]	0.0403	0.0635	0.08		0.41
Emerging Asia	0.2275[a]	0.0036	0.0488[c]	0.06		0.01	0.2381[a]	0.0027	-0.0272	0.06		0.04
Developed America	0.1547[a]	0.0775	0.1095[b]	0.05		0.15	0.1675[a]	-0.0371	0.0854	0.04		0.10
Emerging America	0.1205[a]	-0.0373	0.0199	0.02		-0.04	0.2244[a]	0.0256	-0.0157	0.05		0.01
			Liquidity equation						***Liquidity equation***			
Developed Europe	0.0162	0.3681[a]	0.2507[a]	0.24	0.16		-0.0011	0.4732[a]	0.2774[a]	0.40	0.22[c]	
Emerging Europe	-0.0118	0.3722[a]	0.2153[a]	0.22	0.09		0.0131	0.3018[a]	0.1844[a]	0.15	0.12	
Developed Asia/Pacific	0.0030	0.3948[a]	0.3190[a]	0.34	0.35		0.0361	0.5011[a]	0.3161[a]	0.48	0.42[c]	
Emerging Asia	0.0186	0.2665[a]	0.2976[a]	0.20	0.10		0.0580[a]	0.4254[a]	0.2488[a]	0.32	0.25[c]	
Developed America	0.0984[c]	0.2267[a]	0.2642[a]	0.16	0.24		0.0148	0.6549[a]	0.2223[a]	0.60	0.40[c]	
Emerging America	-0.0056	0.2328[a]	0.1463[a]	0.08	0.03		-0.0147	0.1450[a]	0.0646	0.03	-0.04	
			Returns equation						***Returns equation***			
Developed Europe	0.0152	0.0079	0.1776[a]	0.03			0.0207	0.0731[a]	0.3114[a]	0.12		
Emerging Europe	0.0497	0.0384	0.1003[a]	0.02			0.0166	0.0345	0.2233[a]	0.06		
Developed Asia/Pacific	0.0718[c]	-0.0068	0.0917[b]	0.02			0.0490	-0.0023	0.2172[a]	0.05		
Emerging Asia	0.0264	-0.0523[c]	0.1036[a]	0.01			0.0350	-0.0880[a]	0.1957[a]	0.04		
Developed America	-0.0036	0.0011	0.1351[b]	0.02			0.0423	0.0444	0.3070[a]	0.11		
Emerging America	-0.0368	-0.0268	0.1191[a]	0.01			0.0010	-0.0698[c]	0.1591[a]	0.03		

Table 5: Interaction between flows and liquidity for liquidity crisis periods and "normal" periods separately

This table presents the results of panel models to explain monthly net capital inflows and market liquidity in liquidity crisis periods and "normal" periods separately. We estimate the panel models by six different regions from January 1995 to December 2008. In both models, we use one-month lagged flows, liquidity, market returns, U.S. market returns (*R_US*), and U.S. market liquidity (*LIQ_US*) as independent variables. We interact each of these variables with dummy variables for liquidity crisis periods and normal periods. We define liquidity crises as the bottom 30% of the time-series distribution of market liquidity within each country. The time-series of liquidity and (local currency) returns are the value-weighted average returns and liquidity across individual stocks by country. We standardize all variables to have zero mean and unit standard deviation at the country-level, thus accounting for country fixed effects. Before the standardization, we stochastically detrend the liquidity time-series at the country-level by subtracting a six-month moving average. We constrain the coefficients to be the same for all countries within each region and we restrict the variance-covariance and coefficient matrices to be diagonal. We suppress intercepts to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively.

	Flows× Normal	**Flows× Crisis**	**Liquidity× Normal**	**Liquidity× Crisis**	**Returns× Normal**	**Returns× Crisis**	***R_US*× Normal**	***R_US*× Crisis**	***LIQ_US*× Normal**	***LIQ_US*× Crisis**	R^2
					Flows equation						
Developed Europe	0.1482[a]	0.1959[a]	0.0308	-0.0001	0.0457	-0.0257	0.0177	0.0443	0.1514[a]	0.1688[a]	0.08
Emerging Europe	0.2710[a]	0.2239[a]	-0.0479	0.0247	-0.0485	-0.0162	0.0278	0.0707[c]	0.1333[b]	0.1796[a]	0.10
Developed Asia/Pacific	0.1918[a]	0.2719[a]	0.0410	-0.0067	0.1821[b]	0.1255[b]	-0.0779	0.0638	0.0311	0.0464	0.10
Emerging Asia	0.0741	0.2850[a]	-0.0051	-0.0230	0.0111	0.0239	0.1134[a]	0.0547	0.0463	0.0534[c]	0.08
Developed America	-0.1878	-0.0731	0.2797[b]	-0.2401	0.5075[b]	0.0620	-0.3366	0.2260	-0.0139	0.4025[a]	0.20
Emerging America	0.3052[a]	0.0594[c]	0.0273	-0.0164	-0.0170	0.0130	0.0782	-0.0051	-0.0020	0.0262	0.03
					Liquidity equation						
Developed Europe	0.0084	0.0107	0.4346[a]	0.5071[a]	0.3058[a]	0.1098[a]	0.1330[a]	0.0422	0.0418	0.0116	0.37
Emerging Europe	-0.0521	-0.0438	0.2054[a]	0.4347[a]	0.0683	0.1037[a]	0.2204[a]	0.0121	0.3207[a]	0.0509	0.20
Developed Asia/Pacific	-0.0941[c]	0.0034	0.4069	0.6651	0.5628	0.1413	-0.1244[b]	0.0811[c]	0.1565	0.0174[a]	0.48
Emerging Asia	-0.0387	0.0163	0.1134[a]	0.5126	0.3021	0.1317	0.1364	0.0056	-0.0005	0.4324[a]	0.33
Developed America	-0.0155	0.0285	0.6068[a]	0.6488[a]	0.7671[a]	0.1387	-0.3982[a]	0.0008	0.1054	0.1045	0.67
Emerging America	-0.0823	0.0000	0.1556	0.4760	0.0789	0.0457	0.0093	0.0374	0.0190	-0.0031[a]	0.10

Table 6: Regressions to explain differences across countries in the response of liquidity to a shock in capital flows

This table presents the results of nine multivariate cross-sectional regressions of the six-month cumulative generalized impulse response (GIR) of market liquidity to a 1SD chock in capital inflows for each of the 46 countries in our sample on several country characteristics measuring a country's economic and financial development, regulatory environment, information environment, openness, and market risk. *EMERGING* is a dummy variable for emerging markets as classified by the *IFC*. *GDP_CAPITA* and *MKTCAP_GDP* (World Development Indicators) are the logarithm of the average ratio of stock market capitalization over GDP and the logarithm of GDP per capita. *BANK_CREDIT_GDP* (World Bank) is the logarithm of the ratio of domestic credit provided by commercial banks over GDP. *TURNOVER* (World Bank) is the total value of shares traded each year divided by the average market capitalization during the year. *AD_RIGHTS* (Djankov et al., 2008) is the anti-director rights index, which is an aggregate index of shareholders rights. *RULE*_OF_*LAW* (La Porta et al., 1998) measures the law and order tradition in the country. *CORRUPTION* (La Porta et al., 1998) measures the corruption in government. Short sales (Bris et al., 2007) is a dummy variable that equals 1 if short-selling is common practice. *ACCOUNT_STAND* (La Porta et al., 1998) measures information dissemination in accounting practices. *ANALYST* (Chang et al., 2000) measures the average number of analysts following large firms. *MEDIA_DEVELOP* (Bushman et al., 2004) measures media development in each country. *CAP_CONTROLS* and *TRADE_FREEDOM* (2009 *Economic Freedom of the World* annual report) measure international capital market controls and freedom to trade internationally. *FOREIGN_BANKS* (Levine, 2001) is the fraction of foreign-owned banking assets of total banking assets in a country. *VOL* is the average market-wide EGARCH(1,1) volatility for each country. Intercepts are suppressed to conserve space. Significance at the 1%, 5%, and 10% level is indicated by [a], [b], and [c], respectively – based on heteroskedasticity consistent (White) standard errors.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Economic/ financial development	***EMERGING***	0.0291								
	GDP_CAPITA		0.0200							
	MKTCAP_GDP	-0.0859	0.0442	-0.0055	-0.1988[b]	-0.1988[c]	-0.1943[b]	-0.1533	-0.1361	-0.2008[b]
	BANK_CREDIT_GDP			0.2019	0.2468	0.2276	0.2309	0.1978	0.2095	0.2072
	TURNOVER					-0.0011				
Regulatory environment	***AD_RIGHTS***	-0.0167								
	RULE_OF_LAW		0.0199		-0.0213		-0.0326			
	CORRUPTION			0.0149						
	SHORT_SALES						0.0627			
Information environment	***ACCOUNT_STAND***	0.0239[a]			0.0222[a]	0.0219[a]	0.0222[a]	0.0200[a]	0.0205[a]	0.0224[a]
	ANALYST		0.0099							
	MEDIA_DEVELOP			0.0017						
Openness	***CAP_CONTROLS***							-0.0244		
	TRADE_FREEDOM								-0.0485	
	FOREIGN_BANKS									-0.0315
Market risk	***VOL***								4.9130	
# Obs.		37	43	39	36	36	35	36	36	36
R^2		0.36	0.20	0.24	0.43	0.43	0.43	0.42	0.43	0.42

Figure 1: Cumulative net portfolio flows by region, 1995:01 – 2008:12

This figure shows the cumulative aggregate net equity portfolio inflows for six regions from January 1995 to December 2008. We scale country-specific portfolio inflows by the market capitalization of the local stock market at the beginning of each month. Aggregate net flows by region are computed as the equally-weighted average of net flows across the countries in each region. We note that emerging Asia is plotted using the secondary y-axis on the right.

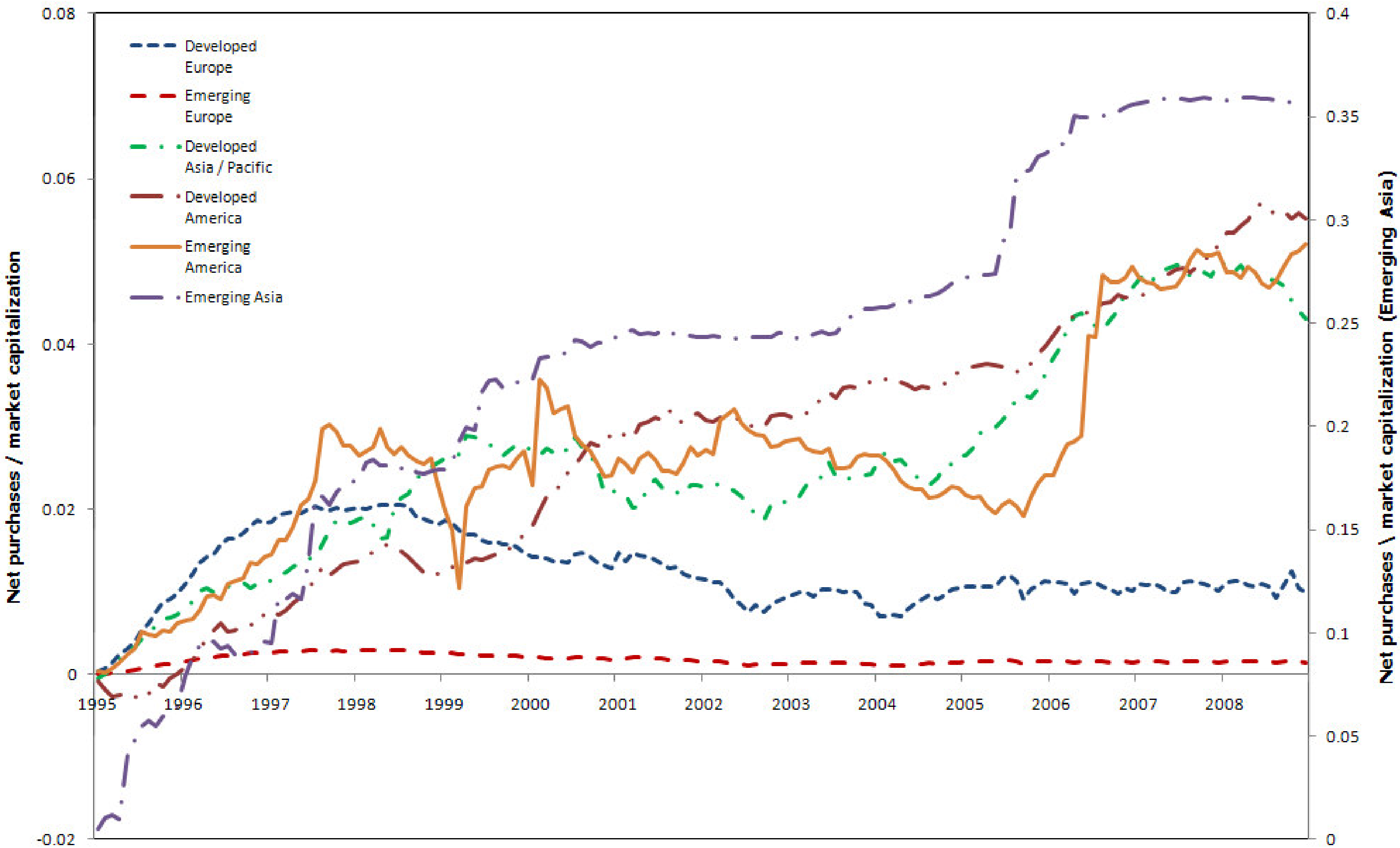

Figure 2: Aggregate market returns by region, 1995:01 – 2008:12

This figure shows the time-series of aggregate market returns for six regions from January 1995 to December 2008. We compute country-specific market returns as the value-weighted average of monthly returns (in local currency) across individual stocks within a country. Aggregate market returns by region are computed as the equally-weighted average of country-specific market returns across the countries in each region.

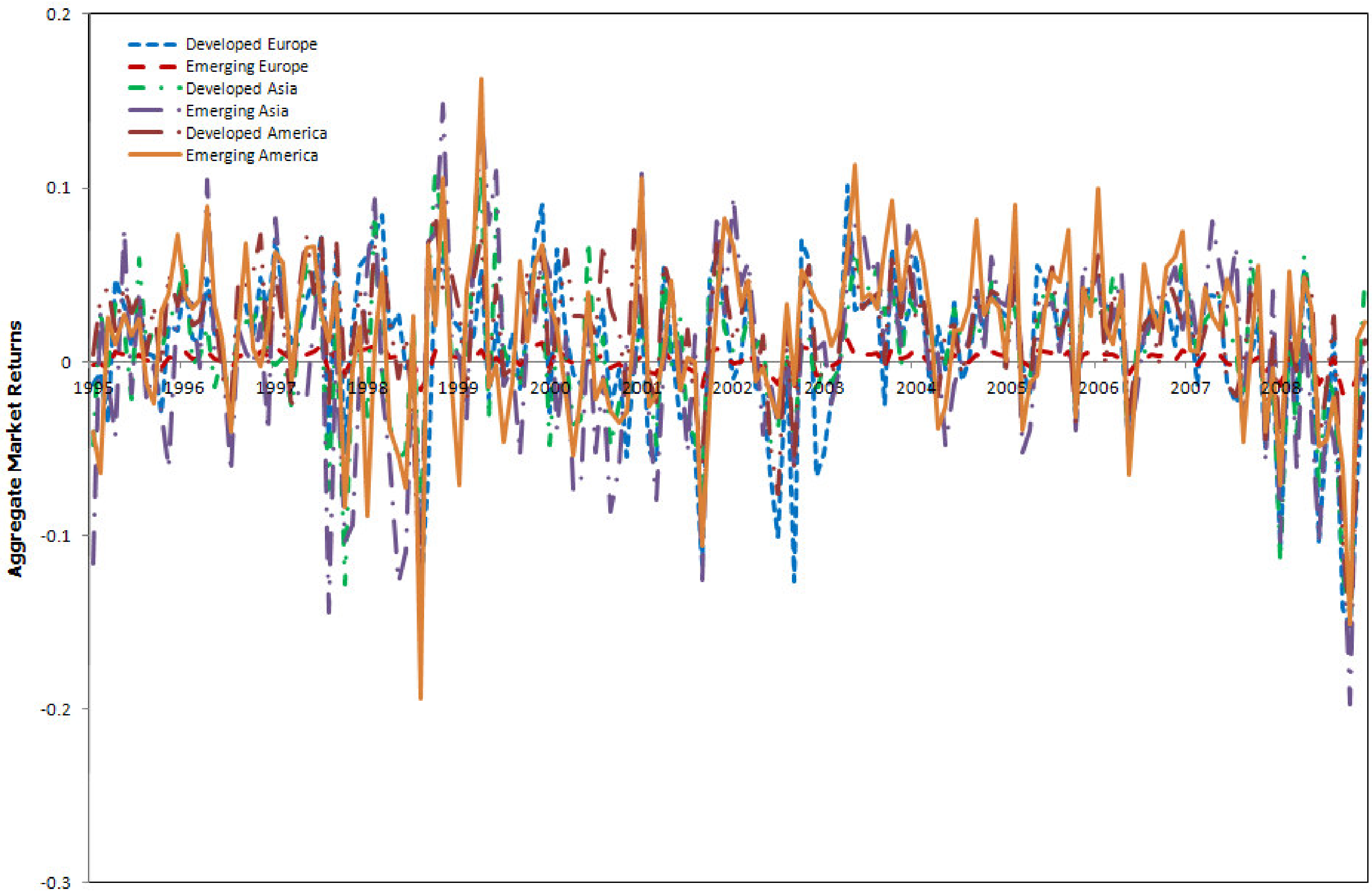

Figure 3: Aggregate market liquidity by region, 1995:01 – 2008:12

This figure shows the time-series of aggregate market liquidity for six regions from January 1995 to December 2008. We compute country-specific market liquidity as the value-weighted average of monthly stock liquidity across individual stocks within a country. Since the level of liquidity is not comparable across countries due to differences in trading volume definitions and currency units, we standardize the series to have zero mean and unit standard deviation before we aggregate within each region. Aggregate market liquidity by region is computed as the equally-weighted average of country-specific market liquidity across the countries in each region.

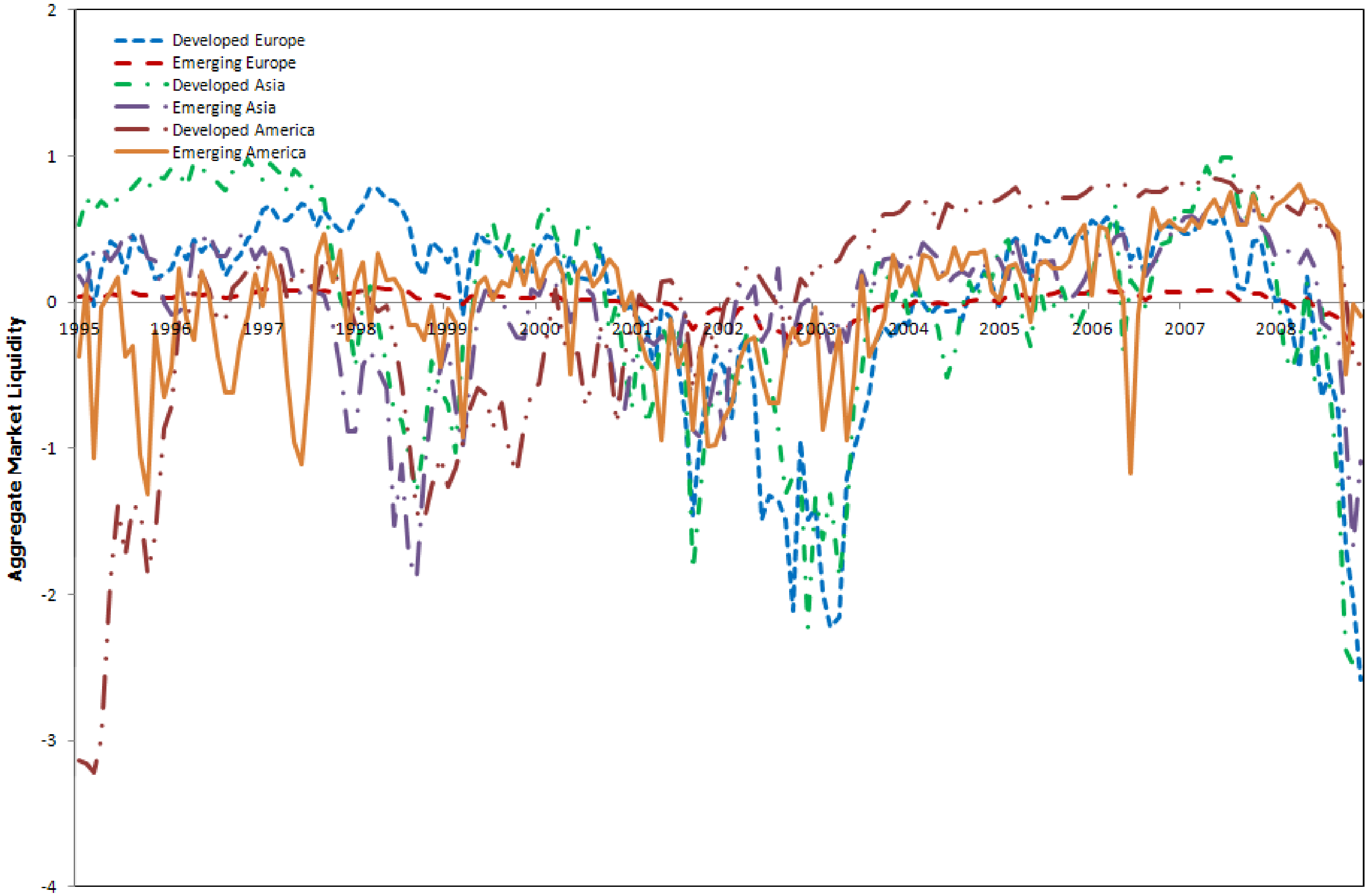

Figure 4: Cumulative GIRs of the baseline VAR model for Europe

This figure shows the standardized cumulative generalized impulse response functions (GIRs) based on the results of the baseline VAR models (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) for developed and emerging Europe reported in Table 3. To conserve space, we only present GIRs of flows to a one standard deviation (1SD) shock in returns and liquidity (expressed as a fraction of 1SD of flows), and GIRs of returns and liquidity to a 1SD shock in flows (expressed as a fraction of 1SD of returns and liquidity). The 95% confidence intervals are computed using Monte Carlo simulation.

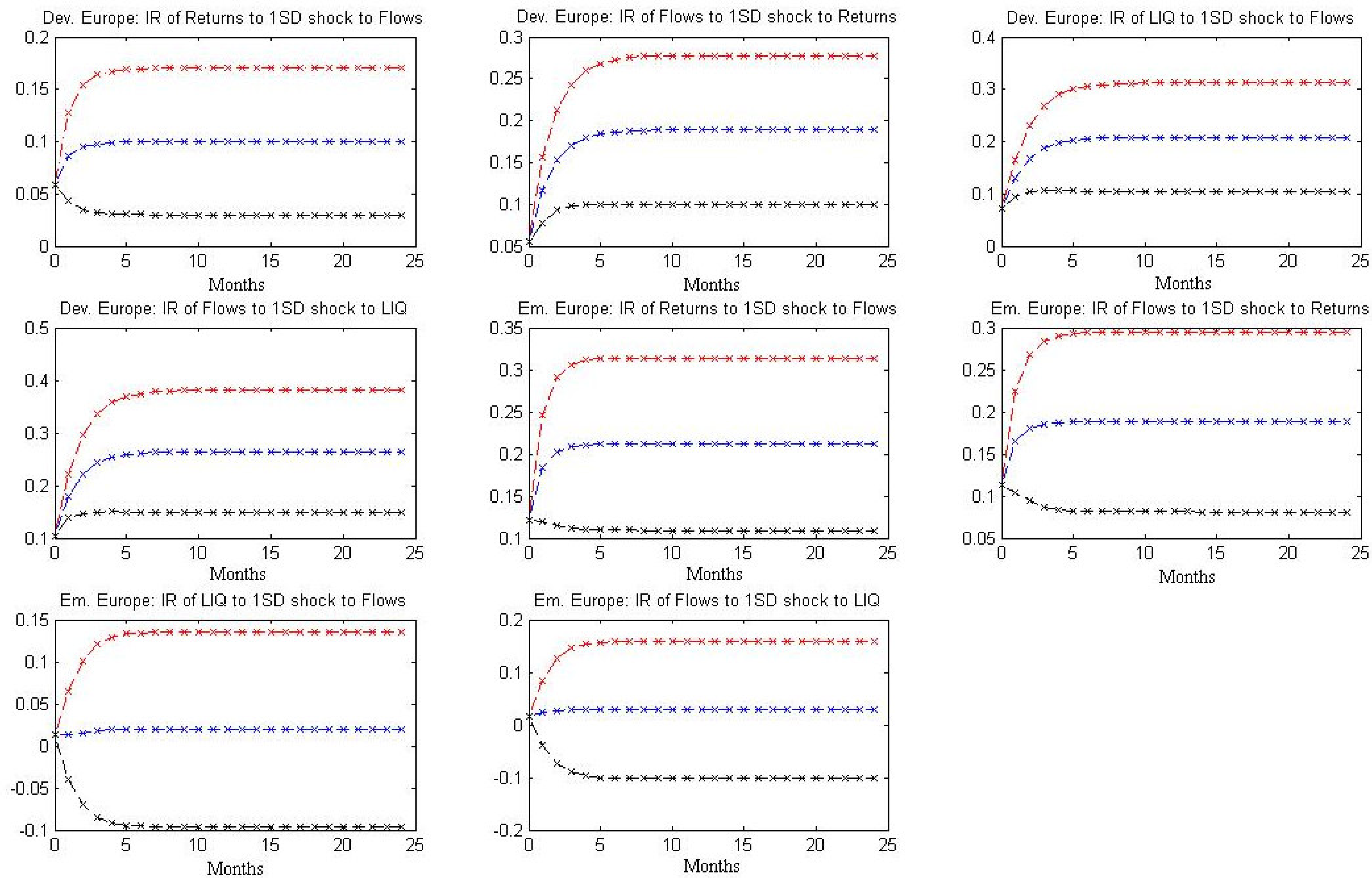

Figure 5: Cumulative GIRs of the baseline VAR model for Asia/Pacific

This figure shows the standardized cumulative generalized impulse response functions (GIRs) based on the results of the baseline VAR models (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) for developed Asia/Pacific and emerging Asia reported in Table 3. To conserve space, we only present GIRs of flows to a one standard deviation (1SD) shock in returns and liquidity (expressed as a fraction of 1SD of flows), and GIRs of returns and liquidity to a 1SD shock in flows (expressed as a fraction of 1SD of returns and liquidity). The 95% confidence intervals are computed using Monte Carlo simulation.

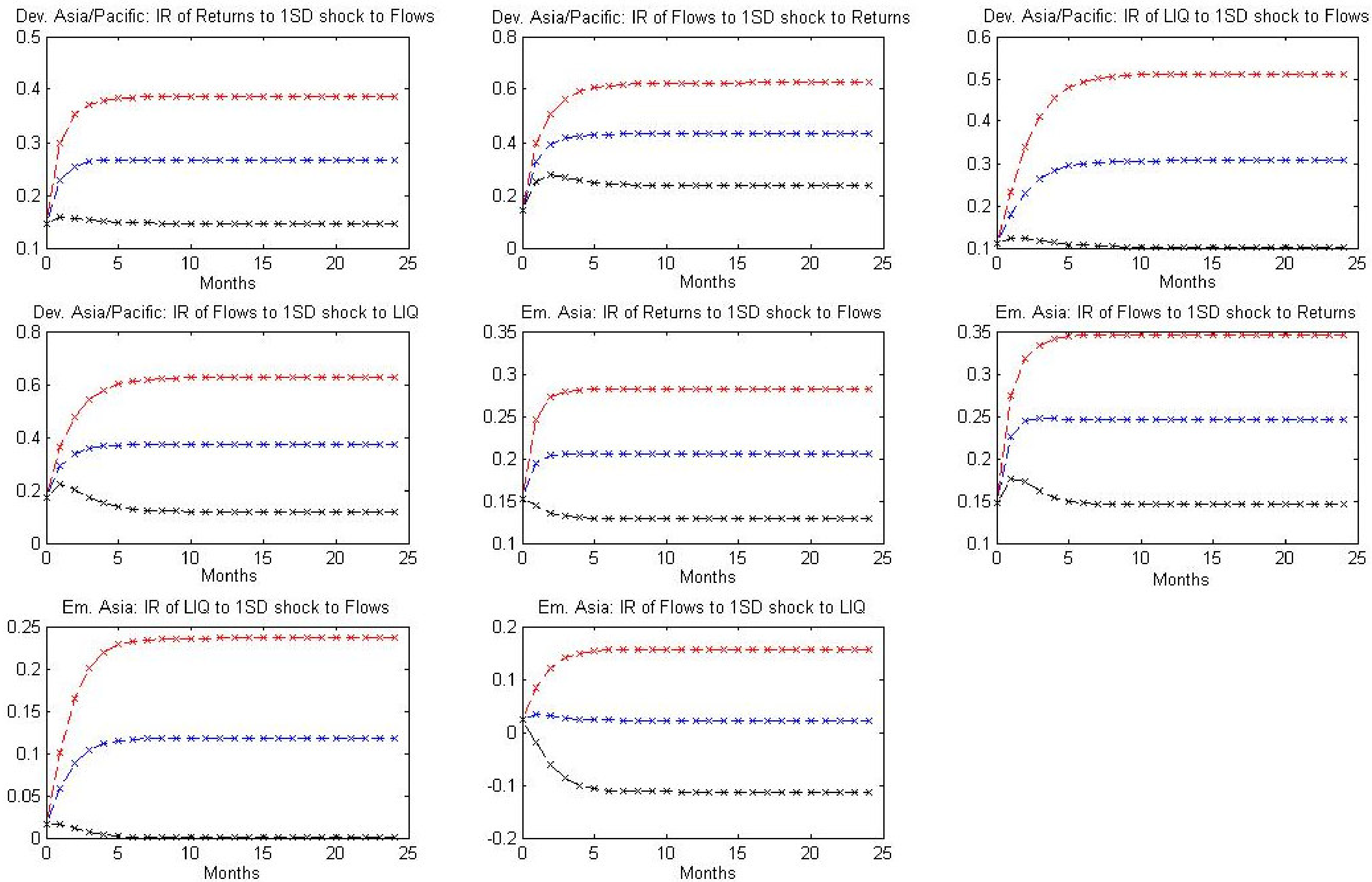

Figure 6: Cumulative GIRs of the baseline VAR model for America

This figure shows the standardized cumulative generalized impulse response functions (GIRs) based on the results of the baseline VAR models (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) for developed and emerging America reported in Table 3. To conserve space, we only present GIRs of flows to a one standard deviation (1SD) shock in returns and liquidity (expressed as a fraction of 1SD of flows), and GIRs of returns and liquidity to a 1SD shock in flows (expressed as a fraction of 1SD of returns and liquidity). The 95% confidence intervals are computed using Monte Carlo simulation.

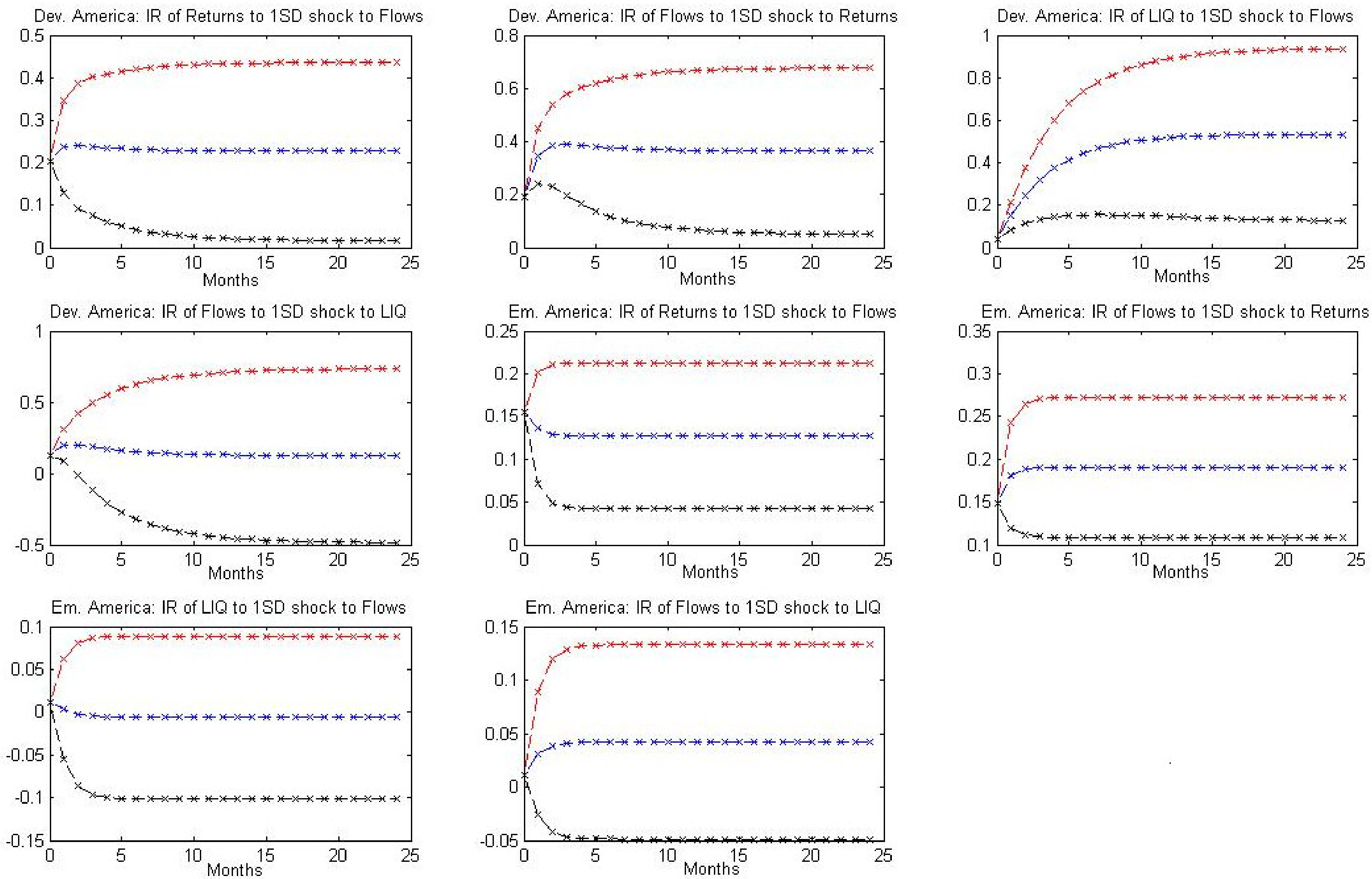

Figure 7: Cumulative GIRs of flows to a 1SD shock in liquidity for 46 individual countries

This figure shows the standardized cumulative generalized impulse responses (GIRs) of net capital inflows to a one standard deviation (1SD) shock in market liquidity after 3, 6, and 12 months (expressed as a fraction of 1SD of flows) for each of the 46 countries in our sample from January 1995 to December 2008. The GIRs are based on the results of the baseline VAR model (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) estimated by country. The countries on the x-axis of the figure are grouped by region based on their economic development and geographic location: developed Europe, emerging Europe, developed Asia/Pacific, emerging Asia, developed America, and emerging America. Bars that are colored black indicate GIRs that are statistically significant at the 5% level, based on 95% confidence bounds computed using Monte Carlo simulation.

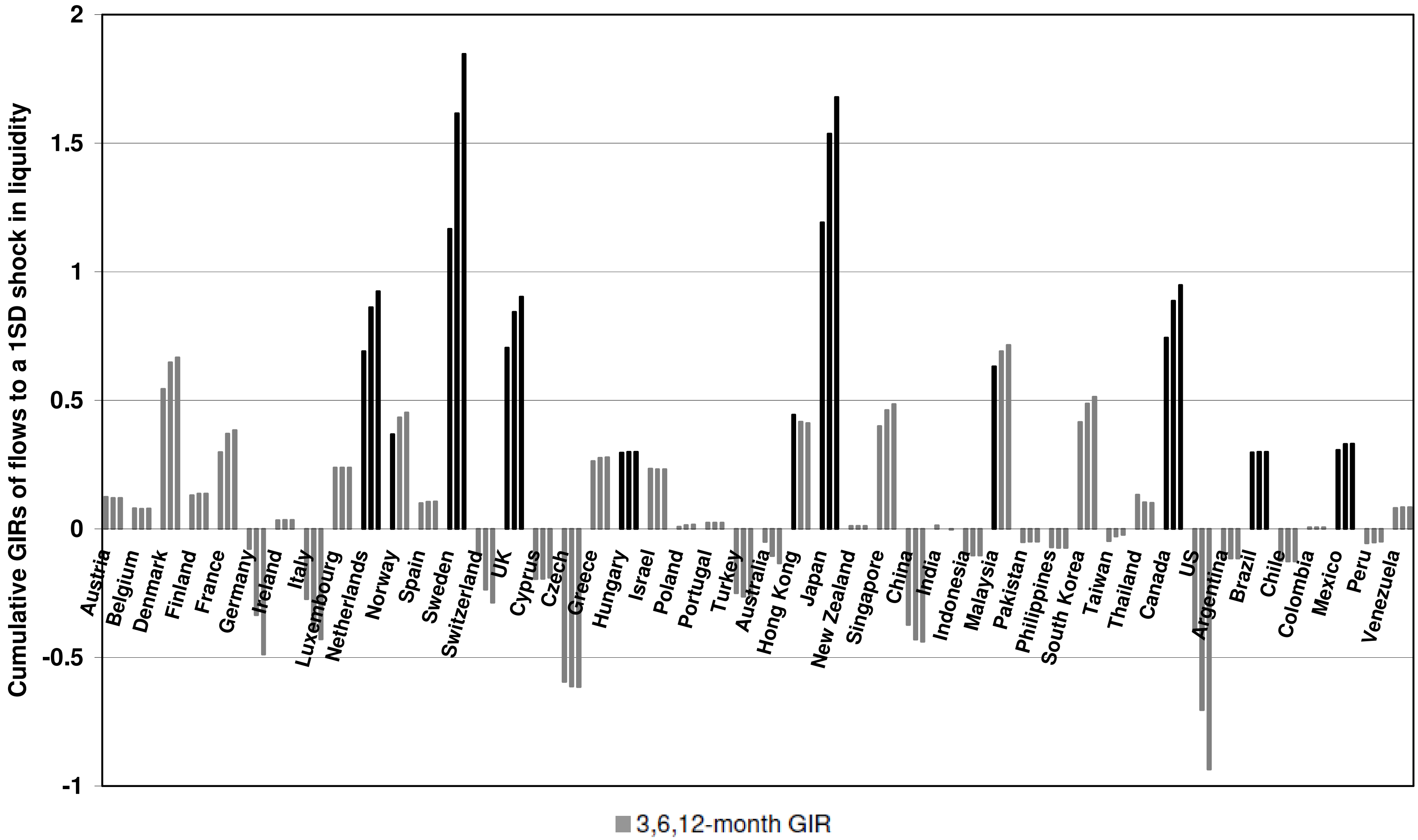

Figure 8: Cumulative GIRs of liquidity to a 1SD shock in flows for 46 individual countries

This figure shows the standardized cumulative generalized impulse responses (GIRs) of market liquidity to a one standard deviation (1SD) shock in market net capital inflows after 3, 6, and 12 months (expressed as a fraction of 1SD of liquidity) for each of the 46 countries in our sample from January 1995 to December 2008. The GIRs are on the results of the baseline VAR model (with monthly net capital inflows, market liquidity, and market returns as endogenous variables) estimated by country. The countries on the x-axis of the figure are grouped by region based on their economic development and geographic location: developed Europe, emerging Europe, developed Asia/Pacific, emerging Asia, developed America, and emerging America. Bars that are colored black indicate GIRs that are statistically significant at the 5% level, based on 95% confidence bounds computed using Monte Carlo simulation.