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Does Hot Money in Equity Flows Affect Emerging Stock Markets?

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ABSTRACT

This research study investigates the influence of hot money in equity flows from the United States to twelve emerging-market (EM) countries on the local stock markets during January 1993 to December 2013, including both crisis and non-crisis periods. The study identifies *de facto* hot money as the temporary component of equity flows. Vector autoregressive models (VARs) were conducted using monthly data on EMs with the Granger causality test and impulse-response analysis. The study found that hot money in equity flows from the United States to EMs does have a significant impact on the local stocks, but the local stock market has little effect on hot money. The findings suggest a new factor regarding equity predictability and profitability that both investment advisors and consultants as well as policymakers may take into account.

INTRODUCTION

Along the path of financial globalization, emerging markets (EMs) have experienced a sharp increase in international capital flows. According to a survey released by the International Monetary Fund (2011a,b), the annual amount of foreign private net capital flowing into EMs was about US$11 billion and US$22 billion in the 1970s and 1980s, respectively. These flows increased dramatically to US$150 billion during 1991–1998, and plunged to US$58 billion between 1998 and 2002 due to the 1997 Asian financial crisis. After that, the volume of equity inflows to EMs resurged until 2007, followed by a significant reversal in 2008–2009 in the "flight to safety" during the late 2000s global financial crisis (Caballero and Krishnamurthy 2008). As the major advanced industrial countries launched quantitative easing schemes during the global financial crisis of the late 2000s, speculative capital flows (or hot money) relocated to the EMs with higher interest rates, which may negatively affect the stability of the local stock market (Martin and Morrison 2008; Korinek 2011).

"Hot money," characterized by high sensitivity, high mobility, and reversibility, refers to the flow of capital from one country to another in order to earn a short-term profit on interest-rate differences, anticipated exchange-rate shifts, or equity premium (Chari and Kehoe 2003; Fuertes et al. 2016). It may become a destabilizing force to emerging-market economies within an undeveloped financial system (Martin and Morrison 2008). In the wake of the late 2000s global financial crisis, a large number of emerging-market economies, including South Korea, Thailand, Indonesia, Taiwan Republic of China, and Brazil, have moderated the pace of liberalization successively and turned to re-impose capital controls with various forms (International Monetary Fund 2011a,b; Ostry et al. 2010). The current advocacy on capital controls in EMs implicitly builds on the presumption that foreign investors destabilize the local financial markets but lacks of empirical evidence, probably because a well-defined method for estimating the magnitude of hot-money inflows for a certain country during a particular period has become available only very recently (Fuertes et al. 2016).

Given the gap in the extant literature, I investigate the question of the interrelationship between hot money in equity flows and the local stock returns. Subjects in my empirical studies are twelve emerging-market economies that are carrying greater weight in the global economy both in terms of gross domestic product (GDP) and market capitalization (CAP). Following Fuertes et al. (2016), I identify *de facto* hot money as the temporary component of equity flows from the United States to emerging-market economies, by state-space model via a Kalman filter using monthly data over a relatively lengthy time span from January 1993 to December 2013. After obtaining data for hot money in equity flows, I conduct vector auto-regressive models (VARs) to explore the interrelationship between hot money in equity flows and the local stock returns using monthly data on EMs with the Granger causality test as well as impulse-response analysis. The VAR models have been used in a strand of literature in this area such as Froot et al. (2001), Dahlquist and Robertsson (2004), Richards (2005), Froot and Ramadorai (2008), Jinjarak et al. (2011), Yan (2015), and Yan et al. (2016).

I find that massive hot money in equity flows from the United States to EMs does yield a significant impact on the local stock markets, but the local stock market does not have a statistically significant effect on hot money. For investment advisors and consultants, the movement of hot money may help them anticipate the trend of the stock market. They should pay more attention to the composition rather than the aggregated amount of cross-border equity flows, especially hot money.

BACKGROUND LITERATURE

This paper closely relates to two strands of the literature. The first investigates the impact of hot money or international capital flows on local markets, and the second studies the drivers of hot money or international capital flows.

IMPACT ON LOCAL MARKETS

Despite an extensive body of research, there remains a heated debate in the literature about the benefits and costs of financial globalization (for surveys, see Stulz 2005; Henry 2007; Kose et al. 2010; and Rodrik and Subramanian 2009). An often-heard critique of financial openness is that the temporary part of capital flows, often termed "hot money," destabilizes local asset markets (see, e.g., Korinek 2011; Fuertes et al. 2016). The inflows of hot money build up gradually over time, but the outflows happen *en masse* and simultaneously, with each player in asset markets, such as shareholders in the stock market, struggling to be the first to exit (for a recent survey, see Kawai and Lamberte 2010).

On the one hand, some researchers, especially those in the neoclassical school, argue that financial globalization and international capital inflows boost economic growth (Bekaert et al. 2005). For instance, Bhagwati (1998), Edison and Reinhart (2001), and Kose et al. (2009) argue that there is a positive influence of capital-account openness on real variables (such as investment, economic growth, etc.). Through the use of event study techniques, Henry (2000) notes a temporary speed-up in the growth rate of private investment following stock market liberalization for major EMs. Henry (2007) adopts a "policy-experiment approach," which considers the growth-enhancing effect of a discrete change in capital account policy as a one-time event and makes arguments based on the results that stock market liberalization is positively associated with growth and investment. Rather than only emphasizing the direct capital flows, literature in this area highlights collateral benefits of capital flows, such as developments in domestic financial sectors (see Levine 2005; Mishkin 2006, 2009), improvements in institutions (see Stulz 2005), and macroeconomic policies (Gourinchas and Jeanne 2006).

On the other hand, Grilli and Milesi-Ferretti (1995), Rodrik (1998), and Prasad et al. (2003) find little evidence supporting the argument that economic growth is positively correlated with capital account liberalization. Calvo (1998) reports that international capital inflows bring about negative effects such as instability of the financial environment, rising prices, deterioration of trade conditions, and so on. Jeanne et al. (2012) run more than 2,300 regressions named a "meta-regression" approach, which employs six *de jure* and *de facto* measures of financial liberalization, attempting to figure out whether capital account openness affects output growth or not. They find little conclusive evidence that capital mobility enhances economic growth, and it is essential to establish a framework that achieves international consensus for desirable capital controls. When a number of emerging-market economies experienced financial crises in the late 1980s, some economists declared that it is enormous capital movements that are the likely source of the local macroeconomic instability and financial fragility. A flood of capital inflows drives credit booms, asset bubbles, and high foreign debt. As a result, a financial crisis can be detonated easily when capital flows stop suddenly or reverse (Kaminsky 1999). More recently, Caballero and Krishnamurthy (2008) and Korinek (2011) have studied the "moving bubble" phenomenon—that when one country or sector in the world economy experiences a financial crisis, hot money will flow into other less-constrained countries or sectors.

A subset of this strand of literature distinguishes among different types of international capital flows (Sarno and Taylor 1999a,b; Fuertes et al. 2016). These authors divide cross-border capital into five types (portfolio equity, debt, official capital, foreign direct investment, and bank flows), and conduct state-space models to gauge the relative importance of the temporary component (hot money) in every form. They conclude that the temporary component or hot money plays a key role in various categories of international capital flows, and these categories have suffered a high degree of reversibility, which provides indirect evidence for the view that these categories of capital flows act as a plausible channel for crisis transmission. None of these papers, however, examines the impact of hot money on local equity markets.

EFFECT ON HOT MONEY IN EQUITY FLOWS

The other side of the problem is the effect of the local stock returns on hot money in equity flows. Mainstream literature distinguishes the drivers of short-term capital inflows to EMs into the "pull" factors (economic fundamentals of recipients) and "push" factors (international economic factors outside recipients). For instance, Taylor and Sarno (1997) indicates that the U.S. federal funds rate is the most important factor that affects short-term debt capital inflows into EMs and that other push factors and pull factors contribute equally to the short-term equity capital or the long-term equity capital inflows. Kim (2000) has shed light on the reason for capital movement in Mexico, Chile, South Korea, and Malaysia by adopting a method of structural decomposition and concludes that push factors are the driving force. Froot et al. (2001) explore not only the correlation between foreign investor inflows and contemporaneous returns but also the association between equity inflows and future returns in EMs. They suggest that it takes local equity prices a few days to drift after the trading of foreign investors, and report a protracted impact instead of a contemporaneous impact of foreign flows on equity prices. Richards (2005) examines the trading behavior of foreign investors in six Asian emerging equity markets by VAR and discovers that net foreign inflows are positively related to the same-day local equity returns. Focusing on the role played by foreign

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exchange, Yan (2015) exploits the interaction between equity flows and stock returns and provides some new evidence on foreign investors' trading behavior and their price impact, and finds that the bi-directional causality is plausible; that is, equity flows have a positive impact on equity returns and vice versa. Although none of the previous papers studies whether and how local equity markets drive the hot money, recent literature (e.g., Fuertes et al. 2016) provides me an opportunity to do so.

DATA

I collect monthly bilateral capital outflow and inflow data in millions of U.S. dollars during January 1993–December 2013 from the U.S. Treasury International Capital database. "Gross purchases by foreigners" and "gross sales by foreigners" are classified as U.S. sales and U.S. purchases, respectively, in the International Capital Reports of the U.S. Treasury Department. The data are collected and presented from the perspective of the foreign parties to the transactions. By definition, "gross purchases by foreigners" are gross sales by U.S. residents. Similarly, "gross sales by foreigners" are gross purchases by U.S. residents. A positive difference indicates net foreign purchases from U.S. residents (U.S. capital inflow) and a negative difference indicates net foreign sales to U.S. residents (U.S. capital outflow).

The twelve EMs in my sample are Argentina, Brazil, People's Republic of China, Chile, Indonesia, India, South Korea, Mexico, Malaysia, the Philippines, Thailand, and Taiwan Republic of China. There are eight Asian markets: People's Republic of China, Indonesia, India, South Korea, Malaysia, the Philippines, Thailand, and Taiwan Republic of China: and four Latin American markets: Argentina, Brazil, Chile, and Mexico. Daily data for such a large number of countries are not available (Yan 2015).

These are the main markets covered by the previous literature. The sample size of twelve markets is large enough to provide results that are potentially fairly general, yet it is small enough to allow more attention to market-specific analysis and presenting results market-by-market in an intelligible way, which may be more difficult using a larger number of markets. My sample markets have been studied in earlier literature. For example, Richards (2005) looked at Indonesia, South Korea, the Philippines, Thailand, and Taiwan Republic of China. Fuertes et al. (2016) and Yan et al. (2016) include all these markets as a subsample of their studies. These markets are of vital importance in the global economy in terms of gross domestic product and the amounts of capital flows.

I scale the observed equity flows by the U.S. consumer price index (CPI) to eliminate the impact of inflation effects. I take the price in 1993 as the price of the base year in the United States. My results do not qualitatively change when I repeat the analysis process based on the un-scaled short-term equity flows data. CPI data are obtained from Datastream.

Following Sarno and Taylor (1999a,b) and Fuertes et al. (2016), I decompose the observed equity flows from the United States to twelve EMs into unobserved permanent and temporary components and identify hot money in equity flows as the temporary component via deploying state-space models using a Kalman filter algorithm.

Table 1

STATE-SPACE MODEL FOR NET EQUITY FLOWS IN EMERGING MARKETS

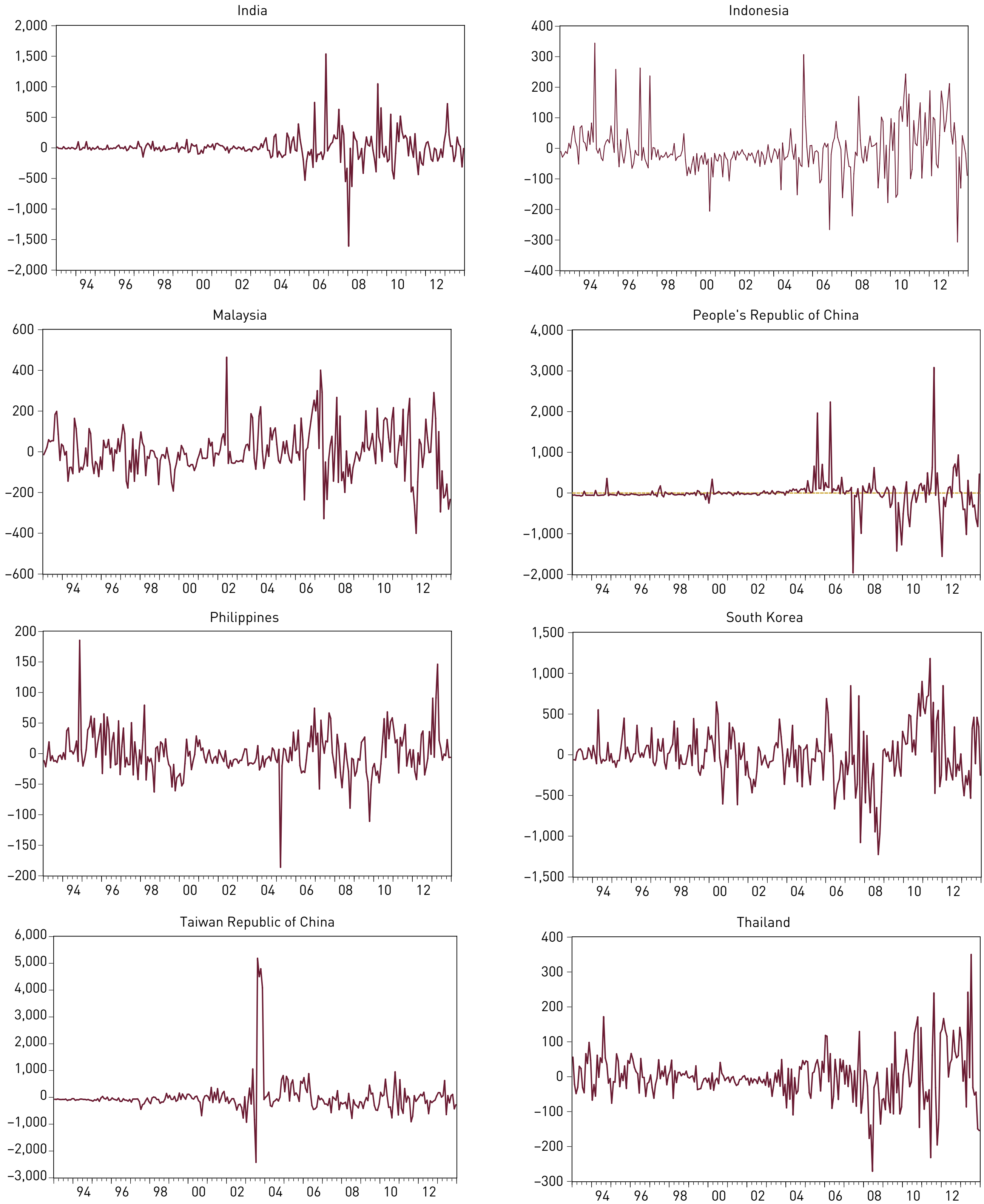
Table 1 reports the results from state-space models for net equity flows, which are CPI-scaled capital flows in millions of U.S. dollars. A dash indicates that the component at hand is absent from the model. 0 ≤ Q-ratio ≤ 1 is the standard deviation of each component over the largest standard deviation across components, computed from the variance-covariance matrix of disturbances. Column seven reports the final level of the stochastic trend and its root mean square error (RMSE). The last column reports the R^2. The sampling frequency is monthly during January 1993–December 2013. The country abbreviations are listed as follows: Argentina (AG), Brazil (BR), People's Republic of China (CH), Chile (CL), Indonesia (ID), India (IN), South Korea (KO), Mexico (MX), Malaysia (MY), Philippines (PH), Thailand (TH), and Taiwan Republic of China (TW).

Country	Q-ratio(ωt) (Stochastic trend)	Q-ratio(νt) (AR)	Q-ratio(εt) (Irregular)	AR(1) coefficient	AR(2) coefficient	Final level of stochastic trend [RMSE]	R^2
AG	0.000	0.202	1.000	1.754	-0.758	-0.655[0.226]	0.492
BR	0.000	0.809	1.000	0.774	–	3.487[0.026]	0.353
CH	0.000	0.569	1.000	0.688	–	-0.784[0.355]	0.404
CL	0.000	0.249	1.000	0.683	-0.116	-0.471[0.097]	0.467
ID	0.000	0.514	1.000	0.672	–	0.203[0.184]	0.391
IN	0.000	0.520	1.000	0.858	–	1.392[0.057]	0.423
KO	0.000	0.789	1.000	0.892	–	0.482[0.669]	0.372
MX	0.000	0.894	1.000	0.841	-0.177	-1.582[0.009]	0.353
MY	0.000	–	1.000	–	–	-0.067[0.511]	0.334
PH	0.000	0.480	1.000	0.848	–	-0.034[0.586]	0.404
TH	0.000	0.486	1.000	0.715	–	0.260[0.008]	0.397
TW	0.000	1.000	0.000	0.510	–	0.9780[0.470]	0.255

Figure 1

HOT MONEY IN ASIAN EMERGING MARKETS

Figure 1 shows monthly hot money extracted from net equity flows for eight individual Asian EMs (India, Indonesia, Malaysia, People's Republic of China, Philippines, South Korea, Taiwan Republic of China, and Thailand) in current millions of U.S. dollars. The sampling frequency is monthly during January 1993–December 2013.



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Bloomberg is used to collect data for emerging-market stock price indexes in U.S. dollars for all of the sample countries. Then I calculate the monthly returns of the equity market indexes in EMs, a proxy for equity returns, which can be approximately estimated by taking the logarithm of stock indexes.

IDENTIFYING HOT MONEY

I report the results from state-space models, which themselves are detailed in the appendix, in table 1. The maximum value of determination R^2 is 0.492 and the minimum coefficient is 0.255. All Q-ratios for the permanent component are extremely low, but Q-ratios for the temporary component are much larger, which shows that the irregular or auto-regressive (AR) component explains significant portions of disturbance variance. My results are in line with those of Fuertes et al. (2016); the dynamics of equity flows can be mainly interpreted by the temporary component. Namely, equity flows from the United States to twelve EMs from 1993–2013 have been dominated by the temporary component (hot money).

Figure 1 shows the unobserved temporary component ($\upsilon_{it} + \varepsilon_{it}$) estimation of equity flows generating from a Kalman filter state-space decomposition. To be specific, figure 1 plots the time-series of the unobserved temporary component (or hot money) in equity flows from the United States to eight Asian EMs and figure 2 reveals the decomposition results of four Latin American EMs.

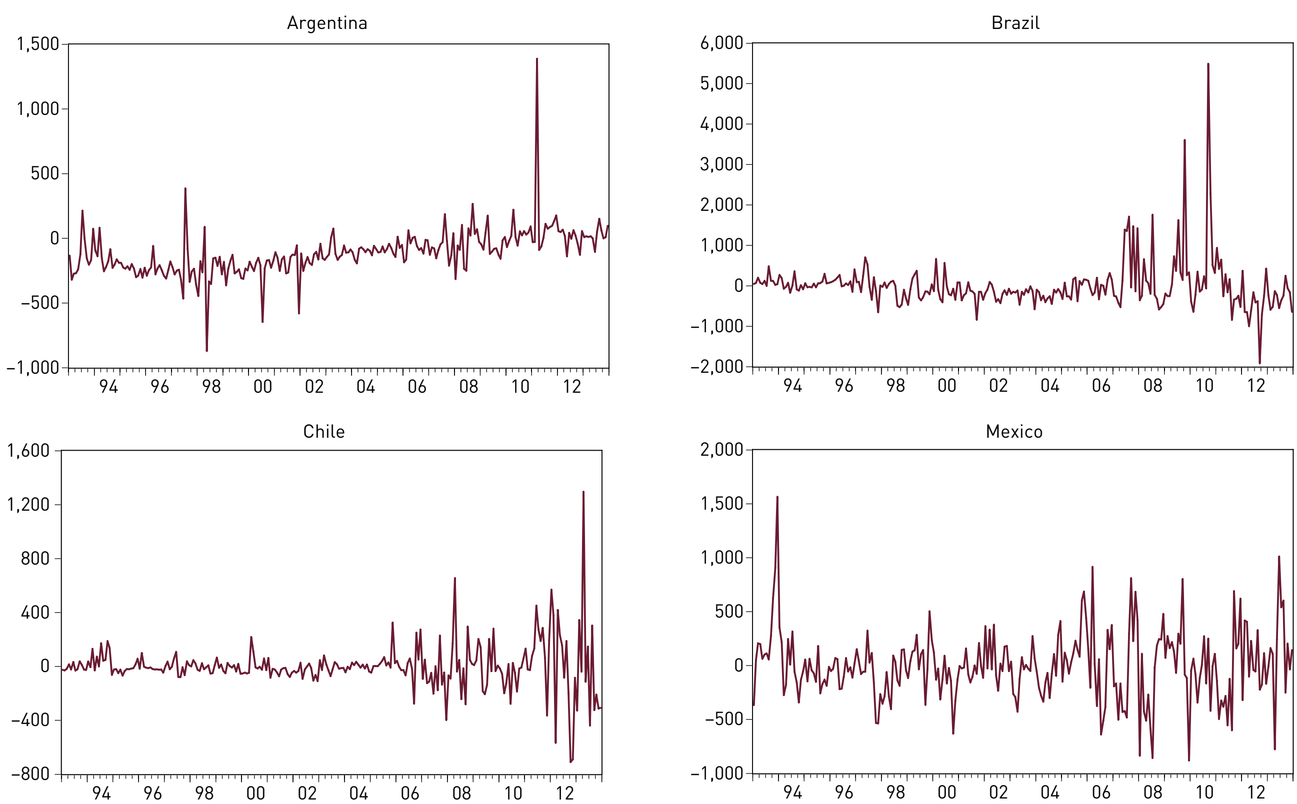
There are some interesting findings. First, in the past several decades we have witnessed a remarkable increase in the scale of hot money from the United States to emerging stock markets. Second, there is a statistically significant difference between Asia and Latin America in the amount of hot money going to EMs. It varies markedly across Asia but not that much across Latin America during the sample period. Most noticeably, Mexico differs significantly from the other three Latin American EMs, which can be seen in figure 2. Perhaps geographic factors and the close cooperative relations between Mexico and the United States are factors. Third, hot-money inflows to Asia and Latin America have increased markedly in volatility since the year 2000 and especially in the recent decade. Clearly, hot money has fluctuated dramatically before and after the 2008 global financial crisis.

Promoted by reductions in stock market investment barriers, equity flows to EMs have increased in both volume and volatility

Figure 2

HOT MONEY IN LATIN AMERICAN EMERGING MARKETS

Figure 2 shows monthly hot money extracted from net equity flows for four individual Asian EMs (Argentina, Brazil, Chile, and Mexico) in current millions of U.S. dollars. The sampling frequency is monthly during January 1993–December 2013.



after the Asian financial crisis. Nevertheless, following their 2007 peak ($205 billion), these equity flows reversed suddenly in 2008–2009 due to a global financial crisis that sparked a flight to safety. During times of quantitative easing in advanced economies, investors treat EMs as fruitful destinations with higher interest rates. Therefore, equity inflows to EMs rebounded strongly in 2010 and 2011. For example, the People's Republic of China experienced only small-scale hot money before 2003, but the magnitude increased after 2005. In fact, the expectation for renminbi (RMB) appreciation rose after July 2005, when RMB exchange rate reform was implemented. This, coupled with expansionary monetary policy and four rounds of quantitative easing in the United States, resulted in more hot money flooding into the People's Republic of China for arbitrage.

RELATIONSHIP BETWEEN HOT MONEY AND LOCAL EQUITY MARKETS

I used standard VAR tools to test whether the model agrees with the initial assumption and economic implications so that I can obtain reliable interpretations of the interaction between hot money and the local stock returns.

VAR MODELS

I do not conduct seasonal adjustment on the main variables, because these variables show little remarkable seasonal variation. I start the analysis of economic time series from the stationarity tests to get rid of the spurious regression. In this paper, I adopt the Augmented Dickey-Fuller test (ADF) to test the stationarity of two time-series variables: hot money and stock market returns.

Table 2 shows that both test statistics for hot money and stock market returns are larger than critical values under the 90-percent, 95-percent, or 99-percent likelihood levels. Hence, I reject the null hypothesis that these series have a unit root. Put differently, I treat these series as stationary.

I primarily propose two hypotheses before examining the interrelationship between hot money in equity flows and the equity returns in EMs. The first is that hot money in equity flows has an influence on emerging stock market returns, which is inspired by the views drawn from Kohli (2001). Kohli (2001) conducts the empirical analysis on Indian data and puts forward that the stock index changes in India are correlated to international capital flows. Nevertheless, the internal mechanism of the impact of hot money on the local stock market is still not clear. Although practitioners widely accept the opinion that the impact is a consequence of foreign investors' technology or information advantage, there is not much empirical evidence to support it. If the standpoint above is plausible, then I expect a positive (negative) excess return when hot money flows in (out) of EMs.

Since the 1990s, mainstream literature has presented arguments on the motivation of U.S. international equity investments (e.g., Taylor and Sarno 1997; Chuhan et al. 1998). Different from the previous views that investors invest their capital in EMs to rebalance their international portfolios, these authors argue that U.S. investors are motivated by chasing returns. Hot money, aimed at earning a short-term profit, is characterized by high sensitivity, high mobility, and reversibility, which makes it a dangerous tool for a portfolio-balancing strategy. In this sense, hot money is more likely to be driven by a return-chasing strategy. Taking this into consideration, I set up the other hypothesis, the reverse causality between hot money and stock returns; that is, stock returns in EMs are dominant drivers of equity inflows. For example, event study techniques lead to the conclusion that there is a temporary speed-up in the growth rate of private investment following stock market liberalization for major EMs (Henry 2000). Richards (2005) examines the trading behavior of foreign investors in six representative Asian emerging equity markets and discovers that net foreign inflows are positively associated with the same-day local equity returns. Edison and Reinhart (2001) carry on the quantitative analysis of the consequences of capital controls in Brazil, Thailand, and Malaysia based on daily data. They conclude that capital controls result in high interest rates and, in turn, lead to adjustment of asset prices in Malaysia, but they fail to find a significant impact of capital controls on asset prices in Brazil and Thailand. If the hypothesis holds, I conjecture that a positive correlation between past stock returns in EMs and current hot-money inflows will be observed.

After obtaining data for hot money, I utilize the vector autoregressive modeling approach to analyze the interrelationship between hot money and the local stock returns. The reason I

Table 2

ADF UNIT ROOT TEST RESULTS

Table 2 reports the Augmented Dickey-Fuller (ADF) test statistic for the null hypothesis of unit root (non-stationary) behavior versus stationarity. The last three columns report critical values at the 1-percent, 5-percent, and 10-percent levels, respectively. The sampling frequency is monthly during January 1993–December 2013.

	t-Statistic	Test Critical Values		
Series	ADF test statistic	1% level	5% level	10% level
Hot Money	-9.7063	-3.4565	-2.8730	-2.5729
Stock Market Returns	-12.7423	-3.4564	-2.8729	-2.5729

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introduce VAR models is that they provide us with a general method to evaluate bi-directional causality; that is, on the one hand, hot money may cause stock prices to rise or fall, and on the other hand, the stock returns would drive hot money flows. The VAR I estimate can be modeled as

$$Y_t = C + \pi_1 Y_{t-1} + \pi 2 Y_{t-2} + \ldots + \pi_k Y_{t-k} + \mu_t \quad (1)$$

where μ_t~i.i.d.N $(0,\Omega)$.

I can display the VAR model in a compact form for t=1, 2, ...T, where Y_t, C, and μ_t are 2×1 column vectors, and π_i is a 2×2 coefficient matrix:

$$Y_t = \begin{bmatrix} Hot\ Money_t \\ Stock\ Return_t \end{bmatrix}, C = \begin{bmatrix} C_1 \\ C_2 \end{bmatrix}, \mu_t = \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \end{bmatrix}, \pi_i = \begin{bmatrix} \pi_{11,i} & \pi_{12,i} \\ \pi_{21,i} & \pi_{22,i} \end{bmatrix}, i = 1, 2, \ldots k$$

The unknown parameter C is the constant intercept term, π_i is the coefficient of the endogenous variables, and μ_t is the disturbance vector. I use aggregate monthly data for hot money and equity returns across all emerging-market economies, covering a sample period from 1993–2013. Hot Money is the temporary component of equity flows from the United States to EMs scaled by the local equity market capitalization; Stock Returns are a monthly percentage of value-weighted returns on emerging stock indexes.

VAR MODEL COEFFICIENTS

I use the Akaike information criterion and Schwartz-Bayes criteria to specify the appropriate lag length of the VAR model, which turns out to be a lag length of one. The VAR model employed eventually can be written as

$$\begin{bmatrix} Hot\ Money_t \\ Stock\ Return_t \end{bmatrix} = \begin{bmatrix} C_1 \\ C_2 \end{bmatrix} + \begin{bmatrix} \pi_{11,i} & \pi_{12,i} \\ \pi_{21,i} & \pi_{22,i} \end{bmatrix} \begin{bmatrix} Hot\ Money_{t-1} \\ Stock\ Return_{t-2} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \end{bmatrix} \quad (2)$$

Table 3 reports the coefficient estimates of vector autoregression with one lag for each endogenous variable. Clearly, past hot money has a significant positive explanatory power on stock returns in EMs because the t-statistic is 4.3238, much larger than the critical value at 1-percent statistical significance level. However, lagged stock returns have little forecasting power for current hot money (the t-statistic is only 0.4778). The following Granger causality tests can confirm the results.

GRANGER CAUSALITY TESTS

Some economic variables are significantly correlated with each other but not necessarily meaningful. Causality is one of the most difficult issues in finance and economics, as well as in other social sciences. One possible way to deal with causality is with Granger causality testing, which is a statistical measure of causality based on prediction. A variable X1 "Granger causes" another variable X2, if and only if the past values of X1 contain information that helps predict X2 beyond the past values of X2 only (for details, please refer to Yan et al. 2016 or others).

Following the extant literature, I carry on Granger causality tests to explore whether the variation of hot money in equity flows (stock returns of EMs) does contribute to the change of stock returns of EMs (hot money in equity flows).

According to the results shown in table 4, hot money in equity flows only has unilateral Granger causality with stock returns in EMs; that is, hot money is the Granger causality of stock returns and stock returns are not the Granger causality of hot money. In other words, changes of stock returns do not yield a significant impact on the movement of hot money.

Table 3

OVERALL VAR ESTIMATES

Table 3 reports the pooled coefficients estimates of one-month lagged hot money and stock returns for all the markets in my sample in aggregate. Left (right) results are for one-month lagged hot money (stock returns). The numbers in the second row (in italics) are t-statistics for the null hypothesis that the corresponding coefficient of hot money or stock returns is zero. The VAR coefficients and co-variance matrix are estimated by ordinary least squares (OLS). The sampling frequency is monthly during January 1993–December 2013.

Series	Hot Money		Stock Returns	
	coefficient	*t*-statistics	coefficient	*t*-statistics
Hot Money(-1)	0.4261	*7.2360*	0.0142	*4.3238*
Stock Returns(-1)	0.5253	*0.4778*	0.1527	*2.4881*
Intercept	-2.8044	*-0.3513*	0.3874	*0.8693*

Table 4

OVERALL GRANGER CAUSALITY TESTS

Table 4 reports F-statistics, P-values, and conclusions for the null hypothesis of 'no Granger causality' either from stock returns to hot money, or from hot money to stock returns for all the markets in my sample in aggregate. The sampling frequency is monthly during January 1993–December 2013.

Null Hypothesis	*F*-Statistic	*P*-value	Conclusion
Stock Returns does not Granger Cause Hot Money	0.2282	0.6333	cannot reject
Hot Money does not Granger Cause Stock Returns	18.6951	2.E-05	reject

IMPULSE RESPONSE ANALYSIS

Moreover, I ensure the stationarity of my VAR model because all eigenvalues of the coefficient matrix lie within the unit circle. I adopt generalized impulse response function to illustrate how each variable in the model responds to shocks as time goes on, because Pesaran and Shin (1998) have demonstrated that the generalized impulse response function is invariant to the ordering of the variables in the VAR. Figure 3 shows the impact of a one-unit standard deviation shock to hot money in equity flows on equity market returns and the influence of stock returns on hot money.

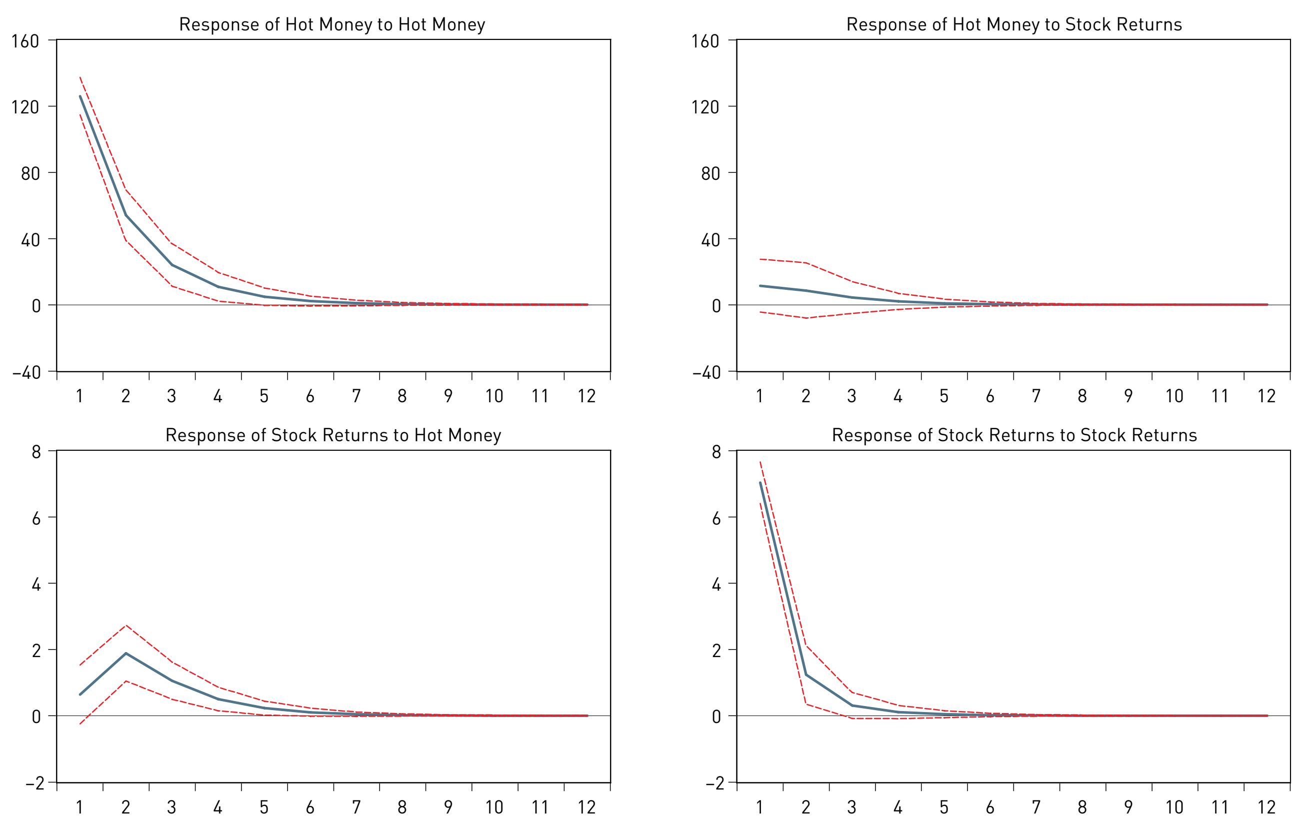
The vertical axis represents changes in hot money (or stock returns), and the horizontal axis stands for lag intervals of shocks (monthly). The solid lines represent the impulse response function, and the dashed lines indicate the double standard deviation band. Obviously, both hot money and stock returns would react strongly to shocks and the response patterns share a similarity. The reaction extent of hot money itself at the first month is the greatest when given a positive shock. Then, the impact decreases gradually and vanishes eventually. It indicates that short-term equity flows quickly into EMs from the United States for short-term profits and promptly withdraws from EMs.

As can be seen from further observation of the cross-response function, a positive shock of hot money by one unit of standard deviation in the current period has a positive impact on stock returns within the following two months and reaches a peak after one-and-a-half months. However, this impact begins to decline after that until it disappears. This demonstrates that giving hot money a positive shock will produce the same impact on stock markets for about one to two months. Namely, hot-money inflows effectively promote the short-term growth of the local stock markets. The other way around, it is clear from the response of hot money to shocks in stock returns that a positive shock to stock returns would bring a light positive response to hot money with short-term persistence effects. In other words, hot money is insensitive to the innovation of the local stock returns and the current stock market boom becomes less appealing to hot-money inflows over time.

Figure 3

OVERALL IMPULSE RESPONSE ANALYSIS

For all the markets in my sample, figure 3 plots the average generalized impulse response functions (GIRF) of hot money to one-unit standard deviation shocks to either hot money or stock returns in the top two graphs, and equity returns to one-unit standard deviation shocks to either hot money or stock returns in the bottom two graphs. The GIRFs are computed from the VAR coefficients reported in table 3 over the full sample period. The vertical axis is returns in percentages and the horizontal axis is months. The solid lines are impulse response function, and the dashed lines indicate the double standard deviation band. The sampling frequency is monthly during January 1993–December 2013.



I find an insignificant effect of stock returns on hot money in equity flows, which aligns with the previous literature that attributes the reason why short-term foreign equity flows enter emerging economies to "push" factors. Taylor and Sarno (1997) suggest that external factors other than U.S. interest rates and "pull" factors make an approximate contribution to short-term and long-term equity capital inflows. Inspired by several previous academic papers (e.g., Chuhan et al. 1998) that classify emerging economies into two groups as Asia and Latin America when discussing factors affecting international capital movements, I repeat empirical analysis to Asia and Latin America EMs, respectively. It turns out that the heterogeneity in terms of my results is not that prominent across countries, and my previous conclusions are reinforced. Table 5 reports the results from Granger causality tests and figures 4 and 5 provide the details of impulse response analysis.

Table 5

GRANGER CAUSALITY TESTS FOR ASIAN AND LATIN AMERICAN SUBGROUPS

Table 5 reports *F*-statistics, *P*-values, and conclusions for the null hypothesis of 'no Granger causality' either from stock returns to hot money, or from hot money to stock returns for two subgroups in my sample. (A) pertains to the subgroup of the Asian countries and (B) to the subgroup of the Latin American countries. The sampling frequency is monthly during January 1993–December 2013.

(A): For Asia			
Null Hypothesis	***F*-Statistic**	***P*-value**	**Conclusion**
Stock Returns does not Granger Cause Hot Money	0.0761	0.7828	cannot reject
Hot Money does not Granger Cause Stock Returns	7.9431	0.0052	reject
(B): For Latin America			
Null Hypothesis	***F*-Statistic**	***P*-value**	**Conclusion**
Stock Returns does not Granger Cause Hot Money	1.4001	0.2484	cannot reject
Hot Money does not Granger Cause Stock Returns	4.5646	0.0113	reject

Figure 4

IMPULSE RESPONSE ANALYSIS FOR THE ASIAN SUBGROUP

For all the eight Asian markets in my sample, figure 4 plots the average generalized impulse response functions (GIRF) of hot money to one-unit standard deviation shocks to either hot money or stock returns in the top two graphs, and equity returns to one-unit standard deviation shocks to either hot money or stock returns in the bottom two graphs. The vertical axis is returns in percentages and the horizontal axis is months. The solid lines are impulse response function, and the dashed lines indicate the double standard deviation band. The sampling frequency is monthly during January 1993–December 2013.

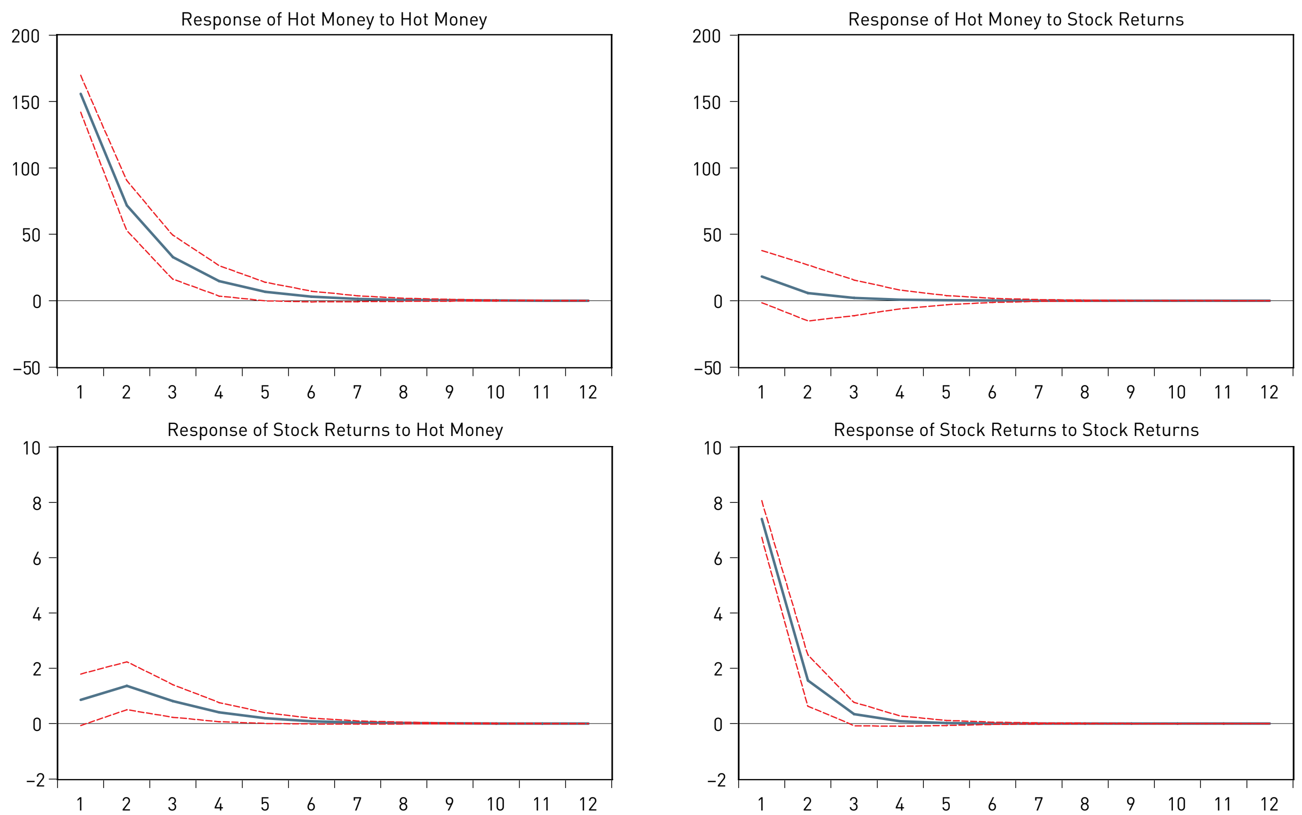
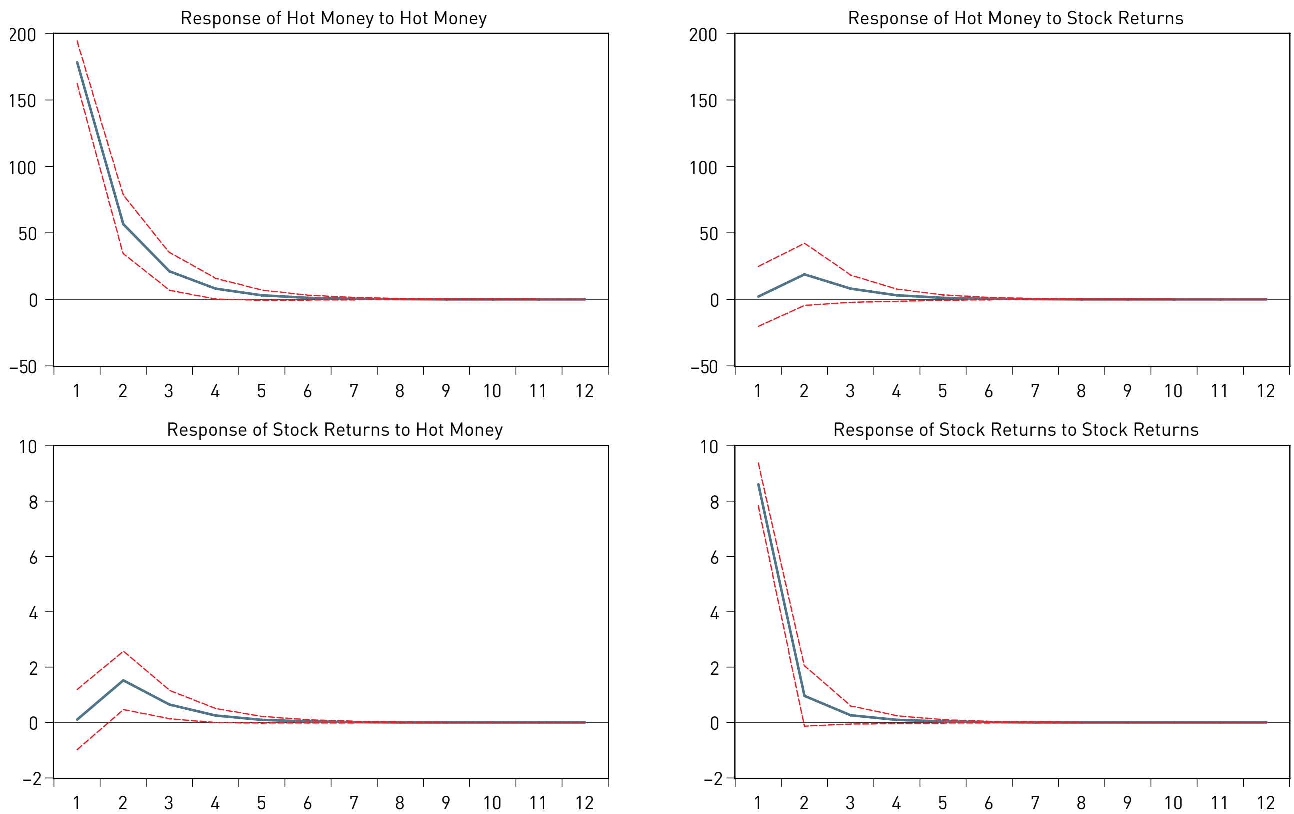


Figure 5

IMPULSE RESPONSE ANALYSIS FOR THE LATIN AMERICAN SUBGROUP

For all the Latin American markets in my sample, figure 5 plots the average generalized impulse response functions (GIRF) of hot money to one-unit standard deviation shocks to either hot money or stock returns in the top two graphs, and equity returns to one-unit standard deviation shocks to either hot money or stock returns in the bottom two graphs. The vertical axis is returns in percentages and the horizontal axis is months. The solid lines are impulse response function, and the dashed lines indicate the double standard deviation band. The sampling frequency is monthly during January 1993–December 2013.



ROBUSTNESS

I have done several additional tests to make sure of the robustness of my results. First, I use the local-currency equity indexes instead of the USD MSCI indexes to construct equity returns, which is in line with the insights of Yan (2015). The results, reported in table 6, show that the main results are qualitatively unchanged. The economic magnitude of the impact of hot money on stock returns has been reduced substantially, from 0.0142 in table 3 to 0.000108 in table 6, while statistically significant as before with a *t*-statistic of 4.02768, which is in line with the intuition of Yan (2015).

Moreover, although this paper demonstrates that hot money is correlated with future returns, other variables could be influencing stock returns. I thank a referee for this comment. I have tried to control the main exogenous variables in the literature and find the results unchanged, if not stronger. For instance, table 7 reports the pooled coefficients estimates of one-month lagged hot money and stock returns for all the markets in my sample in aggregate with effective federal fund rates, the VIX from CBOE, and the TED spread as control variables. The coefficient of lagged hot money in the stock return equation increased from 0.0142 to 0.017961, with a *t*-statistic of 2.56495. We have also tried other combinations in Yan et al. (2016) and find similar results.

Last but not least, given the data covers a long period with both crisis and non-crisis years, it might be interesting to analyze the impact of the latest financial crisis. I thank the referees for this comment. Table 8 reports the pooled coefficients estimates of one-month lagged hot money and stock returns for all the markets in my sample in aggregate over crisis periods. The crisis period is defined from January 2007 to December 2013, and from August 2007 to December 2013, in panels A and B, respectively. I confirm the previous results that past hot money has a significant positive explanatory power on stock returns in EMs, but lagged stock returns have little forecasting power for current hot money. More interestingly, the economic magnitude of the impact of hot money on local equity markets is larger during crisis periods (from 0.0142 to 0.020864), and even larger when the crisis is going on (0.022813). Overall, I find that hot money has

Table 6

OVERALL VAR ESTIMATES WITH LOCAL-CURRENCY STOCK RETURNS

Table 6 reports the pooled coefficients estimates of one-month lagged hot money and local-currency stock returns for all the markets in my sample in aggregate. Left (right) panel results are for one-month lagged hot money (stock returns). The numbers in the second row (in italics) are *t*-statistics for the null hypothesis that the corresponding coefficient of hot money or stock returns is zero. The VAR coefficients and covariance matrix are estimated by OLS. The sampling frequency is monthly during January 1993–December 2013.

	Hot Money		Stock Returns	
Series	coefficient	*t*-statistics	coefficient	*t*-statistics
Hot Money(-1)	0.420614	*7.17255*	0.000108	*4.02768*
Stock Returns(-1)	125.0191	*0.93336*	0.181007	*2.95875*
Intercept	-3.904870	*-0.48506*	0.008688	*2.36294*

Table 7

OVERALL VAR ESTIMATES WITH CONTROL VARIABLES

Table 7 reports the pooled coefficients estimates of one-month lagged hot money and stock returns for all the markets in my sample in aggregate with effective federal fund rates, the VIX from CBOE, and the TED spread as control variables. Left (right) panel results are for one-month lagged hot money (stock returns) on the crisis period. The numbers in the second row (in italics) are *t*-statistics for the null hypothesis that the corresponding coefficient of hot money or stock returns is zero. The VAR coefficients and covariance matrix are estimated by OLS. The sampling frequency is monthly during January 1993–December 2013.

	Hot Money		Stock Returns	
Series	coefficient	*t*-statistics	coefficient	*t*-statistics
Hot Money(-1)	0.136061	*1.10504*	0.017961	*2.56495*
Stock Returns(-1)	-0.400903	*-0.20407*	0.004269	*0.03821*
Effective Federal Fund Rate(-1)	5.534549	*0.28153*	1.266457	*1.13274*
VIX(-1)	0.516221	*0.2073*	-0.12511	*-0.88338*
TED(-1)	-75.83571	*-1.34064*	-3.413345	*-1.06101*
Intercept	15.44367	*0.32496*	4.263328	*1.57734*

Table 8

OVERALL VAR ESTIMATES ON THE CRISIS PERIOD

Table 8 reports the pooled coefficients estimates of one-month lagged hot money and stock returns for all the markets in my sample in aggregate over the crisis periods. Left (right) panel results are for one-month lagged hot money (stock returns) on the crisis period. The numbers in the second row (in italics) are *t*-statistics for the null hypothesis that the corresponding coefficient of hot money or stock returns is zero. The VAR coefficients and covariance matrix are estimated by OLS. The sampling frequency is monthly. The crisis period is defined from January 2007 to December 2013, and from August 2007 to December 2013, in panel A and B, respectively.

	Hot Money		Stock Returns	
(A)	coefficient	*t*-statistics	coefficient	*t*-statistics
Hot Money(-1)	0.179488	*1.61331*	0.020864	*3.32071*
Stock Returns(-1)	0.654370	*0.35882*	0.149354	*1.45013*
Intercept	-13.57445	*-0.91292*	0.520034	*0.61928*
	Hot Money		**Stock Returns**	
(B)	**coefficient**	***t*-statistics**	**coefficient**	***t*-statistics**
Hot Money(-1)	0.232458	*2.01785*	0.022813	*3.41728*
Stock Returns(-1)	0.569373	*0.30622*	0.120427	*1.11768*
Intercept	-11.97567	*-0.77806*	0.232629	*0.26081*

a significant impact on the local stock markets, but not the other way around.

CONCLUSIONS

In the wake of the late 2000s global financial crisis, the impact of hot money on the EMs has come again under intense scrutiny. The resurgence of global capital flows, in the aftermath of quantitative easing programs in the United States, has brought back proposals for a Tobin tax (a tax suggested by economist and Nobel Memorial Prize in Economic Sciences Laureate James Tobin) on cross-border capital flows and has led the International Monetary Fund (IMF) to publicly abandon its position that capital controls are inappropriate for most countries. Several EMs, including Brazil, Taiwan

Republic of China, South Korea, Indonesia, and Thailand, recently have re-adopted capital controls. Those advocating capital controls implicitly build on the presumption that foreign investors destabilize local financial markets, but the international finance literature has provided scarce evidence on this subject. This paper fills this gap.

Perhaps the most difficult issue is to gauge the actual amount of hot money during a specific period for a specific country. Following Fuertes et al. (2016), in this paper I identify *de facto* hot money as the temporary component of equity flows using state-space models via a Kalman filter algorithm.

The main part of this paper is the interrelationship between hot money in equity flows and the local stock returns. My empirical analysis indicates that massive hot money in equity flows from the United States to EMs does yield a significant impact on the local stock markets, but the local stock markets have little effect on hot money. For investment advisors and consultants, hot money can be a clue for them to predict the trend of the stock market. They should pay more attention to the composition rather than quantity of cross-border equity flows, especially hot money.

One future direction can be to look at hot money from the perspective of trust (e.g., Massa et al. 2015), because the EMs are typically low-trust markets and the advanced markets are usually high-trust ones. For this reason, it is plausible that the hot money in equity flows from the United States to the EMs is greatly trusted by the investors in the United States. Hence, the international hot money is able to affect the emerging equity markets by both stock-picking and timing, as well as resist the attraction from the short-term fluctuations from the emerging equity markets. However, it is beyond the scope of this paper and I leave it as a possible direction for future research.

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APPENDIX: STATE-SPACE MODELS

State-space models (or unobserved components models) have been used widely to estimate unobserved time variables such as rational expectation, permanent income, measurement error, etc. Using the recursive Kalman filter algorithm, these models incorporate unobserved variables (state variables) into observable models and eventually receive the estimated result. Here, state-space models enable us to measure unobserved hot money via decomposing the observable equity flows. The unobserved components model can be written as follows:

$$EF_{it} = \omega_{it} + \nu_{it} + \varepsilon_{it} \qquad (1)$$

where ε_t~i.i.d.N $(0,\sigma^2_{\varepsilon,i})$, i = 1,2,.., N are countries, and t = 1,2,.., T are months

EF_{it} denotes the observed equity flows from the United States to a given emerging market i at time t, ω_{it} is the unobserved permanent component of the equity flows that is considered to be a random-walk process, and $\upsilon_{it} + \varepsilon_{it}$ is the unobserved temporary component that is dominated by an appropriate function, an order-two auto-regressive process to be exact. The random disturbance in the system is also a set of time-dependent variables, which is represented by a white noise ε_{it}.

The general form of the permanent component is

$$\omega_{it} = \gamma + \omega_{it-1} + \delta_{it}\ ,\ \delta_t \sim \text{i.i.d.N}(0,\ \sigma^2_{i\delta}) \qquad (2)$$

where γ is the drift and δ_{it} is a white noise part.

The general form for the temporary component is

$$\nu_{it} = \lambda_1\nu_{it-1} + \lambda_2\nu_{it-2} + \xi_{it} \qquad (3)$$

where ξ_{it} ~i.i.d.N $(0,\ \sigma^2_{i\xi})$ and coefficients satisfy: $|\lambda_1+\lambda_2|<1$, $|\lambda_1-\lambda_2|<1$, $-1<\lambda_2<1$.

The state-space models contain two equations: one state equation and one signal equation. The state equation reflects the state of the dynamic system at a certain moment under the effect of state variables and the signal equation (or measurement equation) connects the state vector of unobserved variables with output variables EF_{it} at some time. When the dynamic system is expressed in state-space form, important algorithms with Kalman filtering as the core can be applied to it. The essence of a Kalman filter is to reconstruct the state vector of the system based upon the measurements.

The signal equation can be written as:

$$EF_{it} = [1\ 1\ 1]\begin{bmatrix}\omega_{it}\\ \nu_{it}\\ \varepsilon_{it}\end{bmatrix} \qquad (4)$$

The state equation is:

$$\begin{bmatrix}\omega_{it}\\ \nu_{it}\\ \varepsilon_{it}\end{bmatrix} = \begin{bmatrix}1 & 0 & 0\\ 0 & \lambda_\nu & 0\\ 0 & 0 & 0\end{bmatrix}\begin{bmatrix}\omega_{it-1}\\ \nu_{it-1}\\ \varepsilon_{it-1}\end{bmatrix} + \begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}\begin{bmatrix}\omega_{it}\\ \nu_{it}\\ \varepsilon_{it}\end{bmatrix} \qquad (5)$$

I use monthly CPI-scaled equity flows for each emerging market and choose Maximum Likelihood as the estimation method for a recursive Kalman filter. Specific to each emerging country, I have attempted the possibilities within the framework of general state-space models and choose the appropriate model according to the R^2 criteria. The model for South Korea, Brazil, Malaysia, People's Republic of China, and Indonesia is as follows: EF_t=ω_t+ν_t+ε_t; ω_t=ω_{t-1}+δ_t ;$_t$=$\lambda_1\nu_{t-1}$+ξ_t. The state-space model for Argentina and Chile can be written as EF_t=ω_t+ν_t+ε_t; ω_t=ω_{t-1}+δ_t; ν_t=$\lambda_1\nu_{t-1}$+$\lambda_2\nu_{t-2}$+ξ_t. For Taiwan Republic of China, the best specification is: EF_t=ω_t+ν_t; ω_t=ω_{t-1}+δ_t; ν_t=$\lambda_1\nu_{t-1}$+ξ_t. The model I select for India, Philippines, and Thailand is: EF_t=ω_t+ν_t+ ε_t; ω_t=γ+ω_{t-1}+δ_t; ν_t=$\lambda_1\nu_{t-1}$+ξ_t. Equity flows of Mexico can be decomposed using the following model: EF_t=ω_t+ ε_t; ω_t=ω_{t-1}+δ_t . Q-ratios in table 1 measure the relative importance of the temporary and permanent components of equity flows, which are defined as:

$$\text{Q-ratio}(\omega_{it}) = \frac{\sigma_{i\delta}}{max(\sigma_{i\delta},\ \sigma_{i\xi},\ \sigma_{i\varepsilon})},\ \text{Q-ratio}(\nu_{it}) = \frac{\sigma_i\xi}{max(\sigma_{i\delta},\ \sigma_{i\xi},\ \sigma_{i\varepsilon})},$$

$$\text{and Q-ratio}(\varepsilon_{it}) = \frac{\sigma_i\varepsilon}{max(\sigma_{i\delta},\ \sigma_{i\xi},\ \sigma_{i\varepsilon})}.$$

Q-ratio(ω_{it}) is expected to be equal to 1 if the variation of equity flows is mainly derived from the dynamics of the permanent component. Q-ratio(ν_{it}) or Q-ratio (ε_{it}) is supposed to be equal to 1 if most variation of equity flows can be explained by the temporary component. For details of state-space models and the Kalman filter, refer to Sarno and Taylor (1999a,b) and Fuertes et al. (2016).

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