รายงานวิจัยฉบับสมบูรณ์

โครงการ Mutual fund flows in Asian Equity Markets

โดย รศ.ดร.พันทิศา ภาวบุตร

มหาวิทยาลัยธรรมศาสตร์

14 สิงหาคม 2556

สัญญาเลขที่ RMU 5380051

รายงานวิจัยฉบับสมบูรณ์

โครงการ Mutual fund flows in Asian Equity Markets

รศ.ดร.พันทิศา ภาวบุตร

มหาวิทยาลัยธรรมศาสตร์

สนับสนุนโดยสำนักงานกองทุนสนับสนุนการวิจัยและ

สำนักงานคณะกรรมการอุดมศึกษา

(ความเห็นในรายงานนี้เป็นของผู้วิจัย สกว. ไม่จำเป็นต้องเห็นด้วยเสมอไป

Acknowledgements

กิตติกรรมประกาศ

The author wishes to thank Thailand Research Fund, the Office of Higher Education Commission and Thammasat Business School for financial support. The research has also benefited from comments from participants at workshop seminars at Thammasat Business School, the Stock Exchange of Thailand, and the Development Bank of Japan, Tokyo. The author is grateful for comments from Anya Khanthavit, Sutthisit Jamdee, Masuharu Hanazaki, Kulpatra Sirodom, Jon Wongswan, and Hong Yan. The author thanks Athivadee Panuvatvanich, Patcharachai Puttikulsathit, and Siraprapa Watakit for wonderful research assistance.

Mutual fund flows in Asian equity markets

Abstract

This research examines the role of emerging market equity mutual fund flows in Asian equity markets in various aspects. First, this paper uses weekly investor net purchases of mutual funds that invest into Asian equity markets over the period 2002-2009. There is evidence that higher market return attracts more incoming flow in the following week. This result is robust after controlling for regional returns, interest rates, and exchange rates. Perturbations of investor net purchase into China funds have a more positive and lasting impact on flow innovations into other country funds. Innovations of investor net purchase into Japanese funds generate only a strong concurrent impact.

Second, there is evidence that fund manager's allocations are highly correlated. More than 70% of the allocation adjustments within each country allocations are done at the same time. Local and U.S. returns and the volatility of investor injection/redemption materially affects fund manager's weight allocation in each market.

Third, the paper uses daily series of foreign equity flows into Thailand during January 1995-December 2012 to investigate the differential pricing impact of foreign equity flows on two market segments; one consisting of stocks that are favored by foreign investors, and the other that are less favored. The study also measures individual stock exposure to foreign flow shocks. A cross-sectional analysis shows that the exposure to foreign flow shocks is associated with a reduction in risk premium. The differential effect of foreign flows on different segments of the markets indicates that the pervasiveness of market liberalization is not equally shared across the local market.

Key words: Emerging markets, international mutual funds, market liberalization, market segmentation, foreign equity flows

Project Code: RMU 5380051 Project period: 15 June 2010 - 14 August 2013

Investigator: Pantisa Pavabutr, Thammasat University, E-mail: pantisa@tbs.tu.ac.th,

บทบาทการเคลื่อนย้ายเงินทุนของกองทุนรวมต่างชาติต่อตลาดหลักทรัพย์ในภูมิภาคเอเชีย

บทคัดย่อ

งานวิจัยนี้ทำการศึกษาการเคลื่อนย้ายของเงินลงทุนของกองทุนตราสารทุนในตลาดเกิดใหม่ในเอเชียแปซิฟิค ผลการศึกษาแบ่งเป็น 3 ประเด็น ดังนี้ ประเด็นที่ 1 ผลจากการวิเคราะห์ข้อมูลการซื้อขายหน่วยลงทุนกองทุนเปิดรายสัปดาห์ระหว่างปี 2002-2009 ของนักลงทุน พบว่าอัตราผลตอบแทนของตลาดเป็นตัวกำหนดปริมาณการซื้อขายหน่วยลงทุนกองทุนที่สำคัญมากกว่าอัตราผลตอบแทนของตลาดภูมิภาค อัตราดอกเบี้ย และอัตราแลกเปลี่ยน ค่าความคลาดเคลื่อนของการซื้อสุทธิในกองทุนที่ลงทุนในตลาดจีนมีผลกระทบเชิงบวกอย่างมีนัยสำคัญและต่อเนื่องต่อการซื้อสุทธิของกองทุนในประเทศอื่นๆ ค่าความคลาดเคลื่อนของการซื้อสุทธิในกองทุนที่ลงทุนในตลาดญี่ปุ่นมีผลกระทบที่สั้นกว่า

ประเด็นที่ 2 การศึกษาพบว่าการปรับน้ำหนักการลงทุนของกองทุนมักเกิดขึ้นพร้อมๆกัน ปัจจัยที่ทำกำหนดการปรับน้ำหนักการลงทุนของกองทุนคืออัตราผลตอบแทนในประเทศ อัตราผลตอบแทนของตลาดสหรัฐ และความผันผวนของการซื้อขายหน่วยลงทุนกองทุนของนักลงทุน

ประเด็นที่ 3 ผู้วิจัยได้ทำการศึกษาข้อมูลรายวันของกระแสเงินลงทุนสุทธิของนักลงทุนต่างชาติในตลาดหลักทรัพย์แห่งประเทศไทยระหว่าง ปี 1995-2012 เพื่อวัดผลกระทบทางราคาและความไหวที่แตกต่างระหว่างหลักทรัพย์ที่ได้รับความนิยมจากนักลงทุนต่างชาติ และหลักทรัพย์ที่ไม่ได้รับความนิยมจากนักลงทุนต่างชาติ พบว่าผลกระทบทางราคาของหลักทรัพย์ที่ได้รับความนิยมจากนักลงทุนต่างชาติเท่านั้นที่มีนัยสำคัญ และระดับความไหวต่อความคลาดเคลื่อนของกระแสเงินลงทุนสุทธิของนักลงทุนต่างชาติมีผลกระทบต่ออัตราผลตอบแทนเพื่อชดเชยความเสี่ยง

1. Executive Summary

Research examining the role of foreign portfolio flows in emerging equity markets took off after the Asian crisis, circa 1997. Today the role of foreign portfolio flows remains an interesting issue of academic and policy debate in Asia given the growing dominance of China and India equity markets in the region, an ever-growing boom in international mutual funds, and the sheer volatility of flows as investors may enter and exit funds at any time. This paper explores the weekly pattern of emerging market mutual fund flows in Asia between 2002-2009 and examines the determinants of their aggregate flows and the hierarchy of fund flows from large to small markets. Then using monthly individual fund allocations into each market, the paper investigates the sources of changes in allocation weights. An analysis of differential effect of foreign flows on different segments of the market is provided using daily equity flow data into the Thai market.

Unlike most existing literature that uses aggregate foreign portfolio flows into equity markets, this study uses a proprietary data set from the Emerging Portfolio Fund Research Inc (EPFR) that maintains investors' weekly net purchase and sale of country funds. As of the third quarter of 2009, we compile a total of 1,063 funds from 116 fund families, which includes Japan country funds and funds under the Asia ex-Japan category. The data does not include flows from Global Emerging Market Funds or other International Funds. The dataset also include monthly country weight allocations over the same for individual funds. To better understand the exposure a stock market may have on foreign equity flow, the study uses daily foreign equity flow data into the Stock Exchange of Thailand between 1995-2012 to measure the differential effect of foreign flows on different segments on the market, one segment favored by foreign investors and the other that is less favored.

1.1 Literature Survey

Earlier research on foreign portfolio flows can be segmented into several key areas. The first involves literature assessing the general behavior of foreign portfolio flows to equity markets.

Barth and Zhang (1999) investigate the role of foreign equity flows during Asian financial crisis in 1997 and find that international placements and private equity investments are stable sources of finance. Foreign investors, who control the majority of free floats and have longer investment horizon, have suffered significant losses. Hedge funds, however, have gained significantly during the study period. Chai-Anant and Ho (2008) examines similar six Asian emerging markets from foreign investors' daily transactions and their relationship with local market returns and exchange rate changes. Their result confirms that equity market returns matter for net equity purchases and vice versa. Foreign investors often move in or out of multiple Asian markets simultaneously and more so on the way in than the way out. Others, for example Bekaert et al. (2002) and Clark and Berko (1996) find an association between equity price movements and foreign flows. A recent empirical work by Jotkasthira et al. (2012), identifies investor flows to funds as sources of transmission of shocks across international markets.

The second segment explores the role of foreign investors as informed or positive feedback traders. On one hand, foreign investors are perceived to have better information processing ability and are capable of anticipating price movements (Choe et al. (1999), Griffin et al. (2004), Seascholes (2004)). On the other, they are perceived to herd after stock returns. Richards (2002) analyses aggregate daily trading of all foreign investors in six Asian emerging equity markets and finds that foreigners are net buyers in these markets on the day after their markets or the US market rise. This suggests information transmission from recent returns, rather than portfolio-rebalancing and larger price impact from trades by foreign investors. Wongswan (2006) reports large and significant association between macroeconomic announcements from developed-economy (such as the US and Japan) to equity volatility and trading volume from emerging-economy (such as Korea and Thailand). Froot and Ramadorai (2008) find trend chasing behavior in closed-end country funds.

The third area focuses on how foreign portfolio flows may increase market volatility given the sheer size of foreign investment flows and their positive feedback tendency. But thus far evidence have shown little support whether the study is based on a large market like Japan

(Hamao and Mei (2001), Karolyi (2002)) or small Asian markets like Indonesia (Bonser et al. (2002)) or Thailand (Pavabutr and Yan (2007)). Extant evidence indicates a strong contemporaneous relationship between net inflow of foreign capital and market return. What is unsettled is the interpretation of this relationship and implications for the role of foreign investors in emerging markets. There are several competing hypotheses to explain this relationship. One hypothesis is that the participation of foreign investors in the market brings about a demand shift and hence a permanent price change. This broadening of investor base increases risk sharing opportunity and hence lowers the required rate of return. Theoretical arguments for this mechanism are provided by Merton (1987), Errunza and Losq (1985), and Eun and Janakiramanan (1986), and empirical work on the effect of liberalization on emerging markets is reported by Bekaert and Harvey (2000) and Henry (2000). Another hypothesis is the temporary price pressure effect due to market illiquidity in absorbing the extra demand and the resulting price change tends to be reversed in subsequent trading periods.

Another segment addresses market integration as a consequence of liberalization. It has also been documented that foreign equity investments in emerging markets tends to favor large and well established companies. This effectively creates a two-tier local market distinguished by relative foreign interest and hence limits the pervasiveness of market liberalization. Differential impact of foreign flows on returns and volatility of stocks in different segments of a local market remains an open question. The issue of segmentation within a market, has thus far been underexplored, but has important implications for pricing of risk of stocks in two different tiers. Such study should provide further understanding to why despite increased levels of integration in many countries in recent years, the level of segmentation remains significant in emerging markets (see Bekaert et al.(2011) and Carrieri, Chaieb, and Errunza (2013).

1.2 Research questions and contributions

This study has several contributions. First, it provides a timely overview of the most recent and important subset of total fund flow patterns in Asia, which has been the key source of growth

in world equities. Thus far, little is known about the behavior of investor flows into these mutual funds.

Second, it provides an analysis of hierarchy of investor flows into mutual funds in Asia. We conjecture that flows are likely move first into important markets like China and Japan which are the barometer of Asian growth before trickling down to smaller markets.

Third, the study explores how much mutual fund investor's injection/redemption activities determines changes in mutual fund country allocations. Understanding investor trading patterns enables the study to delineate the sources of allocation co-movements among funds. Jotikasthira et al. (2012) show that investor flows into funds are also an important channel of market comovement.

Fourth, the study links stock price sensitivity or exposure to foreign flow shocks to return levels. Although the work of Bekaert and Harvey (2000), Henry (2000), and Chari and Henry (2002), all of which favor market liberalization, there is limited research on how such exposure may affect valuation.

The study finds that weekly fluctuations in investment flows into emerging market funds are high and yet they are fairly persistent. This finding is similar to Kaminsky et al. (2001) who provide an overview of emerging market fund activities during emerging market crises in 1990s and document high fluctuations in fund injections and redemptions. We find that higher market return is associated with increased investments in mutual funds in the following week. Investor flows into Japan and China funds have strong contemporaneous impact on flows into other Asia mutual funds. In addition, an increase in flows into Japan and China in earlier weeks can predict reductions in flows into other Asian countries. Although the economic impact from Japan flows are greater at the contemporaneous level, impulse response functions reveal that shocks from inflows into China mutual funds have a permanent positive impact on inflows into other Asian funds.

There is evidence that fund manager's allocations are highly correlated. More than 70% of the allocation adjustments within each country allocations are concurrent. Using fixed effects

regressions, we find that local and US returns as well as the volatility of investor injection/redemption are key determinants of mutual fund's shift in allocation in each market. The study shows that comovement in mutual fund flows in equity markets are not at the discretion of fund manager's alone but also determined by the investor trading patterns.

The final part of the study examines the dynamic relation between foreign flow and price impact as well as individual stock exposure to foreign flow shock with a focus on the Thai stock exchange. The exposure is measured with "flow beta," estimated from univariate and multivariate regression of excess stock return on flow shocks. The study finds that monthly flow betas are mostly negative. Furthermore, the stock segment that is relatively more favored by foreign investors exhibit even more negative flow beta relative to those that are less favored. Our cross-sectional analysis shows that the exposure to foreign flow as measured by the flow beta of returns for stocks in the market is associated with a reduction in risk premium.

This research has five sections. The second section provides data description and some market background. The third section reports the study on the dynamics of investor injection and redemption in emerging market funds and the determinants of country allocations of emerging market mutual funds. Next, section four investigates the differential pricing impact on different market segment on the Thai exchange. Section five concludes the study.

2. Data Description

2.1 Asian mutual fund flows and country allocations

Panel A of Table 1 provides the total number of mutual fund data available from the EPFR database in Asia ex-Japan and in Japan as well as the number of dedicated country funds over the

sample period. A limited number of hedged funds are in the sample. Not included in our computations are Global Emerging Market Funds and other International Funds. We do not separate funds that are indexed based ETFs and non-ETFs.

Despite the recent market downturn, the number of fund families in Asia ex Japan has grown from 76 in 2003 to 112 in 2009 mainly driven by growth from China and India. Likewise, the average end-of-week asset size per fund in China funds grew from USD 97 million in 2003 to USD 215 million in 2009 whereas Indian funds grew from USD 64 million in 2003 to USD 103 million in 2009 shown in Panel B of Table 1. As part of "Greater China," Hong Kong and Taiwan experienced spill-over of growth and wealth from the mainland. Mutual fund activities in the rest of Asia including Japan are more subdued. Thailand in particular is the only country in our sample where the average end of week fund size has shrunk from USD 46 million in 2003 to only USD 22 million in 2009.

Figure 1 demonstrates cumulative flow in USD millions into Asia ex-Japan and Japan funds during the total period. Equity flows into Japan lead flows going to other Asian countries and funds going out. At the end of December 2009, Japan exhibits cumulative outflow where in other Asian markets report net inflow.

Table 2 presents cumulative weekly foreign equity flows during January 2002 to December 2009 from 11 different countries. The data is also divided into two sub-periods to separate the crisis period which starts during 2007. The first period is from January 2002 to December 2006 and the second period covers January 2007 to December 2009.

For the total period, seven countries (China, Hong Kong, India, Indonesia, the Philippines, Singapore, and Taiwan) exhibit cumulative inflow and four countries (Japan, Korea, Malaysia and Thailand) report cumulative outflow. All countries, except for Korea and Malaysia, have cumulative net inflow during the first sub-period before the crisis. During and after the crisis, there is cumulative inflow to four countries (Hong Kong, Indonesia, Korea, and Taiwan) and cumulative outflow from seven countries (China, India, Japan, Malaysia, the Philippines, Singapore and

Thailand). There is high cumulative equity flow into China and India during the same period. Largest amount of inflow goes to Japan during the first sub-period and also outflow coming out in the second sub-period. Taiwan is the only country exhibiting cumulative net inflow for all periods and Malaysia is the only country showing cumulative net outflow for all periods.

Table 3, Panel A reports weekly correlation of foreign equity flows by region. There is a higher positive correlation (0.61) between Asia ex-Japan and Emerging Europe markets. Markets by region have positive correlation, except for Asia ex-Japan and Middle East and Africa. Weekly correlation of foreign equity flows to individual Asian markets is shown in Table 2, Panel B. China and India have the highest correlation among Asian markets at 0.659. Thailand is positively correlated with other Asian Markets, except for Malaysia (-0.10) and exhibits relatively higher correlation with India (0.346) and Taiwan (0.291).

Table 4 reports the summary statistics of weekly foreign equity flows by country. Weekly foreign equity flows are very volatile albeit fairly persistent. For example, net investment flows into Japan funds has autocorrelation of above 0.60 in both first and second week lags. For the entire sample period, India and China exhibit the highest average weekly foreign equity flows of approximately USD 11 million and USD 9 million, respectively. The average net foreign equity flow into these two countries are particularly high in the first sub-period with average net weekly flow of USD 25 million and USD 24 million. This trend is reversed in the second sub-period during which average net foreign equity moved out at a rate of USD 15 million and USD 19 million per week. In contrast, Japan and Korea experience the largest average weekly foreign equity outflow of USD 92 million and USD 26 million over the same period. Despite having a net weekly inflow of close to USD 92 million in the first sub-period, Japan realized a large negative outflow as high USD 205 million in the second sub-period. In the meantime, average weekly net foreign equity flow into Thailand is USD -0.83 million for the entire sample period this is predominantly a consequence of the large weekly outflows in the second sub-period which is around USD 3.05 million.

Table 5 shows 9 destinations attracted more than 50% of Global Emerging Market's asset allocation. The average allocation seems to be associated with market size as Korea, Hong Kong,

China and Taiwan are most popular countries as capital deployment destination for mutual funds where as the number indicate much smaller size of Thailand Stock market to other comparable countries in Asia.

2.2 Thai foreign equity flows and market performance by segment

In the analysis of pricing impact of foreign equity flows by market segment, the study utilizes daily and monthly equity flows into the Thai stock exchange between 1995-2012. Beginning with 477 stocks in the sample, only those with trading at least 2 days of the week are selected leaving 432 stocks in the screened sample. We further separate stocks into S50 sample which are those in the SET 50 index and those outside, henceforth X50 group. We verify that S50 stocks are the segment favored by foreign investors since 20 of them have active weekly trading on the foreign board. We use the notation MB20 to represent return statistics of these 20 stocks on the main board and FB20 for the same stocks that trade on the foreign board. These stocks are also large and liquid and tend to be categorize as investable for international mutual funds. Table 6 shows that S50 stocks have average market capitalization value of THB 69.8 bn per firm. As a whole group, S50 stocks account for 75% of the total market capitalization and around 62% of total market trading volume. The X50 group pales to size and trading volume by comparison, with average market capitalization of only THB 3.5 bn per firm. This group account for 25% of the market capitalization and 38% of total market trading volume.

We compute the S50 and X50 value weighted returns and find that the daily correlation between returns of the two groups is only 0.13. From Table 7, although the average net daily foreign equity flow into the Thai market is only THB 88 mn or 0.09% of the entire market capitalization, the volatility of flow is very high as evidence from daily standard deviation of flow, which is THB 1,539 mn for the full sample period. For the entire sample period, foreign equity flow account for 30% of total trading value of the Thai exchange.

3. Dynamics of mutual fund flows and allocations

3.1 Determinants of mutual fund flows

Bivariate model

Numerous empirical work document positive feedback trading by foreign equity flows, which means that high market return begets high foreign flows.[1] We conduct a bivariate vector autoregressive model between flow and return to account for endogeneity between market return r_t and on scaled weekly investment in USD into country *j* mutual fund f_t. The scaling is done by dividing the weekly investment amount by country *j* market capitalization in USD. The two-equation structural model has the following identification,

$$Y_t = \delta + \Phi_1 Y_{t-1} + ... + \Phi_p Y_{t-p} + \varepsilon_t \qquad (1)$$

and define

$$Y_t = \begin{bmatrix} f_t \\ r_t \end{bmatrix}, \quad \delta_t = \begin{bmatrix} \delta_1 \\ \delta_2 \end{bmatrix}, \quad \phi_t = \begin{bmatrix} \phi_1 \\ \phi_2 \end{bmatrix}, \quad \varepsilon_t = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix}$$

with the following residual structure

$$\sum_{\varepsilon} \begin{bmatrix} \mathrm{var}(\varepsilon_{1t}) & 0 \\ 0 & \mathrm{var}(\varepsilon_{2t}) \end{bmatrix}$$

[1] Choe, Kho, and Stulz (1999) and Kim and Wei (2002) report strong positive feedback activity in Korea. Bonser-Neal, et al. (2002) examine foreign trading behavior in the Indonesian market between 1995-2000 and find that foreign investors exhibit herding behavior. Richards (2005) study a broad range of Asian markets during the crisis and find positive feedback trading.

Table 8 reports the bivariate VAR coefficients up to four weekly lags based on the Akaike Information Criteria (AIC) statistics 4 for weekly and the persistence of weekly fund flow. For all countries, we find that previous week local return have a significant impact on contemporaneous mutual fund flows. China equity returns have the largest coefficients with a 1% change in contemporaneous and previous week increase in return leading to a 3% increase in flows into China-focused funds. Investor flows are persistent, in particular flows into China and Japan country funds shows persistence up to the third week

B. Multivariate model

In this subsection, we include some exogenous factors that may determine foreign flows, such as regional returns and exchange rate. To do so, we extend equation (1) and re-estimate the structural model,

$$Y_t = \delta + \sum_{i=1}^{p} \Phi_i Y_{t-i} + \sum_{i=1}^{s} \Pi_i X_{t-i} + \varepsilon_t \qquad (2)$$

where

$$X_t = \begin{bmatrix} x_{1t} \\ x_{2t} \\ x_{3t} \end{bmatrix}$$

is a vector of regional returns, change in 3-month US treasury bill yield, and change in exchange rate of local currency to US dollars.

Table 9 shows that a positive Asian ex Japan regional return at distant lags seems to predict a positive flows into all markets except Hong Kong, Malaysia, Singapore, and Taiwan. This may reflect that regional return momentum induces more investment flows into individual country funds. We also find that a reduction in bond yields attracts more flows. Investor flows into China and Japan funds are more sensitive to reduction in yields. We do not find evidence that currency movements affects investment flows.

A final point to note for this part is that, although regional market returns are important in explaining country fund flows, country fund flows are dominated by movements in local returns noted by the size of the coefficients on the VAR models. For example, a 1% increase in local market return in the previous week increases investment flows into Thai country funds by 0.07%, but a 1% increase in regional market return in 2, 3, and 4 weeks earlier raises investment flows by only 0.001%.

3.2 Is there a hierarchy of mutual fund flows?

To date Japan remains the largest and most developed market in Asia. But the recent decade has seen explosive growth in the Chinese economy and with that the growth in its capital market. In this section, we examine the impact of mutual fund flows into Japan and China on the rest of Asia. To do so, we use various specifications of the VAR model.

Beginning with a bivariate model between country fund flows with China and with Japan, we assume that flows into China (Japan) funds have contemporaneous affect on each country's mutual fund flows, but not vice versa. The two-equation structural model has the following identification,

$$B_0 Y_t = \Gamma_B + B_L Y_{t-i} + \varepsilon_t \qquad (3)$$

where

$$B_0 = \begin{bmatrix} 1 & -b_1 \\ 0 & 1 \end{bmatrix}, \quad B_L = \begin{bmatrix} \phi_{11}(L) & \phi_{12}(L) \\ \phi_{21}(L) & \phi_{22}(L) \end{bmatrix}$$

and

$$Y_t = \begin{bmatrix} f_{1t} \\ f_{2t} \end{bmatrix}, \quad \Gamma_B = \begin{bmatrix} \gamma_1 \\ \gamma_2 \end{bmatrix}, \quad \varepsilon_t = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \end{bmatrix}$$

with the following residual structure

$$\sum_{\varepsilon} \begin{bmatrix} \text{var}(\varepsilon_{1t}) & 0 \\ 0 & \text{var}(\varepsilon_{2t}) \end{bmatrix}$$

Multiplying equation (1) by B_0^{-1}, results in a reduced form representation in equation (2) where $\Gamma_A = B_0^{-1}\Gamma_B$, $A_L = B_0^{-1}B_L$, and $e_t = B_0^{-1}\varepsilon_t$

$$Y_t = \Gamma_A + A_L Y_{t-i} + e_t \qquad (4)$$

Define f_{1t} as scaled weekly investment in USD into country *x* mutual funds and f_{2t} is scaled weekly investment into China or Japan focused mutual funds. In Panel A of Table 10, we find that only contemporaneous flows into China funds have significant impact on all country fund flows in particular India where the size of the coefficient and statistical significance is strongest with a 1% increase in China fund flows leading to a 0.04% increase in Indian fund flows. We expect this is attributable to the strong performance of Indian equities that has led to the emergence of many "BRIC" dedicated funds. Next in Panel B of Table 10, we re-estimate the bivariate VAR models by replacing China fund flows with Japan fund flows. A similar conclusion emerges with the coefficients of contemporaneous Japan fund flows having the strongest positive impact on country fund flows, most notably for China and India, where a 1% increase in flows into Japan funds leads

to a 1.6% and 1.1% increase in flows into China and India respectively. The negative and significant coefficients on lags of flows into China and Japan funds indicates some flow reversion and that these flows are quite volatile from week to week.

Figure 2 is a series of impulse response function plots showing the response of Korea, Singapore, India, and Thailand to one standard deviation perturbation of investment flows into China funds (left hand side) and Japan funds (right hand side). A consistent pattern exist for all countries selectively shown here that perturbations into China fund have a more positive and lasting impact on flow innovations into other country funds. The result is indicative that positive sentiment leading to increased flow innovations into China will lead to positive innovations into other Asian market funds.

3.3 Comovement and determinants of allocations

In this section, we measure the comovement of alllocations by calculating the fraction of country allocations that increases or decreases concurrently among international mutual funds. The measure of comovement is computed from,

$$c_j = \frac{\max\left(n_{jt}^{up}, n_{jt}^{down}\right)}{n_{jt}^{up} + n_{jt}^{down}} \qquad (5)$$

where $n_{jt}^{up}, n_{jt}^{down}$ measures the number of funds with allocations up or down in the same direction to country *j*. Table 11 reports the comovement in fund allocations with more than 70% of weight adjustment between all fund are being done at the same time. We next explore the source

of synchronicity in fund movement by using fixed effects regressions for each country allocations shown below,

$$\begin{bmatrix} y_1 \\ y_2 \\ \dots \\ y_N \end{bmatrix} = \left[\begin{array}{c|cccc} \mathbf{x}_1 & d_1 & 0 & 0 & 0 \\ \mathbf{x}_2 & 0 & d_2 & 0 & 0 \\ \dots & 0 & 0 & \dots & 0 \\ \mathbf{x}_N & 0 & 0 & 0 & d_N \end{array}\right] \begin{bmatrix} \mathbf{b} \\ \mathbf{a} \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \dots \\ \varepsilon_N \end{bmatrix} \qquad (6)$$

the vector of independent variables are the monthly changes in country allocations by fund geofocus from (1, 2..to N)[2] , the vector of explanatory variables $\mathbf{x}$ includes concurrent and one month lag values of local returns, US returns, and the lag volatility of monthly flows (investor injection/redemption of funds), and an interaction term between lag volatility of monthly flows and month dummy when the cumulative net flow is negative. The last two variables are added to account for likelihood that changing volatility in investor flow into mutual funds will impact the funds' allocation in the following period.

Table 12 reports the regression by country. As a whole, concurrent local and US returns affects allocation weights as higher local returns increases allocation weights to a particular market whereas lower US returns increases allocation to Asia. Local returns, however have more significant impact. The lag volatility of monthly flows and interaction term between lag volatility of monthly flows and month dummy when the cumulative net flow is negative also emerge as significant in most of the regressions. However, the signs on the coefficient is mixed. Higher lag

[2] There are five fund categories Asia excluding Japan, Pacific, Global emerging, Global funds, and Gloal excluding US.

volatility leads to lower allocation in Indonesia and Malaysia, but higher allocation in Korea and India. Conditional on the previous month net investor redemption of funds, higher volatility leads to higher allocation weights to Hong Kong, Malaysia, Singapore, and Thailand, but reduction in allocations to Korea. The analysis suggests that comovement of mutual funds flows into countries are not based on the discretion of fund managers alone but also the discretion of mutual fund investors whose behavior is captured in their trading activities via fund injection and redemption.

4. Exposure to foreign flows and valuation effect

4.1 Differential price impact and measuring exposure

Foreign investors have typically invested in large and well-established firms in emerging markets (Aggarwal, Klapper and Wysocki (2003), Kang and Stulz (1997) and Dahlquist and Robertsson (2001)). It is plausible that returns of these companies will respond more strongly to foreign flows than smaller firms in the market, and thus create segmentation of the market. To see if this is the case, we carry out a structural VAR analysis of foreign flows and returns on a S50 and X50 stocks. A multivariate VAR model including the perform a multivariate structural VAR by including the variables of volatility and turnover to the system of equations. The multivariate analysis provides a better examination of true channels of interactions between these variables. The four-variable structural VAR assumes that the order of causality starts from (unexpected) flow $\longrightarrow$ turnover $\longrightarrow$ volatility $\longrightarrow$ return.[3]

[3] Because we are analyzing high frequency daily data, we are not considering variables such as dividend yields and interest rates, as considered in Bekaert, Harvey and Lumsdaine (2002), as these variable are much more slow moving.

Unconditionally, flows are highly persistent. They also depend on both local and external returns. Therefore, they can be highly predictable. In addition, the price pressure effect we identified above due to market illiquidity may mask deeper relationships between foreign flow and local market return. Hence, studying the effect of surprises in foreign flow on market return can provide more insight into the role of foreign investors. More specifically, if unexpected flow is treated as the portion that is responsive unpublicized information, then the ability of unexpected flow to forecast future returns well should reflect trade by those privy to information unknown to other investors in the earlier period and thus should be treated as informed. The use of unexpected shocks to flow rather than flow levels is also advocated by Clark and Berko (1997) and Warther (1995), and examined in Bekaert, Harvey and Lumsdaine (2002) and Richards (2002).

First, we compute the unexpected shocks to foreign flow, from the following autoregressive model at time t using data from a preceding window of 60 days for daily data and 20 months for monthly data. We do not include the lag terms of market returns in separating unexpected flow from actual flow because doing so will require the removal of the lags of market returns from the unexpected flow equation of the structural VAR model.

$$FLOW_t = \alpha_0 + \Sigma_{i=1}^{L} \gamma_i \cdot FLOW_{t-i} + U_t^f \qquad (7)$$

Table 13 presents the result of structural VARs for returns on all market, S50, FB20, and X50 stocks. The result for the first three groups are similar indicating strong relationship between return and contemporaneous surprise flow. The study also finds that unexpected flow consistently predicts next day's return. Impulse response function plot of return response to flow shocks reveal that there is no return reversal over the next 10 trading days. However, the result for X50 which shows a substantially weakened contemporaneous relationship between portfolio return and flow. Moreover, there is no significant negative relationship between return and lagged flows or return reversal. Furthermore, there is no evidence of negative and significant price reversal at longer

lags suggesting price pressure due to foreign flows in this segment of the market even though this segment can be extremely illiquid.

4.2 Linking exposure to cross section valuation

The effect of market liberalization on the reduction of costs of capital in emerging markets is well documented in Bekaert and Harvey (2000) and Henry (2000). This is consistent with the result discussed above that increased foreign flow induces a permanent rise in prices. Most of previous studies have focused on aggregate market levels partly due to data limitation,[4] yet we have observed in the previous section that different segments of the market respond differently to the shocks in foreign portfolio flow, reflecting preferences in foreign equity holdings in emerging markets. This implies that the benefit of reduction in risk premium on stocks brought about by increased foreign flows is not shared evenly in a single emerging market, and therefore foreign flows will have a differential cross-sectional impact on stock returns across different segments of the market. We investigate this issue in this section.

Given the significant and systematic impact of foreign net purchases on emerging market returns, it is plausible to regard flow as a systematic factor in the market and use a factor model framework to assess the effect of foreign on the cross-section of returns. Moreover, as the study has earlier examined FB25 and X50 stock's differential responses to foreign flow as a group, we now explore individual responses by measuring the flow beta or exposure to foreign flow shocks for individual stocks within each group.

[4] Dahlquist and Robertsson (2001) examine the relationship of reduction in costs of capital and firm characteristics in Sweden.

Using the shock to the flow factor from equation (7), the flow betas of individual stocks are calculated by regressing excess returns on unexpected flows in a single factor and multi-factor models:

$$R_{it} - R_{ft} = \alpha_i + \beta_i^F \cdot U_t^f + \eta_{it} \quad (8)$$

$$R_{it} - R_{ft} = \alpha_i + \beta_i^F \cdot U_t^f + \beta_t^M \cdot \left(R_t^M - R_{ft}\right) + \beta_i^W \left(R_t^W - R_{ft}\right) + \varepsilon_{it} \quad (9)$$

where R_{ft} is the Thai overnight interbank rate at time *t*, R_t^M is the SET index return, and R_t^W is the world market return.[5] The beta estimation is done on monthly data and then used to complete a cross-section regression (GLS) of the average excess return over the sample period on all betas as well as on market capitalization (log) and turnover ratio (log) averaged over the sample period.

$$R_i^e = \alpha_i + \lambda_{1it} \cdot \beta_i^F + \lambda_{2i} \cdot \beta_i^M + \lambda_{3i} \cdot \beta_i^W + \lambda_{4i} \cdot \ln SIZE_i + \lambda_{5i} \cdot \ln TURN_i + \varsigma_i \quad (10)$$

where R_i^e is the excess return for stock *i*. To account for errors in variables problems from first past estimate of the betas, we apply the Shanken (1992) t-statistics correction. Define the weighting matrix $\Sigma = E\left(\varepsilon_t \varepsilon_t'\right)$ and estimate equation (10) with GLS. The corrected t-statistics of the pricing premium is by incorporating the factor variance, Σ_f when computing the variance of the premiums. Finally, the variance of the premiums, $\sigma^2(\lambda)$ to be used in corrected t-statistics is computed from $\sigma^2(\lambda) = \frac{1}{T}\left[\left(\beta'\Sigma^{-1}\beta\right)^{-1} \cdot \left(1 + \lambda'\Sigma_f^{-1}\lambda\right) + \Sigma_f\right]$

Before presenting the result of cross-sectional regression, Table 14 tabulates the characteristics of the betas from univariate and multivariate regressions. Both show that the betas tend to be negative, in particularly in the univariate estimation. What is consistent is that the S50

[5] The inclusion of the world market return is to account for increasing integration of the Thai capital market as noted in Bekaert and Harvey (1995), Carrieri, Errunza, and Hogan (2007)

segment tends to have lower (more negative beta) than X50 firms. The size of the negative beta for S50 firms is significantly larger than X50 indicating that they are more exposed to foreign flow shocks. The cross sectional regression in Table 15 indicates a significant relationship between exposure to flow beta with cross-section of stock returns. The price impact is 1.18% per month for the market as a whole. This implies that the risk premiums of stocks with high foreign interest and negative and significant flow betas, are on average reduced much more than stocks receiving low foreign interest.

5. Conclusion

This paper uses weekly net investor purchases into country funds to examine their pattern of investments and their determinants. Between 2002-2009, the number of fund families in Asia ex-Japan has grown 47%, mainly driven by growth from China and India. During this period, Hong Kong and Taiwan experienced spill-over of growth and wealth from China while mutual funds activities in the rest of Asia are more subdued. Furthermore, as Hong Kong and Taiwan are part of "Greater China" funds, which we classified as flows into China, the flows used in their individual VAR estimates will be understated. Thailand is the only country where fund size has reduced. International mutual funds exhibit positive cumulative flows into seven Asian equity markets and negative cumulative flows into four markets during the study period.

China and India have the highest correlation and Thailand exhibits relatively higher correlation with India and Taiwan. Concurrent and previous week local return have a significant impact on concurrent mutual fund flows for all countries. We find that previous day world return predicts an increase in foreign net flow but it is the local returns that attracts country fund flows. Same week flows into China funds have significant impact on all country fund flows and in particular to India. In addition, positive innovations in investor flow into China funds leads to positive activities into other Asian market funds.

After documenting strong comovement in fund country allocation patterns, the paper also examines the determinants of fund allocations. The study separates funds by geo focus, Asia Pacific excluding Japan, Pacific funds, Global Emerging market funds, Global funds, and Global excluding US funds and finds that changes in country allocations into Asian equity markets are mainly driven by concurrent local returns, US returns, and previous month volatility in investor injection/redemption in mutual funds.

At country level, where the focus is on the Thai market, the segmentation of the market can lead to cross-sectional differences in required rates of return due to the exposure to the shocks of foreign flows. Because foreign flows are volatile and influence local market returns significantly, one would imagine that investors will demand a premium for bearing exposures to this risk. Yet for emerging markets, foreign capital inflows are consequence of market liberalization that helps broaden investor bases, enhance risk sharing and hence reduce risk premium on stocks. In this context, the sensitivity to shocks of foreign flow, which can be regarded as a proxy for foreign interest, should be desirable. Our cross-sectional examination shows that among all the stocks traded on the main board of the exchange, exposure to foreign flows leads to reduction in risk premiums on these stocks. This effect is robust with the control of the local market beta, size and turnover, and suggests that differential effect of foreign flows on different segments of the markets has significance on pricing and that the benefits of market liberalization is not equally shared across the local market.

References

Aggarwal, R., L. Klapper, P. D. Wysocki, 2003, Portfolio Preferences of Foreign Institutional Investors, working paper, Georgetown University.

Barth , M.I.. and X. Zhang, 1999, Foreign Equity Flows and the Financial Crisis, in Financial Markets and Development: The Crisis in Emerging Markets, Brookings Institution,179-218.

Bekaert, G., and C.R. Harvey, 2000, Foreign Speculators and Emerging Equity Markets, Journal of Finance, 55, 565-613.

Bekaert G., C.R. Harvey, C.T. Lundblad, and R.L. Lumsdaine, 2002, Dating the integration of world equity markets, 66, 203-247.

Bekaert G., C.R. Harvey, C.T. Lundblad, and S. Siegel, 2011. What segments equity markets?, Review of Financial Studies, 3841-3890.

Bonser-Neal, C., S. L. Jones, D. Linnan, and R. Neal, 2002, Herding, Feedback Trading of Foreign Investors, Working Paper, Indiana University.

Borensztein E.R. and R.G. Gelos, 2000. A panic-prone pack? The behavior of emerging market mutual funds.IMF Working Paper.

Carrieri, F., V. Errunza, and K. Hogan, 2007, Characterizing world market integration through time, Journal of Financial and Quantitative Analysis, 42, 915-940.

Carrieri, F., I. Chaleb, and V. Errunza, 2013. Do implicit barriers matter for globalization?, Forthcoming, Review of Financial Studies.

Chai-Anant, C. and C. Ho, 2008, Understanding Asian Equity Flows, Market Returns and Exchange Rates, BIS working paper.

Choe, H., B. Kho, and R. M. Stulz, 1999, Do Foreign Investors Destablize Stock Markets? The Korean Experience in 1997, Journal of Financial Economics, 54, 227-264.

Clark, J., and E. Berko, 1997. Foreign investment fluctuations and emerging market stock returns: The case of Mexico, Working paper, Vol 24, Federal Reserve Bank of New York

Dahlquist, M., and G. Robertsson, 2001, Direct foreign ownership, institutional investors, and firm characteristics, Journal of Financial Economics 59, 413-440.

Dvorak, T. 2005. Do domestic investors have an information advantage? Evidence from Indonesia, Journal of Finance, 60, 817-839.

Errunza, V., and E. Losq, 1985. International asset pricing under mild segmentation: Theory and test, Journal of Finance, 105-124.

Eurrunza, V., and S. Janakiramanan, 1987. A model of international asset pricing with a constraint on the foreign equity ownership, 897-914.

Froot, K. A, and T. Ramadorai, 2008, Institutional portfolio flows and international investments, Review of Financial Studies, 21, 979-971.

Griffin, J.M., F. Nardari, and R.M. Stulz. 2004. Daily cross-border equity flows, Pushed or pulled? Review of Economics and Statistics 86: 641-657.

Jotikasthira, Ch., C. Lundblad, and T. Ramadorai, 2012, Asset fire sales and purchases and the international transmission of funding shocks, Journal of Finance, 2015-2050.

Hamao, Y. and Mei J., 2001, Living with enemy: An analysis of foreign investment in the Japanese equity market, Journal of International Money and Finance, 20, 715-735.

Henry, P., 2000. Stock market liberalization, economic reform, and emerging market equity prices, Journal of Finance, 529-564.

Kaminsky, GL, RK. Lyons, SL.Schmukler, 2001. Mutual fund investments in emerging markets: An overview. Working Paper.

Kang J.K. and R. Stulz, 1997, Why is there a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan, Journal of Financial Economics, 46, 3-28.

Kim, W., and S. Wei, 2002, Foreign Portfolio Investors Before and During a Crisis, Journal of International Economics, 56, 77-96.

Merton, R., 1987, A simple model of capital market equilibrium with incomplete information, Journal of Finance, 483-510.

Pavabutr, P., and H. Yan, 2007, The Impact of Foreign Portfolio Flows on Emerging Market Volatility: Evidence from Thailand, Australian Journal of Management, 32, 345-368.

Richards, A., 2005. Big Fish in Small Ponds: The Trading Behavior and Price Impact of Foreign Investors in Asian Emerging Equity Markets, Journal of Financial and Quantitative Analysis, 40, 1-27.

Seascholes, M.S. 2004. Re-examining information asymmetries in emerging markets. Unpublished working paper, University of California, Berkeley.

Shanken, J. 1992, On the estimation of beta pricing models, Review of Financial Studies, 1-55.

Warther V.A. 1995, Aggregate mutual fund flows and security returns, Journal of Financial Economics, 39, 209-235.

Wongswan, J. 2006, "Transmission of Information Across International Equity Markets", Review of Financial Studies, v 19, n 4, 1158-1186.

Table 1: Number of funds and fund families and average fund size in millions of USD by country

This tables reports the number of funds and fund families and average fund size in millions of USD by country between the years 2003-2009 from the EPFR database. The non-Japan focused funds included in the sample are those categorized under Asian ex-Japan funds.

Panel A

Year	2003	2004	2005	2006	2007	2008	2009
Number of Fund Families	76	78	78	82	106	115	112
Number of regional funds	255	214	323	330	465	571	498
Number of Country Funds	201	177	308	344	546	652	553
China	71	78	141	167	266	300	248
Hong Kong	24	20	31	21	31	34	29
India	28	21	45	70	122	164	144
Indonesia	5	2	4	3	8	7	5
Korea	32	24	38	30	42	53	44
Malaysia	2	2	3	3	4	7	5
Pakistan	0	0	0	0	0	3	3
Philippines	3	1	1	1	1	2	1
Singapore	9	9	14	17	26	23	19
Taiwan	16	10	12	15	22	25	29
Thailand	11	10	19	17	22	31	23
Vietnam	0	0	0	0	2	3	3
Japan							

Number of Fund Families	12	8	10	10	17	6	4
Number of Funds	32	19	30	32	65	34	12

Panel B

Year	2003	2004	2005	2006	2007	2008	2009
EoW Asset Size (US$ mn)							
Fund Family	62	101	108	157	209	93	125
Regional Funds	60	90	98	135	175	77	91
Country Funds	63	116	119	180	239	107	157
China	97	120	119	194	271	130	215
Hong Kong	32	62	42	88	148	221	258
India	64	269	269	243	264	88	104
Indonesia	4	29	17	25	22	18	8
Korea	57	92	75	123	200	55	73
Malaysia	93	167	137	204	341	65	107
Pakistan	0	0	0	0	0	0	0
Philippines	0	0	8	35	52	21	21
Singapore	23	27	41	107	167	70	87
Taiwan	34	86	139	227	213	113	144
Thailand	46	49	43	57	52	20	22
Vietnam	0	0	0	0	695	213	298

Japan	126	248	332	475	347	174	115

Table 2: Cumulative foreign equity flow in millions of USD by country

This table reports cumulative weekly foreign equity flows in millions of USD by country over different periods. The sample period is January 2002 to September 2009. The sample is split into two sub-periods, sub-period 1, January 2002-December 2006, sub-period 2, January 2007-September 2009.

Country	Period	Cum. Flow in USD millions
China	01/2002-09/2009	3,683
China	01/2002-12/2006	6,324
China	01/2007-09/2009	(2,641)
Hong Kong	01/2002-09/2009	585
Hong Kong	01/2002-12/2006	72
Hong Kong	01/2007-09/2009	513
India	01/2002-09/2009	4,493
India	01/2002-12/2006	6,657
India	01/2007-09/2009	(2,164)
Indonesia	01/2002-09/2009	78
Indonesia	01/2002-12/2006	(4)
Indonesia	01/2007-09/2009	82
Japan	01/2002-09/2009	(5,934)

Japan	01/2002-12/2006	23,017
Japan	01/2007-09/2009	(28,951)
Korea	01/2002-09/2009	(906)
Korea	01/2002-12/2006	(1,000)
Korea	01/2007-09/2009	94
Malaysia	01/2002-09/2009	(88)
Malaysia	01/2002-12/2006	(10)
Malaysia	01/2007-09/2009	(77)
Philippines	01/2002-09/2009	8
Philippines	01/2002-12/2006	17
Philippines	01/2007-09/2009	(9)
Singapore	01/2002-09/2009	129
Singapore	01/2002-12/2006	180
Singapore	01/2007-09/2009	(51)
Taiwan	01/2002-09/2009	561
Taiwan	01/2002-12/2006	186
Taiwan	01/2007-09/2009	374
Thailand	01/2002-09/2009	(309)
Thailand	01/2002-12/2006	108
Thailand	01/2007-09/2009	(417)
Vietnam	09/2007-09/2009	80

Table 3: Correlation of weekly foreign equity flow

Panel A of this table reports weekly correlation of foreign equity flows by region. Panel B reports weekly correlation of foreign equity flows to Asian markets.

Panel A: Regional correlation

Region	Asia ex-Japan	Emerging Europe	Europe & Middle East	Middle East	Middle East & Africa	Latin America
Asia ex-Japan	1.00	0.61	0.33	0.15	-0.02	0.35
Emerging Europe		1.00	0.48	0.26	0.07	0.41
Europe & Middle East			1.00	0.44	0.25	0.29
Middle East				1.00	0.39	0.16
Middle East & Africa					1.00	0.24
Latin America						1.00

Panel B: Country correlation

	China	Hong Kong	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
China	1.000	0.300	0.659	0.225	0.231	0.139	-0.009	0.287	0.260	0.011	0.186
Hong Kong		1.000	0.163	0.061	-0.029	0.125	0.004	0.322	0.103	0.013	0.007
India			1.000	0.330	0.344	0.147	0.029	0.195	0.224	0.127	**0.346**
Indonesia				1.000	0.078	0.167	0.059	-0.022	-0.061	-0.040	0.144
Japan					1.000	0.001	0.172	0.136	0.055	0.032	0.150
Korea						1.000	0.091	0.159	0.120	0.021	0.122
Malaysia							1.000	0.081	0.194	-0.245	-0.100
Philippines								1.000	0.181	0.125	0.246
Singapore									1.000	0.157	0.061
Taiwan										1.000	**0.291**
Thailand											1.000

Table 4: Summary statistics of weekly foreign equity flows

This table reports summary statistics of weekly foreign equity flows for total sample period and sub-periods. The last two columns report the weekly autocorrelation at lags 1 and 2, respectively.

Country	Min	Mean	Median	Max	Std	ρ 1	ρ2
Total sample period							
China	-942.47	9.03	3.64	806.90	123.76	0.43	0.31
Hong Kong	-354.08	1.42	0.06	181.41	29.48	0.14	0.1
India	-848.10	10.99	8.61	346.38	112.55	0.41	0.23
Indonesia	-13.90	0.18	-0.01	19.91	3.04	0.31	0.04
Japan	-1453.07	-15.14	-8.06	1537.80	333.67	0.68	0.62
Korea	-465.17	-2.26	-1.24	226.15	42.33	0.15	0.1
Malaysia	-24.88	-0.22	-0.02	25.60	3.41	0.46	0.32
Philippines	-6.40	0.02	0.00	8.38	1.54	0.12	-0.05
Singapore	-138.38	0.39	-0.02	109.72	17.12	0.23	0.18
Taiwan	-54.93	1.34	-0.23	183.92	19.72	0.6	0.47
Thailand	-73.57	-0.82	-0.45	81.70	12.00	0.37	0.15

Vietnam	-42.98	0.76	0.00	40.13	9.35	-0.19	-0.15

Table 4: Summary statistics of weekly foreign equity flows (Continued)

Country	Min	Mean	Median	Max	Std	$\rho 1$	$\rho 2$
Period 1							
China	-173.88	24.23	4.36	806.90	73.63	0.49	0.41
Hong Kong	-354.08	0.28	0.02	124.90	28.87	0.08	0.01
India	-668.05	25.51	12.33	275.05	76.65	0.5	0.25
Indonesia	-9.30	-0.02	-0.01	8.30	1.76	0.33	0.04
Japan	-795.60	91.70	34.13	1537.80	291.24	0.64	0.56
Korea	-465.17	-3.83	-1.06	58.12	33.01	0.04	-0.05
Malaysia	-3.61	-0.04	-0.01	3.19	0.44	0.44	0.2
Philippines	-4.91	0.09	0.00	8.38	1.10	0.18	-0.12
Singapore	-41.24	0.69	0.01	30.56	6.00	0.18	0.07
Taiwan	-34.63	0.71	-0.09	25.13	7.60	0.16	-0.12

Thailand	-28.88	0.41	-0.15	65.07	9.22	0.31	0.25
Period 2							
China	-942.47	-18.51	-8.72	557.54	179.54	0.35	0.23
Hong Kong	-121.13	3.48	0.76	181.41	30.55	0.23	0.25
India	-848.10	-15.33	-4.66	346.38	155.00	0.34	0.19
Indonesia	-13.90	0.54	-0.03	19.91	4.50	0.03	0.03
Japan	-1453.07	-205.33	-147.78	838.76	320.27	0.56	0.45
Korea	-322.41	0.59	-3.02	226.15	55.38	0.17	0.2
Malaysia	-24.88	-0.54	-0.42	25.60	5.68	0.46	0.31
Philippines	-6.40	-0.07	-0.07	6.69	1.99	0.08	-0.01
Singapore	-138.38	-0.15	-1.87	109.72	27.61	0.24	0.19
Taiwan	-54.93	2.48	-2.26	183.92	31.50	0.65	0.53
Thailand	-73.57	-3.05	-3.20	81.70	15.65	0.39	0.07
Vietnam	-42.98	0.76	0.00	40.13	9.35	-0.19	-0.15

Table 5 Average country allocations weight by fund geo focus. AXJ is Asia ex Japan funds, GEM is Global emerging markets, Global is Global funds, GlobalXUS, Global excluding US funds, and PAC is Pacific funds.

	China	Hong Kong	India	Indonesia	Korea	Malaysia	Singapore	Taiwan	Thailand
AXJ	13.05	15.62	6.42	3.03	20.19	4.77	8.29	14.34	5.80
GEM	8.68	0.94	6.98	2.47	15.73	2.47	0.25	10.54	2.23
Global	1.09	3.01	0.78	0.09	3.00	0.05	1.04	0.95	0.08
Globalxus	1.37	3.24	0.99	0.12	2.90	0.04	1.17	1.04	0.06
PAC	3.76	7.90	2.98	0.63	4.82	0.60	4.49	3.37	0.71

Table 6 Daily return and trading volume of stocks on the Thai exchange separated by group, FB20 consists of 20 stocks with active trading on foreign board, MB20 consists of the same 20 stocks on the main board, MBALL all stocks on the main board, S50 consists of SET50 index members, and X50 are stocks outside SET50 index.

Daily (1995-2012)	FB20	MB20	MBALL	S50	X50
Return	0.012%	0.014%	0.018%	0.020%	0.006%
SD	2.099%	2.019%	2.651%	2.051%	4.301%
Turnover	0.085%	0.419%	1.050%	0.430%	1.833%
SD	0.108%	0.364%	1.024%	0.346%	2.388%
No of firms	20	20	432	50	382
Tot obs	4409	4409	4409	4409	4409
Daily Trading Volume (1995-2012)					
Max (THB bn)	6.62	36.57	66.41	50.24	28.11
Mean (THB bn)	0.87	4.11	10.60	6.58	4.02
Min (THB bn)	0.01	0.13	0.34	0.14	0.06
SD (THB bn)	0.59	3.79	9.97	6.55	3.98
% Trading val to tot. mkt tradeval	8.24%	38.72%	100.00%	62.09%	37.91%
*Author's: Aggregate VO x Last price					
Mkt Cap					
Average Mcap per firm (THB bn)	85.34	85.34	11.91	69.83	3.46
Total mkt cap of group (Thb bn)	1,706.60	1,706.60	3,665.47	2,738.44	927.03
% Mcap to total mkt	46.56%	46.56%	100.00%	74.71%	25.29%

Table 7: Daily foreign flow activities on the Stock Exchange of Thailand (1995-2012)

Trading Stats Daily (1995-2012)		Full	1995-2000	2001-2006	2007-2012
Avg foreign net flow (THB mn)		88.00	75.80	129.93	58.15
Avg flow pct of mkt cap		0.09%	0.08%	0.10%	0.08%
SD flow (THB mn)		1,539.10	692.94	1,569.75	2,040.80
Avg retail net flow (THB mn)		(2,542.08)	-42.23	-111.33	(7,484.39)
Avg flow pct of mkt cap		0.20%	0.14%	0.30%	0.14%
SD flow (THB mn)		6,182.04	647.00	1,446.39	8,702.39

Table 8: Bivariate VAR between mutual fund flows and local returns

This table presents results from bivariate model between mutual fund flows and local returns for weekly frequencies. The ordering in VAR begins from local return to scaled mutual fund flow (mutual fund flows divided by average market capitalization). Let ***, **, * denotes significance at 1%, 5%, and 10%, respectively.

Flow Eqn	China	Hong Kong	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Mutual fund flow											
Lag1	0.218	0.115	0.243	0.312	0.298	-0.016	0.358	0.135	0.151	0.440	0.290
t-stat	4.32***	2.28**	4.81***	6.24***	5.90***	-0.32	7.08***	2.71***	3.01***	8.89***	5.73***
Lag2	0.118	0.074	0.094	-0.062	0.166	0.089	0.049	-0.030	0.051	0.097	0.072
t-stat	2.30**	1.46	1.80*	-1.19	3.28***	1.78*	0.93	-0.61	1.00	1.78*	1.37
Lag3	0.150	0.062	0.072	0.026	0.291	0.143	0.203	-0.212	0.058	-0.012	-0.032
t-stat	2.9	1.2	1.4	0.5	5.8***	2.9***	3.9***	-4.3	1.1	-0.2	-0.6
Lag4	0.080	0.011	0.019	0.133	0.045	0.051	0.023	0.120	0.161	0.181	-0.021
t-stat	1.74*	0.22	0.40	2.72***	0.91	1.02	0.46	2.43***	3.26***	3.68***	-0.44
Local return											
Lag0	2.143	0.009	0.239	0.014	0.061	0.031	0.008	0.009	0.024	0.020	0.058

t-stat	5.62***	1.59	9.59***	3.25***	5.86***	2.62**	1.93*	1.58	1.88*	3.15***	3.75***
Lag1	3.094	0.011	0.180	0.019	0.055	0.035	0.012	0.013	0.047	0.010	0.064
t-stat	7.80***	2.03**	6.52***	4.59***	5.02***	2.91***	2.69***	2.48***	3.58***	1.63	4.02***
Lag2	0.032	-0.004	-0.032	0.004	0.031	0.018	0.009	-0.004	0.007	0.011	0.010
t-stat	0.08	-0.72	-1.11	1.05	2.80***	1.44	2.08**	-0.67	0.51	1.69*	0.63
Lag3	0.004	0.002	-0.019	0.001	0.004	-0.003	-0.007	0.000	0.021	0.007	0.011
t-stat	0.01	0.34	-0.66	0.22	0.38	-0.24	-1.51	0.09	1.59	1.12	0.69
Lag4	-0.770	-0.006	-0.017	-0.010	-0.003	-0.011	-0.002	0.016	-0.010	0.012	-0.003
t-stat	-1.84	-1.14	-0.60	-2.29	-0.25	-0.91	-0.41	2.99***	-0.76	1.84*	-0.20
Adj. Rsq	0.351	0.029	0.388	0.177	0.600	0.048	0.289	0.089	0.133	0.408	0.177

Table 9: Determinants of mutual fund flows

This table presents results from a VAR model between mutual fund flows and local returns for weekly frequencies. The ordering in VAR begins from country return in USD to scaled mutual fund flow (mutual fund flows divided by average market capitalization). Two exogenous variables are included, Asia ex Japan returns in USD and change in local currency relative to USD. Let ***, **, * denotes significance at 1%, 5%, and 10%, respectively.

	China	Hong Kong	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Mutual fund flow											
Lag1	0.220	0.110	0.242	0.289	0.234	-0.017	0.347	0.142	0.167	0.439	0.276
t-stat	4.24***	2.15***	4.67***	5.62***	4.61***	-0.33	6.77***	2.77***	3.22***	8.58***	5.35***
Lag2	0.111	0.074	0.092	-0.054	0.116	0.084	0.037	-0.055	0.044	0.119	0.064
t-stat	2.11**	1.43	1.74*	-1.02	2.24**	1.66*	0.69	-1.08	0.85	2.14**	1.19
Lag3	0.148	0.055	0.085	0.040	0.262	0.137	0.187	-0.226	0.070	-0.033	-0.022
t-stat	2.81***	1.06	1.61	0.75	5.24***	2.70***	3.54***	-4.55	1.37	-0.60	-0.41
Return											
Lag0	2.098	0.009	0.233	0.014	0.067	0.031	0.010	0.008	0.019	0.021	0.061
t-stat	5.44***	1.57	9.15***	3.24***	6.41***	2.50**	2.19	1.43	1.45	3.26***	3.78***

Lag1	2.776	0.016	0.113	0.018	0.074	0.003	0.019	0.013	0.048	0.006	0.062
t-stat	4.12***	1.06	2.76***	2.94***	4.76***	0.14	2.98***	1.89*	1.81*	0.61	2.68***
Lag2	0.456	0.002	0.002	0.007	0.069	0.038	0.017	0.001	0.059	0.026	0.040
t-stat	0.66	0.14	0.05	1.12	4.34***	1.83	2.72***	0.11	2.19**	2.63**	1.73*
Lag3	-0.019	-0.016	-0.025	0.005	0.046	-0.002	0.004	0.000	0.011	0.001	0.010
t-stat	-0.03	-1.05	-0.60	0.74	2.87***	-0.07	0.66	-0.04	0.40	0.07	0.45

Table 10: Bivariate VAR between mutual fund flows and local returns

This table presents results from bivariate model between mutual fund flows and local returns for weekly frequencies. The ordering in VAR begins from scaled China flows to scaled mutual fund flow . Let ***, **, * denotes significance at 1%, 5%, and 10%, respectively.

Panel A

	Japan	Hong Kong	India	Korea	Singapore	Taiwan	Indonesia	Malaysia	Philippines	Thailand
Mutual fund flow										
Lag1	0.397	0.127	0.278	0.054	0.209	0.481	0.270	0.389	0.172	0.341
t-stat	7.88***	2.51**	5.48***	1.06	4.17***	9.71***	5.41***	7.75***	3.43***	6.69***
Lag2	0.146	0.070	0.112	0.082	0.034	0.101	-0.021	0.036	-0.029	0.044
t-stat	2.82***	1.37	2.11**	1.61	0.65	1.84*	-0.42	0.69	-0.58	0.82
Lag3	0.288	0.042	0.083	0.132	0.070	-0.031	0.077	0.215	-0.199	-0.057
t-stat	5.54***	0.84	1.56	2.58**	1.39	-0.56	1.50	4.07***	-3.98	-1.06
China Flow										
Lag0	0.005	0.003	0.042	0.005	0.006	0.001	0.002	0.0005	0.003	0.005
t-stat	6.02***	6.71***	16.12***	4.11***	5.36***	1.27	4.01***	1.68*	7.93***	3.09***
Lag1	-0.001	-0.001	-0.010	-0.004	-0.004	0.000	0.002	0.000	-0.002	-0.0002

t-stat	-0.74	-2.03	-2.92	-3.10	-3.20	0.21	3.18***	-0.88	-3.69	-0.10
Lag2	0.0001	-0.0004	-0.003	0.003	0.003	-0.001	0.000	0.000	-0.001	-0.002
t-stat	0.13	-0.68	-0.81	2.10**	2.73***	-0.85	0.57	0.48	-1.39	-0.96
Lag3	-0.003	0.000	-0.004	-0.003	0.000	0.000	-0.002	-0.001	0.000	-0.001
t-stat	-3.55	-0.32	-1.22	-2.25	0.18	0.24	-3.83	-2.06	0.23	-0.60
Adj. Rsq	0.587	0.113	0.503	0.077	0.170	0.399	0.201	0.268	0.179	0.145

Panel B

	China	Hong Kong	India	Korea	Singapore	Taiwan	Indonesia	Malaysia	Philippines	Thailand
Mutual fund flow										
Lag1	0.320	0.118	0.321	0.001	0.202	0.485	0.300	0.383	0.151	0.346
t-stat	6.34***	2.34**	6.32***	0.01	4.02***	9.82***	5.96***	7.63***	2.74***	6.80***
Lag2	0.101	0.082	0.069	0.099	0.080	0.096	-0.050	0.028	-0.028	0.063
t-stat	1.92*	1.61	1.30	1.98**	1.58	1.74*	-0.97	0.52	-0.50	1.16

Lag3	0.142	0.058	0.107	0.157	0.071	-0.028	0.047	0.213	-0.206	-0.076
t-stat	2.67***	1.14	2.02**	3.14***	1.41	-0.51	0.90	4.04***	-3.77	-1.40
Japan Flow										
Lag0	1.612	0.035	1.106	0.076	0.088	0.031	0.013	0.047	0.068	0.260
t-stat	6.02***	1.31	6.61***	1.70*	1.52	0.91	3.54***	3.16***	2.42**	2.76***
Lag1	-0.781	-0.037	-0.285	-0.048	-0.178	0.065	0.004	-0.038	-0.070	-0.073
t-stat	-0.26	-1.30	-1.53	-0.93	-2.85	1.77*	1.01	-2.38	-2.29	-0.72
Lag2	-0.349	-0.039	-0.146	0.047	0.150	-0.072	-0.001	0.021	0.029	0.056
t-stat	-0.12	-1.39	-0.81	0.94	2.43**	-1.99	-0.18	1.33	0.97	0.56
Lag3	-0.180	0.003	-0.550	-0.058	-0.094	0.028	-0.016	-0.033	0.050	-0.038
t-stat	-0.60	0.11	-2.99	-1.12	-1.48	0.75	-4.12	-2.08	1.62	-0.38
Adj. Rsq	0.274	0.024	0.251	0.025	0.108	0.408	0.164	0.286	0.077	0.144

Table 11: Monthly comovement in fund allocations

	% Comovement
China	82%
Hong Kong	79%
India	82%
Indonesia	78%
Korea	85%
Malaysia	79%
Singapore	71%
Taiwan	82%
Thailand	79%

Table 12: Determinants of monthly allocation changes. Fixed effects regression by country with different fund regional focus intercepts and AR (1) error term adjustments.

China					**Indonesia**					**Singapore**			
Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|
Local ret (t)	0.574	7.220	<.0001		Local ret (t)	1.024	5.290	<.0001		Local ret (t)	0.346	2.190	0.030
US return (t)	-0.607	-2.650	0.009		US return (t)	-0.537	-1.580	0.117		US return (t)	-0.396	-1.740	0.083
Local ret (t-1)	-0.211	-2.630	0.009		Local ret (t-1)	0.138	0.750	0.456		Local ret (t-1)	-0.042	-0.270	0.788
US return (t-1)	0.067	0.310	0.760		US return (t-1)	-0.173	-0.490	0.622		US return (t-1)	0.289	1.230	0.218
σ Flow (t-1)	0.004	0.310	0.761		σ Flow (t-1)	-0.045	-2.210	0.029		σ Flow (t-1)	-0.004	-0.330	0.744
σ flow (t-1)| flow < 0	0.013	0.700	0.482		σ flow (t-1)| flow < 0	0.008	0.290	0.771		σ flow (t-1)| flow < 0	0.027	1.690	0.093
AdjRsq	0.256				AdjRsq	0.151				AdjRsq	0.058		
P>F	<.0001				P>F	<.0001				P>F	0.174		
Hong Kong					**Korea**					**Taiwan**			
Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|
Local ret (t)	0.257	2.360	0.019		Local ret (t)	0.638	5.660	<.0001		Local ret (t)	0.681	5.490	<.0001
US return (t)	0.087	0.470	0.636		US return (t)	-0.490	-2.450	0.015		US return (t)	-0.712	-3.480	0.001
Local ret (t-1)	0.027	0.250	0.807		Local ret (t-1)	-0.181	-1.560	0.120		Local ret (t-1)	-0.028	-0.220	0.826
US return (t-1)	0.114	0.620	0.538		US return (t-1)	0.109	0.540	0.592		US return (t-1)	-0.063	-0.310	0.760
σ Flow (t-1)	-0.008	-0.910	0.363		σ Flow (t-1)	0.026	2.410	0.017		σ Flow (t-1)	0.008	0.700	0.483
σ flow (t-1)| flow < 0	0.040	3.110	0.002		σ flow (t-1)| flow < 0	-0.025	-1.620	0.107		σ flow (t-1)| flow < 0	-0.011	-0.710	0.477
AdjRsq	0.095				AdjRsq	0.203				AdjRsq	0.153		
P>F	0.011				P>F	<.0001				P>F	<.0001		
India					**Malaysia**					**Thailand**			
Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|		Parameter	Estimate	t Value	Pr > |t|
Local ret (t)	0.449	3.060	0.003		Local ret (t)	1.895	4.150	<.0001		Local ret (t)	0.839	3.620	0.000
US return (t)	-0.639	-1.630	0.105		US return (t)	-0.665	-1.280	0.203		US return (t)	-0.785	-1.700	0.090
Local ret (t-1)	0.060	0.370	0.711		Local ret (t-1)	1.248	2.640	0.009		Local ret (t-1)	0.455	2.060	0.040
US return (t-1)	-0.454	-1.110	0.269		US return (t-1)	-0.736	-1.340	0.180		US return (t-1)	0.366	0.770	0.444
σ Flow (t-1)	0.037	1.680	0.094		σ Flow (t-1)	-0.099	-3.090	0.002		σ Flow (t-1)	0.003	0.120	0.903
σ flow (t-1)| flow < 0	-0.042	-1.340	0.180		σ flow (t-1)| flow < 0	0.109	2.360	0.019		σ flow (t-1)| flow < 0	0.120	2.950	0.004
AdjRsq	0.098				AdjRsq	0.132				AdjRsq	0.129		
P>F	0.009				P>F	0.001				P>F	0.001		

Table 13: Quadrivariate VAR of with order running from unexpected flow, turnover, volatility, and return by market segment on the Thai Stock Exchange. To save space only coefficients of unexpected flow impact of market segment return is reported. FB20 consists of 20 stocks with active trading on foreign board, MB20 consists of the same 20 stocks on the main board, MBALL all stocks on the main board, S50 consists of SET50 index members, and X50 are stocks outside SET50 index.

Unexpflow	MBALL	S50	X50	FB20	MB20
Lag0	0.2316	0.2385	0.0786	0.2423	0.2304
t-stat	**17.77**	**23.52**	**3.60**	**24.77**	**23.05**
Lag1	0.0414	0.0557	0.0069	0.0401	0.0568
t-stat	**3.06**	**5.15**	0.32	**3.82**	**5.34**
Lag2	0.0165	0.0225	0.0051	0.0048	0.0195
t-stat	1.219	**2.085**	0.235	0.456	**1.833**
Lag3	-0.0058	0.0026	-0.0137	-0.0125	-0.0017
t-stat	-0.430	0.243	-0.625	-1.192	-0.164
Lag4	0.0043	-0.0003	0.0163	0.0026	0.0008
t-stat	0.32	-0.03	0.75	0.25	0.08
Lag5	0.0002	-0.014	0.0174	-0.0199	-0.0149
t-stat	0.01	-1.33	0.80	-1.92	-1.42
Adjrsq	0.1788	0.1456	0.1382	0.1726	0.1437
F Stat	38.59	30.14	29.46	36.85	29.2

Table 14: Beta distribution S50 and X50 groups from univariate and multivariate regressions

Distribution of flow beta from univariate estimate at monthly frequency						
Type	N	Mean	Std Dev	Std Err	Minimum	Maximum
X50	208	-0.0175	0.0152	0.00106	-0.0633	0.022
S50	30	-0.0387	0.0144	0.00263	-0.0674	-0.00405
Diff	(1-2)	0.0211	0.0151	0.00296		
Diff (unequal var)						
t-test		**7.47**				
Distribution of flow beta from multivariate estimate at monthly frequency						
Type	N	Mean	Std Dev	Std Err	Minimum	Maximum
X50	208	0.00413	0.0107	0.000745	-0.0392	0.036
S50	30	-0.00168	0.0094	0.00172	-0.0187	0.0221
Diff		0.0058	0.0106	0.00207		
Diff (unequal var)						
t-test		**3.81**				
Distribution of local mkt beta from multivariate estimate at monthly frequency						
Type	N	Mean	Std Dev	Std Err	Minimum	Maximum
X50	208	0.6741	0.4717	0.0327	-0.1776	2.2314
S50	30	1.1144	0.4539	0.0829	0.2745	1.8762
Diff	(1-2)	-0.4402	0.4695	0.0917		
Diff (unequal var)						
t-test		**-4.94**				
Distribution of world mkt beta from multivariate estimate at monthly frequency						
Type	N	Mean	Std Dev	Std Err	Minimum	Maximum
X50	208	-0.1876	0.3956	0.0274	-1.6801	0.9293
S50	30	-0.1056	0.3381	0.0617	-0.8471	0.5604
Diff		-0.082	0.389	0.076		
Diff (unequal var)						
t-test		-1.21				

Table 15: Cross sectional regressions of pricing factors

The table provides results of the GLS regression of excess return in local currency. Flow beta is the stock's sensitivity to foreign flow shock. Local market beta and world market beta is stock sensitivity to SET index and MSCI all country world index. T-statistics are adjusted for errors-in-variables as in Shanken (1992)

Parameter	Estimate	Std Err	t Value	Pr > |t|
FBETA	0.012	0.049	5.13	0.0178
MBETA	-0.010	0.002	-1.65	<.0001
WBETA	0.000	0.001	-0.08	0.8053
lnSize	0.000	0.000	0.56	0.5738
lnTURN	0.002	0.000	5.83	<.0001
Adj Rsq	0.2124			

Figure 1: Cumulative weekly foreign equity flows in Asia

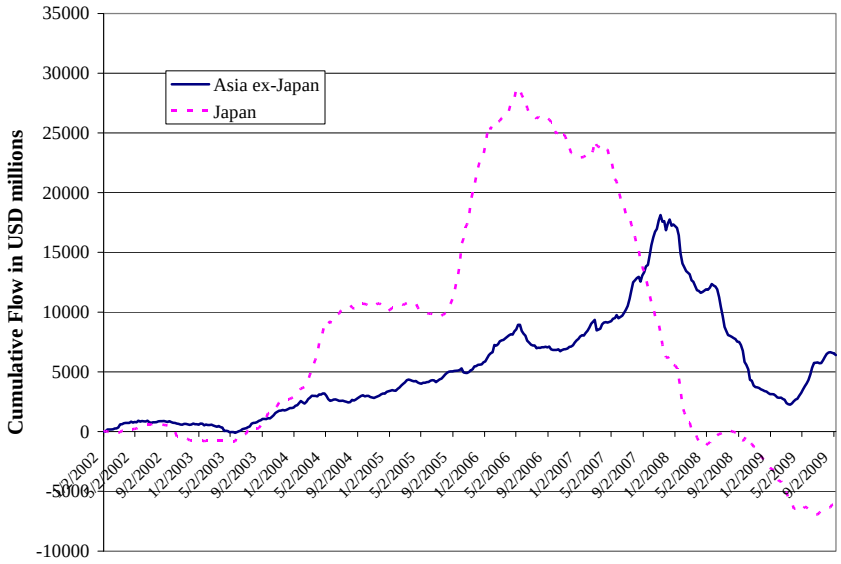
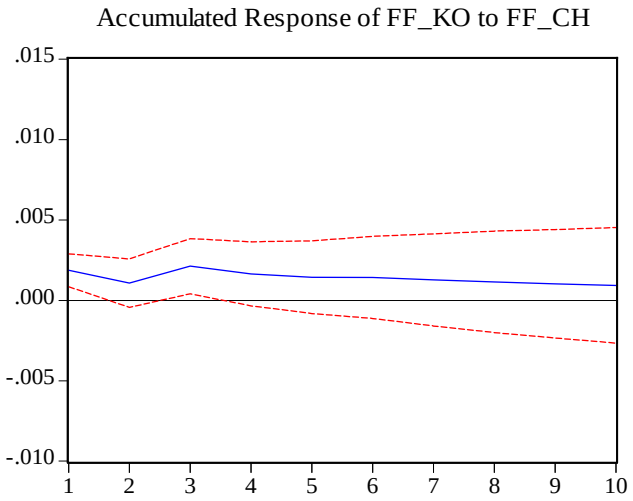
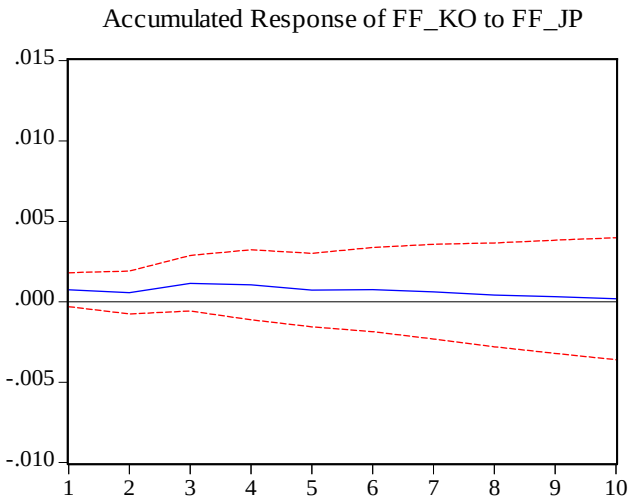


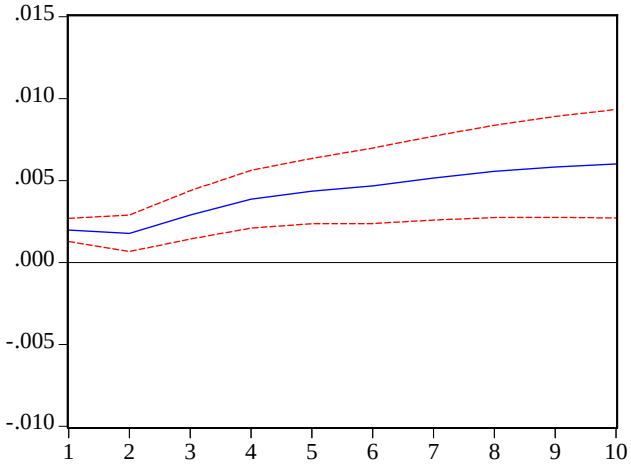
Figure 2: Accumulative Impulse Response Functions

The following figures are accumulative impulse response plots of one standard deviation shock in net flow (FF) for each period from two -variable VAR. The x-axis is the number of days. The flow innovations are based on Cholesky factorization with ordering of variables running from China flows (FF_CH) to country *j* returns or Japan flows (FF_JP) to country *j* flows ie. Korea (FF_KO), Singapore (FF_SG), India, (FF_IN), and Thailand (FF_TH). The dotted lines are 95% confidence band computed with Monte Carlo simulation.

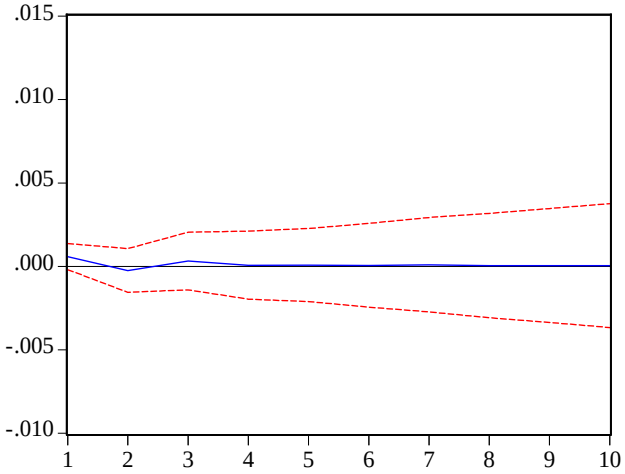




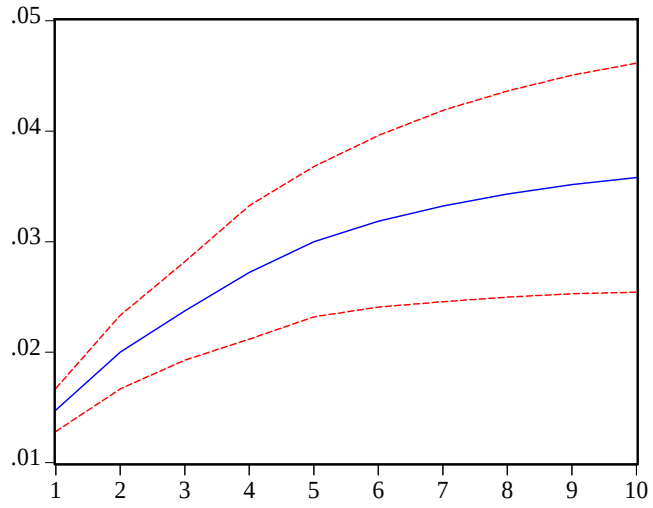
Accumulated Response of FF_SG to FF_CH



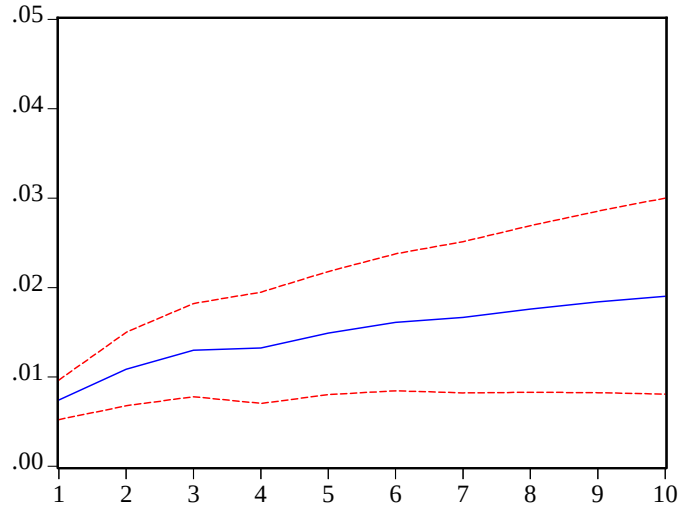
Accumulated Response of FF_SG to FF_JP



Accumulated Response of FF_IN to FF_CH



Accumulated Response of FF_IN to FF_JP



ภาคผนวก

การนำงานวิจัยไปใช้ประโยชน์

Output จากโครงการ Mutual fund flows in Asian Equity Markets

การนำงานวิจัยไปใช้ประโยชน์

1. การนำเสนอผลงาน

1.1 การประชุมสัมมนา Capital Market Research Forum ตลาดหลักทรัพย์แห่งประเทศไทย ครั้งที่ 1/2553

1.2 การประชุมวิชาการ ศาสตราจารย์สังเวียน อินทรวิชัย ครั้งที่ 19 ปี 2554 คณะพาณิชยศาสตร์และการบัญชี มหาวิทยาลัยธรรมศาสตร์

1.3 การประชุมวิชาการ นักวิจัยรุ่นใหม่ พบ เมธีวิจัยอาวุโส สกว. ครั้งที่ 12 ปี 2555

2. การบรรยายพิเศษในต่างประเทศ

2.1 บรรยายพิเศษเรื่องตลาดทุนในภูมิภาคเอเชีย European Business School, Paris, 2012

2.2 บรรยายพิเศษเรื่องตลาดทุนในภูมิภาคเอเชีย European Business School, Paris, 2013

3. การสร้างเครือข่ายความร่วมมือทางวิชาการ

บรรยายพิเศษเรื่อง Liquidity and trading cost segmentation in Asia Pacific Equity Markets

Shimomura Fellowship, Development Bank of Japan, Tokyo 2011

4. งานวิจัยเผยแพร่เกี่ยวกับตลาดทุนในภูมิภาคเอเชีย

วิจัยร่วมกับ Kuntonrat Davivongs, Pricing of Liquidity Risk in Emerging Markets: Evidence from Greater China, International Business Research Papers, 2012. 8, 20-32. World Business Institute.

5. โครงการต่อเนื่องอื่นๆ

5.1 รายละเอียดการพัฒนาฐานข้อมูลของผู้วิจัยเพื่อประโยชน์ต่อการขยายงานในอนาคต

Emerging Portfolio Fund Research

Data Processing Manual

5.2 การขยายงานวิจัยให้ครอบคลุมตลาดเกิดใหม่ทั้งหมดเพื่อผลงานวิจัยที่ robust และขยายผลในผลในวงกว้างมากขึ้นสำหรับการตีพิมพ์ต่อไป สรุปสถิติที่ได้จากการจัดการฐานข้อมูลทั้งหมดซึ่งได้ขยายฐานข้อมูลจาก Asia Pacific เป็น Emerging market ทั้งหมดทุกภูมิภาคตามตาราง

Table 5.2.1 Total number of emerging market funds by geographic focus and total number of fund families

Year	2003	2004	2005	2006	2007	2008	2009
Total Number of funds	2707	2251	2969	3432	5253	5428	5464
Number of funds by Geo focus							
Asia ex Japan (AXJ)	412	379	583	671	1027	1050	1041
Europe, Africa, ME (EMA)	140	122	189	215	373	449	449
Global emerging (GEM)	275	266	342	425	666	674	703
International (INT)	1652	1335	1668	1921	2830	2898	2912
Latin America (LAT)	117	78	108	108	176	197	199
Pacific (PAC)	111	71	79	92	181	160	160
Fund Families	2003	2004	2005	2006	2007	2008	2009
Total number of fund families	331	343	369	423	560	606	618
Asia ex Japan (AXJ)	66	70	78	84	110	116	113
Europe, Africa, ME (EMA)	56	52	51	55	71	78	79
Global emerging (GEM)	60	65	69	80	106	112	111
International (INT)	84	102	113	141	186	205	220
Latin America (LAT)	35	28	31	30	43	49	48
Pacific (PAC)	30	26	27	33	44	46	47
Average no. of fund in the family							
Asia ex Japan (AXJ)	6.54	5.66	7.77	8.18	9.69	9.29	9.38
Europe, Africa, ME (EMA)	2.64	2.39	3.78	3.91	5.57	5.91	5.68
Global emerging (GEM)	4.82	4.29	5.03	5.52	6.47	6.07	6.51

International (INT)	20.15	13.76	15.03	13.82	15.64	14.64	13.48
Latin America (LAT)	3.44	2.79	3.60	3.60	4.09	4.19	4.15
Pacific (PAC)	3.96	2.73	3.04	2.88	4.21	3.48	3.48
End of Week Assets	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Aggregate total in billions of USD	13,091.01	18,286.45	25,803.18	39,518.42	61,157.17	58,900.68	18,959.07
Asia ex Japan (AXJ)	844.21	1,599.29	2,384.12	4,407.37	8,033.82	7,473.75	2,726.44
Europe, Africa, ME (EMA)	299.31	601.42	1,091.11	1,936.22	2,402.32	2,419.53	442.37
Global emerging (GEM)	2,110.68	3,039.02	4,150.19	6,650.39	9,941.54	9,704.31	3,326.88
International (INT)	9,545.48	12,526.96	17,393.97	24,956.05	37,843.46	36,262.59	11,589.08
Latin America (LAT)	112.66	181.69	383.60	915.36	1,761.83	2,098.99	582.51
Pacific (PAC)	178.67	338.07	400.20	653.04	1,174.21	941.51	291.79

Table 5.2.2 Aggregate weekly net investor flows by region in billions of USD. EoW is end of week asset value

Year	2003	2004	2005	2006	2007	2008	2009
Aggregate weekly inflows							
Asia ex Japan (AXJ)							
Inflows (USD billlions)	0.19452	0.283	0.37477	0.80074	1.40547	0.92438	0.92559
Outflows (USD billions)	-0.09559	-0.17514	-0.21236	-0.47785	-1.08999	-1.30087	-0.49606
% Inflows/EoW(t-1)	1.14%	0.91%	0.80%	0.98%	0.90%	0.65%	0.87%
% Outflows/EoW(t-1)	-0.66%	-0.58%	-0.46%	-0.59%	-0.72%	-0.92%	-0.52%
Europe, Africa, ME (EMA)							
Inflows (USD billlions)	0.05081	0.1204	0.21922	0.23145	0.25781	0.30667	0.10846
Outflows (USD billions)	-0.03431	-0.07838	-0.10646	-0.26754	-0.27615	-0.40093	-0.133
% Inflows/EoW(t-1)	0.86%	1.06%	1.06%	0.64%	0.54%	0.60%	0.62%
% Outflows/EoW(t-1)	-0.59%	-0.68%	-0.50%	-0.73%	-0.61%	-0.99%	-0.83%
Global emerging (GEM)							
Inflows (USD billlions)	0.20514	0.2627	0.50523	0.73527	1.2529	1.12506	1.03146

						-	
Outflows (USD billions)	-0.16475	-0.36555	-0.46478	-0.65434	-0.96014	1.30333	-0.48052
% Inflows/EoW(t-1)	0.51%	0.43%	0.62%	0.58%	0.63%	0.69%	0.81%
% Outflows/EoW(t-1)	-0.43%	-0.63%	-0.58%	-0.52%	-0.50%	-0.75%	-0.41%
International (INT)							
Inflows (USD billlions)	0.80234	0.95778	1.42248	1.95172	2.9344	2.48277	1.68046
						-	
Outflows (USD billions)	-0.7416	-0.65648	-1.03615	-1.38175	-2.22566	3.20853	-1.76867
% Inflows/EoW(t-1)	0.44%	0.40%	0.42%	0.41%	0.41%	0.36%	0.37%
% Outflows/EoW(t-1)	-0.41%	-0.28%	-0.30%	-0.28%	-0.30%	-0.49%	-0.41%
Latin America (LAT)							
Inflows (USD billlions)	0.02268	0.03447	0.11738	0.18917	0.38283	0.24349	0.29421
						-	
Outflows (USD billions)	-0.01547	-0.02797	-0.03771	-0.12534	-0.18759	0.35583	-0.10625
% Inflows/EoW(t-1)	0.98%	0.94%	1.45%	1.11%	1.15%	0.60%	1.32%
% Outflows/EoW(t-1)	-0.73%	-0.84%	-0.55%	-0.75%	-0.57%	-0.97%	-0.48%
Pacific (PAC)							
Inflows (USD billlions)	0.0197	0.03459	0.03097	0.07833	0.14984	0.05913	0.07732
						-	
Outflows (USD billions)	-0.01742	-0.02839	-0.03613	-0.05779	-0.15425	0.13768	-0.0448
% Inflows/EoW(t-1)	0.55%	0.52%	0.40%	0.63%	0.69%	0.32%	0.67%
% Outflows/EoW(t-1)	-0.51%	-0.44%	-0.47%	-0.47%	-0.70%	-0.77%	-0.42%

Development Bank of Japan Inc.

9-1,Otemachi 1-chome, Chiyoda-ku, Tokyo
100-0004, Japan

June 8, 2011

Dr. Pantisa Pavabutr
Associate Professor of Finance
Thammasat Business School
2 Prachan Rd. Bangkok 10200

Dear Dr. Pantisa Pavabutr

The Development Bank of Japan Inc., upon reviewing your application for the Shimomura Fellowship dated January 11, 2011 has decided to award you the above Fellowship and invite you to the Development Bank of Japan Inc.'s Research Institute of Capital Formation as a Shimomura Fellow, a visiting research fellow from abroad under the Shimomura Fellowship Program to work the research title "Liquidity and Trading Cost Segmentation in Asia Pacific Equity Markets" during the period August 1 to September 16, 2011.

We trust that your research efforts based on the research theme stated in your application will prove to be productive.

In regard to your research, we request that you read over and acknowledge the Shimomura Fellowship Contract Clause enclosed herewith.

Yours sincerely,

M. Hanazaki

Masaharu Hanazaki
Executive Director
Research Institute of Capital Formation
Development Bank of Japan Inc.

ESCP EUROPE

PARIS LONDON BERLIN MADRID TORINO **BUSINESS SCHOOL**

79, avenue de la République – 75543 Paris Cedex 11 – France
P + 33 (0)1 49 23 20 00 – **F** + 33 (0)1 43 55 99 63 – escpeurope.eu

ATTESTATION

I, Mrs. Frédérique ALEXANDRE-BAILLY, Dean of the faculty of ESCP Europe, certify that Pantisa PAVABUTR has been appointed as Visiting Professor from May 17, 2011 to May 27, 2011. Mrs Pantisa PAVABUTR will teach in the Master In Management Programme.

Paris, March 3, 2011

Frédérique ALEXANDRE-BAILLY
Dean of the Faculty

Professor Pantisa PAVABUTR
Thammasat Business School
Thammasat University
Bangkok 10200 THAILAND

March 1st, 2013

Dear Professor Pantisa PAVABUTR,

We are pleased to invite you to ESCP Europe to discuss research collaborations and give special lectures to our students for the period of May 29, 2013 through June 15, 2013.

During your visit, you will have full access to the library and other facilities of our school.

We look forward to your visit. If you have any questions, please do not hesitate to contact us.

Sincerely,

Anne GAZENGEL
Coordinator, Finance Department
ESCP Europe
79, avenue de la République
75543 Paris cedex 11, FRANCE
Tel : +33 1 49 23 22 26
Fax : +33 1 49 23 20 80
Email : gazengel@escpeurope.eu

International Review of Business Research Papers
Vol. 8. No.1. January 2012. Pp. 20 - 32

Pricing of Liquidity Risk in Emerging Markets: Evidence from Greater China

Kuntonrat Davivongs[1] and Pantisa Pavabutr[2]

This paper used the liquidity adjusted capital asset pricing model of Acharya and Pedersen (2005) to examine the liquidity risk of stocks in two retail-based equity markets, China and Taiwan during the period of 1996-2008. We found that the proportion of liquidity risk overwhelms market risk, unlike the findings in US markets. As a pricing factor, the evidence indicated that systematic liquidity risk was more important than market risk in Taiwan. In China, cross-sectional differences in individual firm liquidity explained differences in returns.

JEL codes*:* G12, G15

Key Words: Asset Pricing, Liquidity Risk, Emerging Markets

1. Introduction

The diversity of liquidity features and their importance in asset pricing have been an active area of research. The main conclusions drawn from existing works are that there exists commonality in liquidity (Chordia et al., 2000, Huberman and Halka, 2001, Hasbrouck and Seppi, 2001) and that investors demand premium from illiquidity (Amihud and Mendelson, 1986, Brennan and Subrahmanyam, 1996, Datar et al., 1998, Amihud, 2002). What is less understood is the relative importance of market risk to liquidity risk. In an attempt to shed light on this issue, Acharya and Pedersen (2005) used an equilibrium model as a framework to measure possible channels of liquidity risk. Although the authors found their "Liquidity Adjusted Asset Pricing Model" provided a better fit than the standard capital asset pricing model, they found only weak evidence that liquidity risk was more important than market risk in U.S. data.

The result of U.S. stock market study may not be applied to emerging markets since these two markets differ in many aspects. Among others, liquidity is one of obvious factors. Comparing to developed stock markets, most of emerging stock markets are small and illiquid. Not only that there is small number of stock listed, but also there is small number of stock traded frequently. This study, therefore, investigated a relative importance as a pricing factor of liquidity risk to market risk in emerging stock markets using 1,355 sample firms between 1996 to 2008 from China and Taiwan. In 2010, China

[1] Corresponding author. Department of Finance, Faculty of Business Administration, Dhurakij Pundit University, 110/1-4 Prachachuen Rd., Laksi, Bangkok 10210, Thailand. Lecturer at Dhurakij Pundit University and a doctoral student in JDBA program, Thammasat University. *Email address:* kuntonrat@gmail.com

[2] Associate Professor of Finance. Thammasat Business School, Thammasat University, 2 Prachan Rd., Phra Borom Maha Ratchawang, Phra Nakhon, Bangkok 10200, Thailand. *Email address:* pantisa_p@yahoo.com

and Taiwan accounted for almost 50% of the market capitalization in Asian emerging markets. China was the most actively traded market, while Taiwan was ranked the fourth in Asian emerging markets (World Federation of Exchange, 2011). Despite common perception of China and Taiwan as diametric opposites, there are important parallels between their market structures and shared characteristics with smaller emerging markets in the region such that the study of these two markets are likely to have broader association. The common traits between these two markets are share class distinctions, retail dominated trading, relatively low free float, and heavy-handed involvement of the state (Cooper, 2007). While the degree of involvement of the state varies in East Asia, the emerging market segment of the region has markets that are predominated retail based (Pavabutr et al., 2009), and that there is share class separation, typically in term of domestic and foreign. In a study of thirty-one emerging markets, Lesmond (2005) had demonstrated, liquidity costs are higher in countries with weak legal enforcement.

Our research clarified the role of liquidity risk in terms of significance and channels in the following ways. First, market risk was insignificantly priced in both countries. Second, expected illiquidity was priced in China and Taiwan during the year of 2003-2008. Third, liquidity risks, in any form, were not priced in China. In Taiwan, investors required compensation for most types of liquidity risks, except for return sensitivity to market illiquidity. Consequently, we may say that as a pricing factor, systematic liquidity risk was more important than market risk in Taiwan. In China, cross-sectional differences in individual firm liquidity explained differences in return.

The next section provides a discussion of liquidity risk in related literature. The liquidity-adjusted asset pricing model is discussed in section 3. The details on sample data is in section 4. Section 5 explains the methodology used in the study and elaborates empirical results. Section 6 is conclusion.

2. Liquidity Risk in Related Literature

Commonality in liquidity refers to the co-movement in liquidity over time. Authors of pioneer papers on the issue conjectured various sources of commonality in liquidity. Chordia et al. (2000) suggested that commonality in liquidity occurred because macro conditions leading to general price swing and trading activity caused a correlated inventory, while Fujimoto (2004) and Brockman et al. (2009) suggested a co-variation in market makers' inventory carrying costs of asset. Similarly, Coughenour and Saad (2004) explained that constraints on capital and profit information of market makers caused a correlated liquidity of stock included in specialist portfolio. Moreover, illusion trades by noise traders (Huberman and Halka, 2001), common floor information (Sadd, 2006), news on revolution of new technology (Chordia et al., 2000), and similar trading styles, objectives, or strategy among investors (Brockman and Chung, 2006) caused trades to be correlated.

Regardless of the source of commonality, the temporal variability of liquidity of stock and market liquidity should be a key element in asset pricing. For instance, if a market's

liquidity dries up but a stock continues to be relatively liquid, then investors must be willing to pay a higher price for that particular stock, thus lowering the required rate of return, *ceteris paribus*. Although some authors pointed out that cross-sectional variation in liquidity had impact on pricing (Amihud and Mendelson, 1986, Brennan and Subrahmanyam, 1996, Amihud, 2002), ample empirical evidence of liquidity commonality evoked the idea that liquidity should not totally be a firm-specific risk.

Lee (2011), Qin (2008), and Davivongs (2011) documented strong liquidity commonality in emerging markets. All authors found the prevalence of commonality within the same market, but commonality weakens when moving towards regional and global levels. In Davivongs (2011), commonality in liquidity was strongest in emerging Asian markets notably in China and Taiwan, while in Lee (2011) emerging markets required a larger premium on systematic liquidity risk. There are various reasons why liquidity commonality is strong in emerging markets. First, emerging markets are relatively small and thus foreign equity flow coordinated by world economic conditions can cause synchronized liquidity inflows and outflows across markets. This observation is applicable to Taiwan's case, as the market does not separate distinct share class. Second, a number of stocks are illiquid. Third, in China's case, retail investors have limited investment alternatives (Eun and Huang, 2007) and are chasing after too few stocks. These observations support the use of an asset pricing model that accommodates local systematic liquidity risk.

An empirical test on the importance of liquidity risk on asset price has increasingly been investigated, e.g., Pástor and Stambaugh (2003), Acharya and Pedersen (2005), Martínez et al. (2005), and Lee (2011). All of them, with the exception of Lee (2011), based their study on portfolio level. Lee (2011) studied asset pricing of liquidity risk at stock level; however, the liquidity betas were estimated at portfolio level—stocks belonging to the same portfolio had the same betas. They all reported significant pricing of liquidity risk. Pástor and Stambaugh (2003) showed that, based on US market data, stocks whose returns were more sensitive to market liquidity factor commanded higher required rate of return than stocks whose returns were less sensitive to the market liquidity factor. Martínez et al. (2005) found that the results depend on the choice of liquidity measures being used. For example, liquidity risk was priced in the Spanish market only when beta was measured relatively to illiquidity ratio, but it was not priced when liquidity beta was Pástor and Stambaugh factor or bid-ask spread return factor. By regressing expected risk premium against expected liquidity cost, market risk, and liquidity risks, Acharya and Pedersen (2005) showed that the expected return of a security increased in its expected illiquidity and its liquidity risk, and that illiquid securities also had high liquidity risk. However, their evidence that the total effect of the liquidity risk mattered over and above market risk and the level of liquidity was rather weak in US data. Lee (2011), by adopting the model of Acharya and Pedersen (2005) to investigate the pricing of liquidity risk of stocks in 50 countries, found that liquidity risk was significantly priced in only US and emerging markets, but not in the developed and overall world markets. For emerging market alone, the commonality in liquidity and liquidity sensitivity to market return were priced, but return sensitivity to market liquidity was not. Inconclusive evidence in literature on liquidity risk and asset pricing make it

important to further observe whether liquidity risk is priced. In addition, the importance of liquidity risk relative to liquidity level and market risk is still not widely observed. Hence, it is worth to study the issue at stock level.

The well known pricing models that incorporate liquidity risk are the works of Pástor and Stambaugh (2003) and Acharya & Pedersen (2005). In the liquidity-adjusted capital asset pricing model of Acharya and Pedersen (2005), systematic risk was decomposed into the standard market beta, and three liquidity related betas: commonality in liquidity, return sensitivity to market liquidity, similar to Pástor and Stambaugh (2003) liquidity beta, and liquidity sensitivity to market return. We discuss the liquidity adjusted capital asset pricing model introduced by Acharya and Pedersen (2005) in the next section.

3. Liquidity-Adjusted Capital Asset Pricing Model

In an overlapping generations economy, risk-averse agents in Acharya and Pedersen (2005) trade securities whose liquidity varied randomly over time. Solving an expected utility maximization problem under wealth constraint, the liquidity adjusted asset pricing model (LCAPM) is a linear equilibrium in equation (1).

$$E_t\left(r_{i,t+1} - c_{i,t+1}\right) = r_f + \gamma_t \frac{cov_t(r_{i,t+1} - c_{i,t+1}, r_{M,t+1} - c_{M,t+1})}{var_t(r_{M,t+1} - c_{M,t+1})} \quad (1)$$

Where $r_{i,t}$ is the gross return of stock i at time t
$c_{i,t}$ is the trading cost per price for stock i at time t
r_f is the gross risk free rate
$r_{M,t}$ is the gross market return at time t
$c_{M,t}$ is the market trading cost per price at time t
$\gamma_t = E_t(r_{M,t+1} - c_{M,t+1} - r_f)$ is the risk premium

By assuming constant conditional variances of innovations in illiquidity and returns or a constant risk premium, the unconditional LCAPM is derived as,

$$E_t\left(r_{i,t} - r_f\right) = E\left(c_{i,t}\right) + \lambda\beta_{1i} + \lambda\beta_{2i} - \lambda\beta_{3i} - \lambda\beta_{4i} \quad (2)$$

Where $\beta_{1i} = \frac{cov(r_{i,t}, r_{M,t} - E_{t-1}(r_{M,t}))}{var(r_{M,t} - E_{t-1}(r_{M,t}) - [c_{M,t} - E_{t-1}(c_{M,t})])}$ (3)

$$\beta_{2i} = \frac{cov(c_{i,t} - E_{t-1}(c_{i,t}), c_{M,t} - E_{t-1}(c_{M,t}))}{var(r_{M,t} - E_{t-1}(r_{M,t}) - [c_{M,t} - E_{t-1}(c_{M,t})])} \quad (4)$$

$$\beta_{3i} = \frac{cov(r_{i,t}, c_{M,t} - E_{t-1}(c_{M,t}))}{var(r_{M,t} - E_{t-1}(r_{M,t}) - [c_{M,t} - E_{t-1}(c_{M,t})])} \quad (5)$$

$$\beta_{4i} = \frac{cov(c_{i,t} - E_{t-1}(c_{i,t}), r_{M,t} - E_{t-1}(r_{M,t}))}{var(r_{M,t} - E_{t-1}(r_{M,t}) - [c_{M,t} - E_{t-1}(c_{M,t})])} \quad (6)$$

Equivalently, the model states that the required excess return is the expected relative illiquidity cost plus risk premium times systematic risk that is covariance between net asset's return and net market return. Systematic risk in the LCAPM consists of the traditional market risk (β_{1i}) and additional three forms of liquidity risks: commonality in liquidity (β_{2i}), return sensitivity to market liquidity (β_{3i}), and liquidity sensitivity to market return (β_{4i}).

The model shows that each form of liquidity risks differently affects the expected return. β_{2i}, commonality in liquidity or the co-movement of stock liquidity with market liquidity, was positively related to the expected return because investors preferred holding stock whose liquidity negatively commoved with that of the market and were willing to pay a premium for that stock. Both β_{3i}, return sensitivity to market liquidity, and β_{4i}, liquidity sensitivity to market return, affected the expected return negatively. This was because investors were willing to accept lower expected return on stocks that yielded a high return in illiquid market and on stock that were liquid in a down market.

To examine the pricing effect of systematic risk, as well as to distinguish the pricing effect of liquidity risk to that of market risk, I followed Acharya and Pedersen (2005) and Lee (2011) by additionally defining a net liquidity beta as a linear combination of the three liquidity betas, and a net beta as a linear combination of all betas.

$$\beta_{5i} \equiv \beta_{2i} - \beta_{3i} - \beta_{4i} \quad (7)$$

$$\beta_{6i} \equiv \beta_{1i} + \beta_{2i} - \beta_{3i} - \beta_{4i} \quad (8)$$

4. Sample and Descriptive Statistics

Originally, daily price and trading data of all stocks listed in Shanghai Stock Exchange and Taiwan Stock Exchange during January 1, 1991 to December 31, 2008, as well as risk free rate for each country were collected from Thomson DataStream. The data was used to calculate daily stock return and Amihud's illiquidity ratio. Daily stock return is calculated as a log value of current closing price over past closing price, $\log(P_t/P_{t-1})$, and daily Amihud's illiquidity ratio is the ratio of absolute daily return to daily trading value in million of local currency. After replacing the extreme 5 percent observations on either side of daily return and illiquidity measure in both cross-sectional and time-series with their associated value at the 5 and 95 percentiles, monthly stock return and liquidity were calculated simply as an average daily value within the month. Monthly market return, as well as market liquidity measure, was simply an equally weighted average value of all stocks in the market. Finally, the months with less than 20 stocks and stocks with less than 36 months of data were excluded from this study. Therefore, based on the observations in China, the study period began from January 1993 for both countries, and the number of sample stocks was 1,355 stocks, 710 Chinese stocks and 645 Taiwanese stocks.

Table 1 shows market characteristics of each exchange. It clearly showed that size and trading activity in these two markets increased dramatically, especially in China. In

1996, there were only 46 actively traded stocks in China. By 2008, this number had grown to 709. At the same time, market capitalization grew from USD 38 billion to almost USD 1 trillion. The trading value grew 10 times from 1996 to 2008. The extraordinary increase in trading activity occurred during 2006-2008. Similar, in Taiwan 179 stocks in 1996 grew to 638 stocks in 2008. The market capitalization in 2008 was about three times greater than that in 1996. The trading value varied from one thousand to four billion. Most stocks were priced less than one U.S. dollar.

Table 1: Market Profile

The table presents market characteristics of China and Taiwan stock exchange in Panel A and B, respectively. N is the number of sample stocks in the market. It is a monthly average number of stocks traded each year. Market capitalization and trading value of the exchange is sum values of all sample stocks in the market. The value presented is monthly averaged over the year. Stock price is mean of monthly cross-sectional median. Price are expressed in USD, while market capitalization and trading value are in million of USD.

	Panel A: China				Panel B: Taiwan			
Year	N	Market Capitalization	Trading Value	Average Price	N	Market Capitalization	Trading Value	Average Price
1996	46	37,438.13	77.95	0.44	179	188,601.01	972.49	0.65
1997	125	75,400.88	263.58	0.56	198	281,174.74	2,515.35	0.81
1998	140	104,938.09	190.56	0.65	225	241,307.45	1,874.78	0.68
1999	178	131,576.55	283.22	0.75	268	278,193.04	2,310.34	0.51
2000	262	210,660.12	773.45	1.06	306	362,835.09	2,652.85	0.45
2001	314	293,468.80	464.11	1.15	345	250,201.36	1,495.51	0.27
2002	354	293,232.82	387.89	0.91	405	284,138.14	1,739.82	0.31
2003	398	300,015.83	468.01	0.74	465	304,444.25	1,815.83	0.36
2004	496	327,079.82	745.08	0.63	518	393,569.86	2,364.51	0.45
2005	553	266,299.33	708.83	0.44	568	430,144.87	1,999.75	0.43
2006	618	341,356.06	2,665.75	0.52	605	497,453.09	2,659.31	0.50
2007	689	1,053,323.97	13,282.78	1.36	626	623,331.59	3,792.39	0.70
2008	709	969,192.38	7,862.54	1.22	638	552,449.32	3,163.05	0.58

Because liquidity, of both a market and stock, was persistent, the unconditional LCAPM of Acharya and Pedersen (2005) focused on the innovation in liquidity when computing the liquidity betas as shown in Equations (3)-(6). To predict market and stock liquidity, The following AR(1) model were estimated.

$$ILLQ_{i,t} * P_{M,t-1} = a_0 + a_1\left(ILLQ_{i,t-1} * P_{M,t-1}\right) + u_t \qquad (9)$$

Where $P_{M,t-1}$ is the ratio of the average capitalizations of the market in month *t-1* and of the market on January 1, 1993. This adjustment was recommended in Acharya and Pedersen (2005) to measure liquidity cost in dollar per dollar invested, instead of in percentage per dollar invested as original illiquidity measure. The same date of market index ($P_{M,t-1}$) was used to ensure that the innovation was measured only in liquidity, not changes in the index. The residual, u_t of the regression was interpreted as the illiquidity innovation. The same specification was also used to predict the market return, as well as the residual. The AR(1) model was selected instead of AR(2) as in Acharya and Pedersen (2005) as the cross-sectional mean of second order serial correlation in each country was statistically insignificant in explaining the concurrent period liquidity, while the first-order serial correlation was significantly high. Moreover, the AR(2) specification produced only slight improvement in the explanatory power. Finally, monthly return and liquidity betas as per equations (3) - (6) are computed using rolling 36-month historical

observations. After finishing computation of betas, we have a series of each beta beginning from January 1996 to December 2008.

Table 2: Liquidity Measures and Liquidity Betas by Firm Size

This table reports for each size quintile the average value of return (R), variance of return ($\sigma^2(R)$), expected (E[Illq]) and unexpected (ε_{Illq}) illiquidity ratio estimated from AR(1) model, variance of unexpected adjusted illiquidity ratio ($\sigma^2(\varepsilon_{Illq})$), and all betas for stocks in each country. The variable is first cross-sectional average by month, then average over the sample period. Betas are rolling beta using the previous 36-month data in computation by equation (3)-(6). A net liquidity beta ($\beta_{i,t}^5$) is calculated as $\beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$, a net beta ($\beta_{i,t}^6$) is calculated as $\beta_{i,t}^1 + \beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$. Size quintile is identified each month using stock market capitalization.

	Panel A: China					Panel B: Taiwan				
Size	Smallest	2	3	4	Largest	Smallest	2	3	4	Largest
N	11,649	11,725	11,711	11,725	11,772	12,773	12,824	12,830	12,824	12,893
R (%)	0.0109	0.0237	0.0175	0.0242	0.0244	-0.0226	-0.0224	-0.0117	0.0023	0.0062
σ^2(R)	0.2407	0.2242	0.2243	0.2173	0.2085	0.3340	0.2921	0.2824	0.2878	0.2541
E[Illq]	0.2024	0.1532	0.1204	0.0917	0.0566	0.0558	0.0208	0.0092	0.0047	0.0008
ε_{Illq}	0.0053	0.0004	-0.0023	-0.0026	-0.0035	0.0012	-0.0004	-0.0004	-0.0001	-0.0001
$\sigma^2(\varepsilon_{Illq})$	0.0104	0.0067	0.0046	0.0031	0.0014	0.0013	0.0003	0.0001	0.0001	0.0000
β^1	0.0254	0.0248	0.0253	0.0251	0.0241	0.2662	0.2636	0.2711	0.2736	0.2566
β^2	1.4015	1.1228	0.8776	0.6894	0.4249	1.2065	0.4492	0.2041	0.0962	0.0176
β^3	-0.0742	-0.0708	-0.0706	-0.0692	-0.0635	-0.1874	-0.1702	-0.16752	-0.1629	-0.1399
β^4	-0.1046	-0.0890	-0.0707	-0.0578	-0.0405	-0.4096	-0.1689	-0.0846	-0.0438	-0.0101
β^5	1.5804	1.28264	1.0190	0.8164	0.5288	1.8036	0.7883	0.4561	0.3028	0.1676
β^6	1.6058	1.3075	1.0443	0.8414	0.5529	2.0697	1.0519	0.7272	0.5766	0.4242

Table 2 presents the properties of stocks in various size quintiles identified by market capitalization. Comparing only the largest and the smallest quintiles, both panels in Table 2 contradicted to the expected pattern that higher return should relate to higher level of illiquidity and risk factors. The table showed however that stocks in the largest quintile yielded higher return (R) while return volatility (σ^2(R)), stock illiquidity (E[Illq] and ε_{Illq}), volatility of unexpected illiquidity ($\sigma^2(\varepsilon_{Illq})$), market risk ($\beta^1$) and liquidity risks ($\beta^2$, β^3 and β^4) were lower.

Table 3 presents the properties of stocks classified by sub-periods. The breaking point was identified based on the trend in market return in China since its stock exchange had shown a significant change during the sample period. The market return in China was at the minimum in 2003 before turning upward and was the beginning of the new cycle. Therefore, the first sub-period is from January 1996 to December 2002 and the second sub-period is from January 2003 to December 2008. The Table shows that the properties of stocks in both exchange varied across periods. The average return during the period of 1996 to 2002 was lower than the average return during the period of 2003 to 2008 in both countries. The volatility of return, however, showed the opposite pattern. Higher average illiquidity level and its volatility in the second sub-period indicated that price impact was greater and more volatile in the second period. Systematic risk varied across period, but the direction depended on the type of risk. Market risk (β^1) was higher in the first period, while commonality in liquidity (β^2) was greater in the second period, for both countries.

Table 3: Liquidity Measures and Liquidity Betas by Sub-Period

This table reports the average value over the sub-period of return (R), variance of return ($\sigma^2(R)$), expected (E[Illq]) and unexpected (ε_{Illq}) adjusted illiquidity ratio estimated from AR(1) model, variance of unexpected adjusted illiquidity ratio ($\sigma^2(\varepsilon_{Illq})$), and all betas for each country. Betas are rolling beta using the previous 36-month data in computation by equation (3)-(6). A net liquidity beta ($\beta_{i,t}^5$) is calculated as $\beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$, a net beta ($\beta_{i,t}^6$) is calculated as $\beta_{i,t}^1 + \beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$. The first period is from the beginning of 1996 to the end of 2002, and the second period is from the beginning of 2003 to the end of 2008.

	Panel A: China		Panel B: Taiwan	
Period	1996-2002	2003-2008	1996-2002	2003-2008
N	17,025	41,557	23,114	41,030
R (%)	-0.0155	0.0385	-0.0244	0.0003
σ^2(R)	0.2063	0.1955	0.3183	0.2832
E[Illq]	0.1054	0.1571	0.0184	0.0219
ε_{Illq}	-0.0020	0.0057	0.0002	0.0003
$\sigma^2(\varepsilon_{Illq})$	0.0027	0.0091	0.0003	0.0004
β^1	0.0228	0.0033	0.3411	0.1031
β^2	0.9061	0.9709	0.2922	0.5771
β^3	-0.0756	-0.0328	-0.1621	-0.1742
β^4	-0.0792	-0.0333	-0.1352	-0.1565
β^5	1.0610	1.0371	0.5896	0.9078
β^6	1.0837	1.0404	0.9306	1.0109

The absolute value of return sensitivity to market illiquidity (β^3) and illiquidity sensitivity to market return (β^4) indicated that the effect of these risks was greater during the first period in China, but it was greater during the second period in Taiwan. Overall, systematic risk, as indicated by net liquidity beta (β^5), and net beta (β^6), was slightly greater in the second period in Taiwan, but was slightly greater in the first period in China.

5. Methodology and Empirical Results

To test whether liquidity risk was priced, as well as to examine its relative importance as pricing factor to market risk, in China and Taiwan, the regression model similar to the unconditional LCAPM as Equation (2) was cross-sectional estimated each month. In the model, stock expected risk premium was regressed against expected liquidity, and market and liquidity betas controlling for stock size that might affect stock risk premium as followed.

$$E(R_{i,t} - R_t^f) = \alpha_t + \theta_t E(C_{i,t}) + \gamma_t^1 \beta_{i,t}^1 + \gamma_t^2 \beta_{i,t}^2 - \gamma_t^3 \beta_{i,t}^3 - \gamma_t^4 \beta_{i,t}^4 \qquad (10)$$

Risk premium is the difference between stock monthly return and monthly risk-free rate. Monthly return was calculated as daily average of return within a month. A 6-month money market rate and a 6-month time deposit rate were proxy for risk-free rate in Taiwan and in China, respectively. Expected liquidity cost, $E(C_{i,t})$ was a forecasted value from AR(1) model. Each beta—market beta(β^1), liquidity commonality beta (β^2), return sensitivity to market liquidity (β^3), and liquidity sensitivity to market return (β^4) — was obtained by a rolling calculation using the previous 36 months of stock returns, and innovations of market return and liquidity, as well as the innovation of stock liquidity, as stated in equation (3) – (6). Net liquidity beta (β^5) was calculated as $\beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$ and

net beta (β^6) was calculated as $\beta_{i,t}^1 + \beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$. Stock size is a log value of market capitalization.

The monthly cross-sectional results estimated from equation (10) reported in the first column of Table 4 were averaged over each sub-periods. As stated before, the first period is from 1996 to 2002 and the second is from 2003 to 2008. In the second column presents the results estimated by running the risk premium against expected illiquidity $E(C_{i,t})$ and market beta (β^1). The third to sixth column present the results estimated by adding one at a time the liquidity betas—liquidity commonality (β^2), return sensitivity to market illiquidity (β^3), illiquidity sensitivity to market return (β^4), and net liquidity beta (β^5). The last column of each panel shows the estimated results of risk premium against expected illiquidity and net beta (β^6).

The Table 4 clearly showed variations in pricing effects across period. For China, Panel A of the Table, the coefficients estimated on market beta (β^1) were negatively and statistically insignificant in the first sub-period, while they were positive and statistically insignificant in the second-sub-period. Therefore, there was no strong evidence that market risk was priced in China. The expected illiquidity may have been more important as a pricing factor than market risk as its coefficients estimated showed consistent sign as expected and were statistically significant, particularly in the second sub-period. The liquidity risk, however, was not such an important pricing factor for Chinese stocks as expected illiquidity. The estimated coefficient on net liquidity beta had a negative sign and was statistically significant in the second sub-period, indicating that liquidity risk was not priced in China. Each type of liquidity risks led to the same conclusion. The sign of estimated coefficients on commonality in liquidity (β^2), on return sensitivity to market illiquidity (β^3), and on stock illiquidity sensitivity to market return (β^4) was inconsistent with the expected result. Moreover, they were statistically significant in the second sub-period.

For Taiwan, Panel B of the Table, the estimated coefficients on market beta (β^1) led to the similar conclusion to that of China that there was no strong evidence supporting that market risk was priced. The coefficients estimated on market beta (β^1) were insignificantly positive in the first sub-period, and were insignificantly, with inconclusive sign in the second sub-period. In contrast to China, evidence supported that both expected liquidity and liquidity risk were priced in Taiwan. Evidence strongly supported that expected illiquidity (E[Illq]) was priced during the second sub-period. The coefficients estimated on expected illiquidity (E[Illq]) were insignificant with inconclusive sign among specifications in the first sub-period, but they were significantly positive in the second period. Both commonality in liquidity (β^2) and stock illiquidity sensitivity to market return (β^4) were priced. The estimated coefficients on commonality in liquidity (β^2) were significantly positive, while the estimated coefficients on stock illiquidity sensitivity to market return (β^4) were significantly negative in both sub-periods, especially in the model that added either one in addition to expected illiquidity and market beta. For stock return sensitivity to market illiquidity (β^3), there was no strong

Table 4: Cross-Sectional Regressions by Sub-period

In this table, an expected risk premium is cross-sectional regressed against an expected liquidity measures (Amihud's illiquidity ratio), market beta, and liquidity betas. The regression: $E(RP_{i,t}) = \alpha_t + \theta_t E(C_{i,t}) + \gamma_t^1 \beta_{i,t}^1 + \gamma_t^2 \beta_{i,t}^2 - \gamma_t^3 \beta_{i,t}^3 - \gamma_t^4 \beta_{i,t}^4$, and its modifications are estimated monthly. Risk premium is difference between return on stock and on risk-free rate which is a 6 month money market rate for Taiwan and is a 6-month time deposit rate for China. Expected liquidity cost, $E(C_{i,t})$ is a forecasted value from AR(1) model. Betas are rolling beta using the previous 36 months data in computation of equation (3)-(6). $\beta_{i,t}^5$ is a net liquidity beta, calculated as $\beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$, and $\beta_{i,t}^6$ is a net beta, calculated as $\beta_{i,t}^1 + \beta_{i,t}^2 - \beta_{i,t}^3 - \beta_{i,t}^4$. The controls variable is a log of market capitalization. In the Tables, the estimated results are averaged over each of two sub-periods. The first sub-period is from 1996 to 2002 and the second sub-period is from 2003 to 2008. The t-statistics are given in parentheses. ***, **, and * indicate significant at 1, 5, and 10 % level, respectively.

Panel A: China							
First sub-period from 1996 to 2002							
Model	1	2	3	4	5	6	7
Intercept	-0.0104*** (-11.65)	-0.0104*** (-11.67)	-0.0104*** (-11.36)	-0.0105*** (-12.09)	-0.0104*** (-11.63)	-0.0104*** (-11.47)	-0.0098*** (-10.49)
E[Illq]	0.0031 (1.23)	0.0028 (1.34)	0.0040 (1.62)	0.0027 (1.31)	0.0039* (1.76)	0.0041* (1.68)	0.0034 (1.27)
β^1	-0.0764 (-1.09)	-0.0579 (-1.41)	-0.0540 (-1.27)	-0.0693 (-1. 00)	-0.0557 (-1.31)	-0.0535 (-1.25)	
β^2	0.0000 (0.05)		-0.0001 (-0.46)				
β^3	-0.0016 (-0.23)			-0.0005 (-0.07)			
β^4	-0.0007 (-0.27)				0.0013 (0.37)		
β^5						-0.0001 (-0.56)	
β^6							0.0000 (-0.11)
LNMV	0.0000 (-0.47)	0.0000 (-0.48)	0.0000 (-0.70)	0.0000 (-0.27)	0.0000 (-0.62)	0.0000 (-0.69)	0.0000 (-0.63)
ADJRSQ	0.1546	0.0891	0.1006	0.1396	0.0966	0.1012	0.0789
Second sub-period from 2003 to 2008							
Intercept	-0.0093*** (-13.05)	-0.0095*** (-13.63)	-0.0093*** (-13.11)	-0.0095*** (-13.50)	-0.0094*** (-13.18)	-0.0093*** (-13.11)	-0.0085*** (-6.81)
E[Illq]	0.0028*** (3.87)	0.0007 (1.20)	0.0025*** (3.30)	0.0011** (2.13)	0.0025*** (3.43)	0.0026*** (3.37)	0.0024** (2.14)
β^1	0.2253 (1.05)	0.1387 (0.79)	0.1663 (0.94)	0.1988 (0.93)	0.1740 (0.98)	0.1699 (0.96)	
β^2	0.0001 (0.68)		-0.0003*** (-4.66)				
β^3	0.0120 (1.02)			0.0128 (1.10)			
β^4	0.0091** (2.63)				0.0087*** (4.76)		
β^5						-0.0003*** (-4.64)	
β^6							-0.0003*** (-4.28)
LNMV	0.0003*** (3.91)	0.0004*** (4.26)	0.0003*** (3.92)	0.0004*** (4.28)	0.0003*** (3.91)	0.0003*** (3.91)	0.0003** (2.49)
ADJRSQ	0.1734	0.1288	0.1333	0.1670	0.1327	0.1334	0.0717

supporting evidence that it was priced in Taiwan. The estimated coefficients were insignificantly positive during the first sub-period, and were insignificantly negative during the second sub-period. The estimated coefficient on net liquidity beta (β^5) confirmed that liquidity risk is a pricing factor in Taiwan, with strong evidence during the second sub-period. However, the insignificantly positive estimated coefficient on the net

beta (β^6) in both sub-periods indicates that total effect of market- and liquidity risk is not priced.

Table 4: Cross-Sectional Regressions by Sub-period (Continue)

Panel B: Taiwan							
First sub-period from 1996 to 2002							
Model	1	2	3	4	5	6	7
Intercept	-0.0172*** (-15.58)	-0.0172*** (-15.52)	-0.0171*** (-15.31)	-0.0170*** (-15.87)	-0.0174*** (-15.35)	-0.0172*** (-15.27)	-0.0170*** (-14.00)
E[Illq]	-0.0125 (-1.24)	0.0067 (0.88)	-0.0048 (-0.49)	0.0069 (0.89)	-0.0107 (-1.04)	-0.0073 (-0.63)	-0.0023 (-0.18)
β^1	0.0007 (0.25)	0.0014 (0.47)	0.0014 (0.46)	0.0009 (0.31)	0.0015 (0.50)	0.0015 (0.48)	
β^2	0.0000 (-0.01)		0.0009* (1.99)				
β^3	0.0014 (0.39)			0.0014 (0.37)			
β^4	-0.0011 (-1.58)				-0.0008* (-1.77)		
β^5						0.0004 (1.38)	
β^6							0.0003 (0.77)
LNMV	0.0002** (2.13)	0.0002** (2.08)	0.0002** (2.01)	0.0002** (2.00)	0.0002** (2.24)	0.0002** (2.10)	0.0002* (1.92)
ADJRSQ	0.2209	0.1444	0.1476	0.2162	0.1487	0.1546	0.0998
Second sub-period from 2003 to 2008							
Intercept	-0.0068*** (-14.98)	-0.0067*** (-14.86)	-0.0068*** (-15.14)	-0.0067*** (-14.77)	-0.0067*** (-15.09)	-0.0068*** (-15.21)	-0.0070*** (-8.85)
E[Illq]	0.0069*** (2.67)	0.0126*** (4.73)	0.0077*** (2.96)	0.0120*** (4.80)	0.0092*** (3.62)	0.0081*** (3.10)	0.0103** (2.41)
β^1	-0.0031 (-0.54)	0.0004 (0.10)	0.0002 (0.06)	-0.0036 (-0.63)	0.0002 (0.06)	-0.0001 (-0.02)	
β^2	0.0003* (1.74)		0.0002*** (2.97)				
β^3	-0.0017 (-0.64)			-0.0020 (-0.78)			
β^4	0.0001 (0.27)				-0.0006*** (-3.00)		
β^5						0.0002*** (2.72)	
β^6							0.0001 (1.14)
LNMV	0.0002*** (4.51)	0.0002*** (4.27)	0.0002*** (4.54)	0.0002*** (4.31)	0.0002*** (4.50)	0.0002*** (4.57)	0.0002*** (3.95)
ADJRSQ	0.1517	0.1145	0.1185	0.1477	0.1168	0.1187	0.0477

In sum, market risk has never been priced in both countries. Neither illiquidity level nor illiquidity risk was priced in China and Taiwan during the first sub-period, 1996-2002. During the second sub-period, the level of illiquidity was priced in both countries. Liquidity risks, in any form, were not priced in China. Though the beta coefficients estimated on commonality in liquidity, on illiquidity sensitivity to market return, and on net liquidity risk were statistically significant, all their liquidity signs are opposite to those expected. In Taiwan, only was return sensitivity to market illiquidity not priced. Other forms, e.g., commonality in liquidity, illiquidity sensitivity to market return, and net liquidity risk, were priced.

6. Conclusion

Liquidity level is well accepted as one of pricing factors. Should liquidity risk be priced depends on whether it is systematic risk. The existence of commonality in liquidity documented in previous studies, e.g. Chordia, Roll, and Subrahmanyam (2000), Huberman and Halka (2001), (2001), Brockman and Chung (2002), Fabre and Frino (2004), Galariotis and Giouvris (2007), Giouvris and Galariotis (2008), etc. indicated that liquidity risk is partly systematic risk.

This study, following the framework of Acharya and Pedersen (2005), investigated at stock level the relative importance of liquidity risk to liquidity level and market risk using 1,355 sample firms listed in Chinese and Taiwanese stock market. Monthly stock returns, expected liquidity, market beta, and all types of liquidity were gathered from 1996 to 2008, and Amihud's illiquidity ratio was used as a liquidity measure. By cross-sectional regressing expected risk premium against expected liquidity cost, market beta, and liquidity betas similar to Fama and MacBeth (1973), we found that the results varied accordingly to country, and time period. Unlike that reported in Acharya and Pedersen (2005) and Lee (2011), evidence indicated market risk was less important, as pricing factor, than expected liquidity and liquidity risk. Chinese and Taiwanese investors generally demanded positive premium for expected illiquidity. In addition, systematic liquidity risk was more notable in Taiwan, especially after the year 2003.

References

Acharya, V & Pedersen, LH 2005, 'Asset Pricing with Liquidity Risk', *Journal of Financial Economics*, Vol. 77, pp. 375-410.

Amihud, Y 2002, 'Illiquidity and Stock Returns: Cross-Section and Time-Series Effects', *Journal of Financial Markets*, Vol. 5, pp. 31-56.

Amihud, Y & Mendelson, H 1986, 'Asset Pricing and Bid-Ask Spread', *Journal of Financial Economics*, Vol. 17, pp. 223-249.

Brennan, MJ & Subrahmanyam, A 1996, 'Market Microstructure and Asset Pricing: On the Compensation for Illiquidity in Stock Returns', *Journal of Financial Economics*, Vol. 41, pp. 441-464.

Brockman, P & Chung, DY 2002, 'Commonality in Liquidity: Evidence from an Order-Driven Market Structure', *Journal of Financial Research*, Vol. 25, pp. 521-539.

Brockman, P & Chung, DY 2006, 'Index Inclusion and Commonality in Liquidity: Evidence from Stock Exchange of Hong Kong', *International Review of Financial Analysis*, Vol. 15, pp. 291-305.

Brockman, P, Chung, DY & Pérignon, C 2009, 'Commonality in Liquidity: a Global Perspective', *Journal of Financial and Quantitative Analysis*, Vol. 44, pp. 851-882.

Chordia, T, Roll, R & Subrahmanyam, A 2000, 'Commonality in Liquidity', *Journal of Financial Economics*, Vol. 56, pp. 3-28.

Cooper, M 2007, 'Capital Markets and Regime Type in East Asia', paper presented at the American Political Science Association annual meeting, Chicago, September.

Coughenour, JF & Saad, MM 2004, 'Common Market Makers and Commonality in Liquidity', *Journal of Financial Economics*, Vol. 73, pp. 37-69.

Datar, VT, Naik, NY & Radcliffe, R 1998, 'Liquidity and Stock Returns: An Alternative Test', *Journal of Financial Markets*, Vol. 1, pp. 203-219.

Davivongs, K 2011, 'Commonality in Liquidity within Emerging Markets', DBA thesis, Thammasat University, Bangkok, Thailand.

Eun, CS & Huang, W 2007, 'Asset Pricing in China's Domestic Stock Markets: Is There a Logic?', *Pacific-Basin Finance journal*, Vol. 15, pp. 452-480.

Fabre, J & Frino, A 2004, 'Commonality in Liquidity: Evidence from the Australian Stock Exchange', *Accounting and Finance*, Vol. 44, pp. 357-368.

Fama, EF & Macbeth, JD 1973, 'Risk, Return and Equilibrium: Empirical Tests', *Journal of Political Economy*, Vol. 81, pp. 607-636.

Fujimoto, A 2004, 'Macroeconomic Sources of Systematic Liquidity', working paper, Yale University.

Galariotis, E & Giouvris, E 2007, 'Liquidity Commonality in the London Stock Exchange', *Journal of Business Finance & Accounting*, Vol. 34, pp. 374-388.

Giouvris, E & Galariotis, E 2008, 'Systematic Liquidity and Excess Returns: Evidence from the Athens Stock Exchange', *Journal of Money, Investment and Banking*, Vol. 2, pp. 81-96.

Hasbrouck, J & Seppi, D 2001, 'Common Factors in Prices, Order Flows, and Liquidity', *Journal of Financial Economics*, Vol. 59, pp. 383-411.

Huberman, G & Halka, D 2001, 'Systematic Liquidity', *Journal of Financial Research*, Vol. 24, pp. 161-178.

Lee, KH 2011, 'The world price of liquidity risk', *Journal of Financial Economics*, Vol. 99, pp. 136-161.

Lesmond, DA 2005, 'Liquidity of Emerging Markets', *Journal of Financial Economics*, Vol. 77, pp. 411-452.

Martínez, MA, Nieto, B, Rubio, G & Tapia, M 2005, 'Asset Pricing and Systematic Liquidity Risk: An empirical Investigation of the Spanish Stock Market', *International Review of Economics and Finance*, Vol. 14, pp. 81-103.

Pástor, L & Stambaugh, RF 2003, 'Liquidity Risk and Expected Stock Returns', *Journal of Political Economy*, Vol. 111, pp. 642-685.

Pavabutr, P, Sirodom, K & Tian, G 2009, 'Liquidity provision in Asian equity markets', working paper, Thammasat University.

Qin, Y 2008, 'Liquidity and Commonality in Emerging Markets', working paper, Massey University.

Sadd, MM 2006, 'Floor Information and Common Variations in Liquidity', *Applied Financial Economics Letters*, Vol. 2, pp. 275-278.

EFPR Data Processing Manual

Contents

EFPR Data Processing Manual

Briefs:

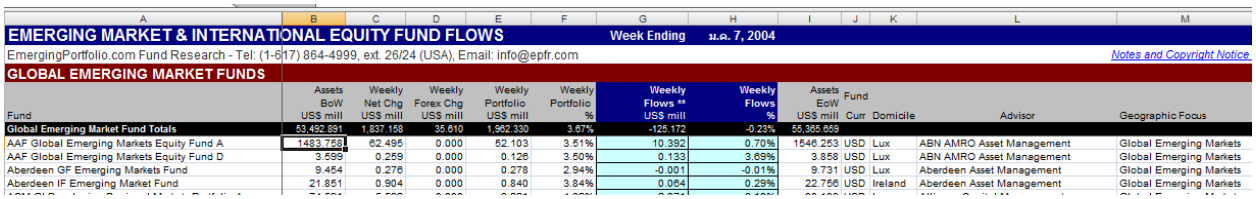
This document explains steps used to process RAW data provided by **EFPR**. The document starts with a brief explanation of the original file layouts then highlight some problems/remedies in the data files. Finally, the document ends with the explanation of the output db(s) and its summary statistics.

EFPR Sources Files:

The provided files are categorized into 3 groups as follow:

- **Equity Fund Flow** at **weekly** frequency
  -File prefix/format: **eff**[YY][MM][DD].xls
  -Range: Jan/2003-**Jul/2009**
  -Total: **240** files
- **Equity Fund Allocation** at **monthly** frequency
  -File prefix/format: **cxw**[YY][MM][DD].xls
  -Range: Jan/2003-**Dec/2009**
  -Total: **84** files
- **FundID** and **ShareID** which are used internally by the EFPR. It is important to note that it is ***NOT*** an official ID used in exchange markets. The files contain only fundname and ShareID/FundID. FundID is an ID for a fund advisor/family. ShareID is an ID for a fundname.
  -File prefix/format: **cew**[YY][MM][DD].xls, **effM**[YY][MM][DD].xls
  -Range: FundID 2004-2009, ShareID 2008-2009
  -Total: **93** files

Equity Fund Flow – Weekly Freq



EMERGING MARKET & INTERNATIONAL EQUITY FUND FLOWS — Week Ending ม.ค. 7, 2004

EmergingPortfolio.com Fund Research - Tel: (1-617) 864-4999, ext. 26/24 (USA), Email: info@epfr.com — Notes and Copyright Notice

GLOBAL EMERGING MARKET FUNDS

Fund	Assets BoW US$ mill	Weekly Net Chg US$ mill	Weekly Forex Chg US$ mill	Weekly Portfolio US$ mill	Weekly Portfolio %	Weekly Flows ** US$ mill	Weekly Flows %	Assets EoW US$ mill	Fund Curr	Domicile	Advisor	Geographic Focus
Global Emerging Market Fund Totals	53,492.891	1,837.158	35.610	1,962.330	3.67%	-125.172	-0.23%	55,385.659				
AAF Global Emerging Markets Equity Fund A	1483.758	62.495	0.000	52.103	3.51%	10.392	0.70%	1546.253	USD	Lux	ABN AMRO Asset Management	Global Emerging Markets
AAF Global Emerging Markets Equity Fund D	3.599	0.259	0.000	0.126	3.50%	0.133	3.69%	3.858	USD	Lux	ABN AMRO Asset Management	Global Emerging Markets
Aberdeen GF Emerging Markets Fund	9.454	0.276	0.000	0.278	2.94%	-0.001	-0.01%	9.731	USD	Lux	Aberdeen Asset Management	Global Emerging Markets
Aberdeen IF Emerging Market Fund	21.851	0.904	0.000	0.840	3.84%	0.064	0.29%	22.756	USD	Ireland	Aberdeen Asset Management	Global Emerging Markets

eff040107.xls

each ***eff*** files contains fund flow information as show in the picture. Each ***eff*** files also categorize fundname into 6 geographical locations which are

- GEM – Global Emerging Market
- EMA – European /Middle East /Africa
- AXJ – Asia Exclude Japan
- INT – International
- LAT – Latin America
- PAC – Pacific (Asia + Japan/Australia/New Zealand)

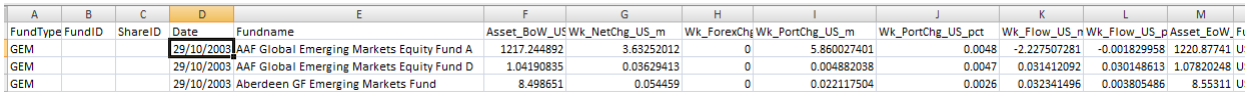
Problems/Remedies:

1) eff Range 1/1/2003 - 10/22/2003 does not provide FX Changes. The FX Changes are re-calculated using this equation

Fx =-[PortChg+Flow-EoW+Bow]

2) each eff files is ***programmatically*** extracted and consolidated. The FundType is determined by the Geo Focus information.

An extracted and processed Fund Flow data is as in this picture.



FundType	FundID	ShareID	Date	Fundname	Asset_BoW_US	Wk_NetChg_US_m	Wk_ForexChg	Wk_PortChg_US_m	Wk_PortChg_US_pct	Wk_Flow_US_n	Wk_Flow_US_p	Asset_EoW_	Fu
GEM			29/10/2003	AAF Global Emerging Markets Equity Fund A	1217.244892	3.63252012	0	5.860027401	0.0048	-2.227507281	-0.001829958	1220.87741	U
GEM			29/10/2003	AAF Global Emerging Markets Equity Fund D	1.04190835	0.03629413	0	0.004882038	0.0047	0.031412092	0.030148613	1.07820248	U
GEM			29/10/2003	Aberdeen GF Emerging Markets Fund	8.498651	0.054459	0	0.022117504	0.0026	0.032341496	0.003805486	8.55311	U

Where there are a few columns added

- FundType – contain the geographic information of the fund
- FundID – the FundID of a fund advisor
- ShareID – the ShareID of a fund
- Date – the end of week reporting date as stated in an **eff** file.

Problems/Remedies:
SharedID and **FundID** are readily available in the original EPFR file during the Range

8/29/2007 -7/1/2009

ShareID and FundID of those missing range is to be either 1) cross-referenced with **Monthly Allocation DB** or 2) ***VLOOKUP*** manually from the provides **KeyDB(s)**

ShareID field will be used as a matching key between Weekly Fund Flow DB and Monthly Allocation DB.

It is important to note that the column **Fundname** and **Advisor** has been cleaned with =**TRIM()** and =**CLEAN()** function in order to delete unnecessary white space and carriage return characters.

Equity Fund Allocation – Monthly Freq

CROSS-BORDER COUNTRY FLOWS		01/31/2005												
EmergingPortfolio.com Fund Research - Tel: (1-617) 864-4999, ext. 26/24 (USA), Email: info@epfr.com														
WEIGHTINGS DETAIL (US$)														
Fund Name	Fund Advisor	Fund Size	Total Asia Eq	Total Pacific (Australia, NZealand, Japan) Eq	Total Latin America Eq	Total Emerging Europe	Total Developed Europe	Total Middle East Eq	Total Africa Eq	Cash	Bangladesh	China	India	
		US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill	US$ mill
		313,852.442												
Aberdeen Emerging Markets Fund	Aberdeen Asset Management	318.606	158.63	15.87	54.10	54.65	0.00	13.45	21.27	0.63	0.00	20.53	45.22	4.
Aberdeen GF Emerging Markets Fund	Aberdeen Asset Management	12.120	6.03	0.68	2.06	2.03	0.00	0.49	0.81	0.02	0.00	0.81	1.73	0.
Aberdeen IF Emerging Market Fund	Aberdeen Asset Management	53.296	26.39	2.99	8.68	9.14	0.00	2.21	3.57	0.31	0.00	3.59	7.78	0.
Acadian Emerging Markets Portfolio	Acadian Asset Management	656.856	424.64	0.00	33.93	131.13	0.00	0.00	54.94	12.21	0.00	65.10	2.92	30.

cwx050201.xls

Each **cwx** files contains 2 sheets: ***Dollar*** and ***Percent***. All extracted data are copied from the sheet ***Dollar***.

Problems/Remedies:

1) Allocating countries: comparing across **84** files, we learn that the order of the countries(column) and the list of the countries are varied. To solve this problem, we carefully re-order the column headers, and ***programmatically*** consolidate the files.

2) **ShareID** is readily available in the original EPFR file during the Range

12/31/2002 - 9/30/2003

ShareID and FundID of those missing range is to be either 1) cross-referenced with **Weekly Fund Flow DB** or 2) ***VLOOKUP*** manually from the provide **KeyDB(s)**

An extracted and processed Fund Flow data is as in this picture.

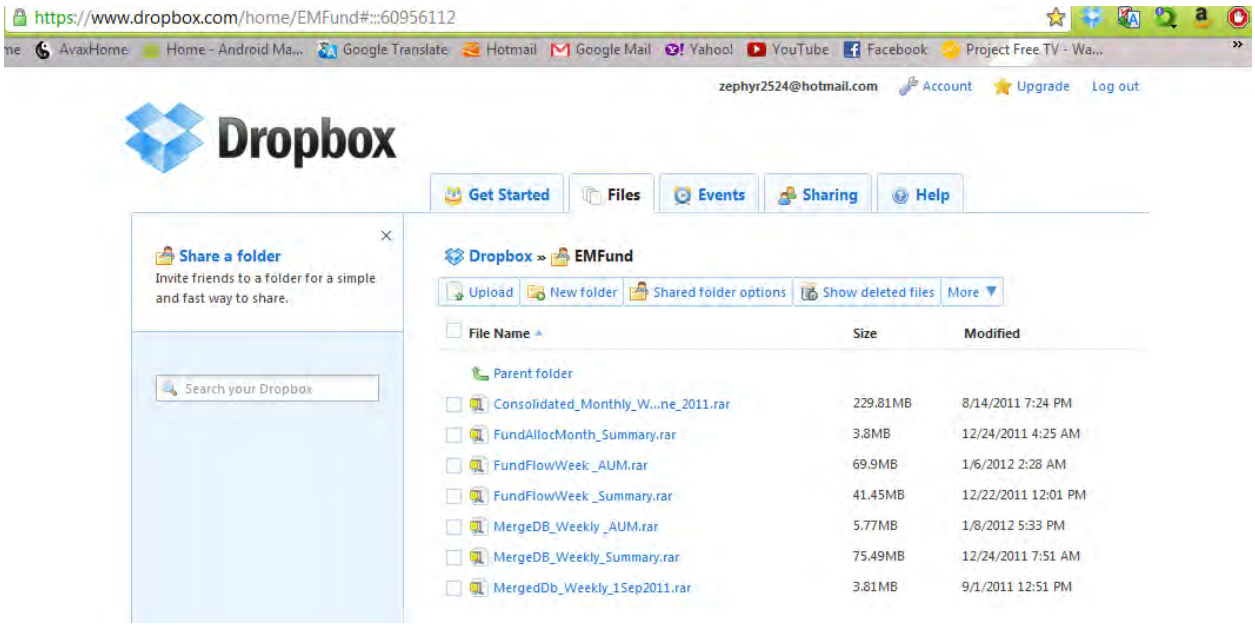
FundTyp	FundID	ShareID	Date	Fund Name	Fund Advisor	Fund Size	Total Asia Eq	Total Pacif	Total Latir	Total Eme	Total Deve	Total Mid	Total Afric	Cash	Banglades	China	India
GEM			31/12/2004	Aberdeen Et	Aberdeen Ass	308.4422	5.8336	0.6701	1.7834	2.0821	0	0.5042	0.7038	0.1062	0	0.7779	1.786
GEM			31/12/2004	Aberdeen G	Aberdeen Ass	11.6835	26.2136	3.1036	8.033	9.3052	0	2.0954	3.286	0.4902	0	3.4265	8.161
GEM			31/12/2004	Aberdeen IF	Aberdeen Ass	52.527	387.8669	0	48.3871	137.0615	0	0	68.8424	11.3417	0	59.6643	3.063
GEM			31/12/2004	Acadian Eme	Acadian Asset	653.4997	105.5416346	6.307269	40.78701	20.3935	0	6.727754	28.38271	0	0	4.204846	17.2398

Where there are a few columns added

- FundType – contain the geographic information of the fund
- FundID – the FundID of a fund advisor
- ShareID – the ShareID of a fund
- Date – the end of month reporting date as stated in a **cwx** file.

ShareID field will be used as a matching key between Weekly Fund Flow DB and Monthly Allocation DB.

It is important to note that the column **Fundname** and **Advisor** has been cleaned with =**TRIM()** and **CLEAN()** function in order to delete unnecessary white space and carriage return characters.



Databases

Key DB(s)

File: Consolidated_Monthly_Weekly_2003-2009_22_June_2011.xlsm
Sheet: Definitions

There are 3 combination of Key Database. All missing FundID/SharedID will be vlookup from these databases

Tab	Description	Remark
ShareID2003	[SharedID only] Key DB extracted from Year 2003, Month 1 to 9	Year 2003
ShareID2008_2010	[FundID and SharedID] Key DB from EPFR [effM080131...effM100430raw] - 29 Files	Year 2008-2010
FundID2004_2009	[FundID only] Key DB from EPFR [cew060501raw...cew091201raw] - 64 Files	Year 2004-2009

1) **ShareID2003** contains only **ShareID** from a hidden column that we found from **cxw** files. see
2) **ShareID2008_2010** contains **ShareID and FundID** provided by EFPR. see
3) **FundID2004_2009** contains only **FundID** provided by EFPR. see

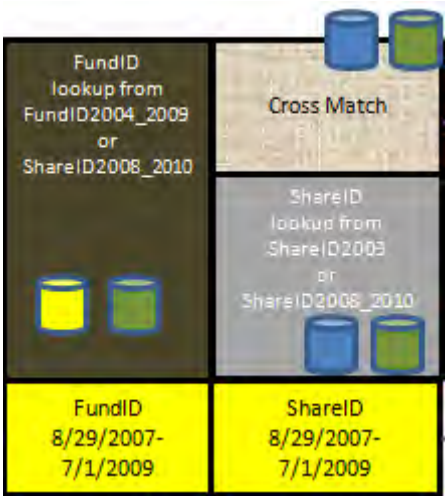
Fundname	FundID	ShareID
3V Invest Swiss Small & Mid Cap	f014363	1019931
AAF Asia Pacific Property Equity Fund A	f016088	1024153
AAF Asia Pacific Property Equity Fund B	f016088	1024154
AAF Asian Tigers Equity Fund A	f000899	301618
AAF Asian Tigers Equity Fund B	f000899	1017418

The picture illustrates an example of a fundname and its ShareID. Note that fundname with same **FundID** means these funds are under the same management/advisor.

FundFlow DB

All **eff** files are cleaned and consolidated into 1 db.
SAS Dataset: Consolidated_Monthly_Weekly_2003-2009_22_June_2011.xlsm
Sheet: WeeklyFlow

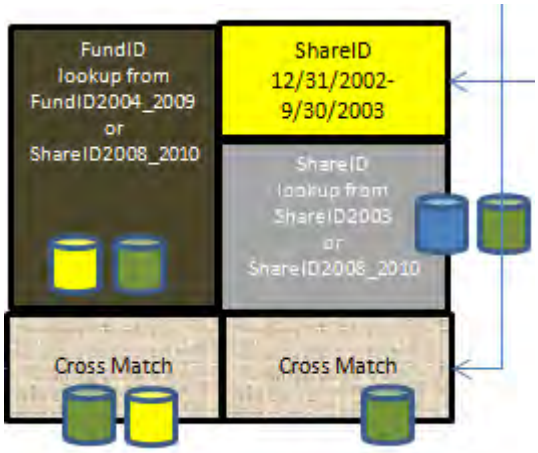
It should be emphasize again that **SharedID** and **FundID** are readily available in the original EPFR file during the Range **[8/29/2007 -7/1/2009]** ShareID and FundID of those missing range is to be either 1) cross-referenced with **Monthly Allocation DB** or 2) ***VLOOKUP*** manually from the provides **KeyDB(s)**



Allocation DB

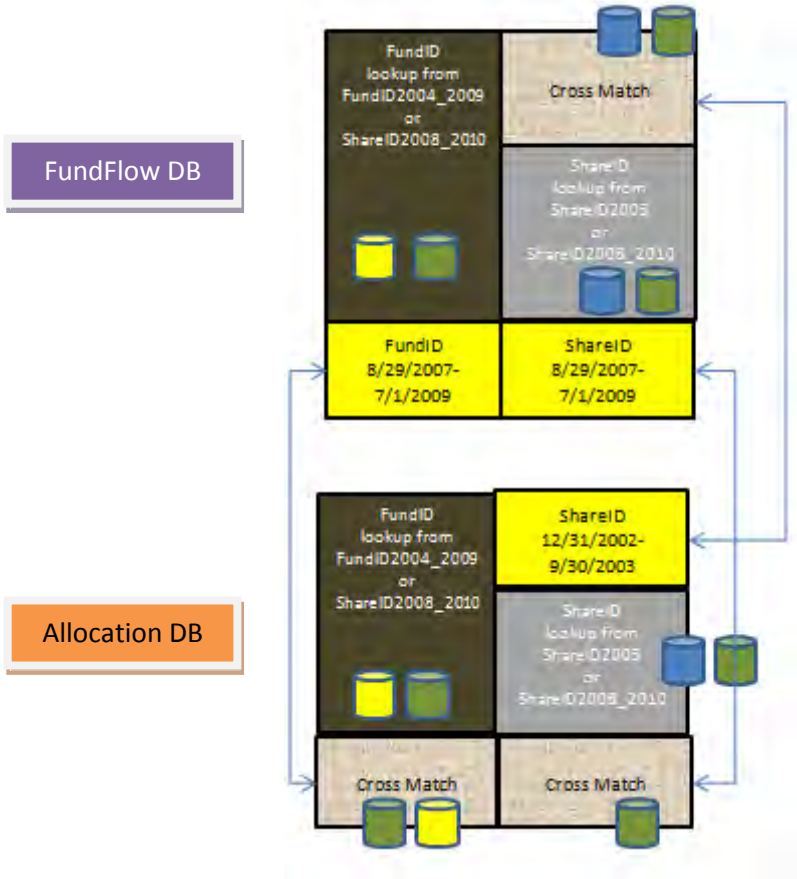
All **cxw** files are cleaned and consolidated into 1 db.
File: Consolidated_Monthly_Weekly_2003-2009_22_June_2011.xlsm
Sheet: MonthlyAlloc

It should be emphasize again that) **SharedID** is readily available in the original EPFR file during the Range[**12/31/2002 - 9/30/2003**] ShareID and FundID of those missing range is to be either 1) cross-referenced with **Weekly Fund Flow DB** or 2) ***VLOOKUP*** manually from the provide **KeyDB(s)**



The Logic of Matching ShareID/FundID back into FundFlow DB/Allocation DB

Round#1 Matching with VLOOKUP in excel



The YELLOW part, where ShareID and FundID are already available from EFPR, is left ***un-touched***. The rest of the cell where ID are still missing uses the logic as follow

1) If the ID at the same time period is available at the other DB, cross-match it.

2) If 1) is not available, lookup from the KeyDB which has the ***closest*** time period first
3) If 2) is not available, lookup from the KeyDB which has a ***further*** time period as a last resource
4) If 3) is not available – set #N/A

See keydb notation here

Round#1 Matching results.

After the round#1 bits, the success rate of matching ***ShareID*** in each DB are as follows:

- Fund Flow DB – 80% success rate
- Monthly Allocation DB – **50** % success rate

Findings:

We found that the fundname in Monthly Allocation DB is slightly different from the fundname in the Fund Flow DB. Hence, the **50**%-missing ShareID of Monthly Allocation DB can be salvaged from Fund Flow DB by using Fuzzy logic matching + EoW size comparing. Consider the following picture

Fundflow						
GEM	f004528	1004133	3-Jan-07	AIG Dynamic Emerging World Fund plc A	AIG Asset Management	3.521328
GEM	f004528	994469	3-Jan-07	AIG Dynamic Emerging World Fund plc Y	AIG Asset Management	81.13921
Fund Allocate						
GEM	#N/A	#N/A	31-Jan-07	AIG Dynamic Emerging World Fund plc	AIG Asset Management	82.7974
GEM	#N/A	#N/A	31-Jan-07	AIG Dynamic Emerging World Fund plc EUR	AIG Asset Management	3.4201

From the above picture, it is obvious the 994469 belongs to [AIG Dynamic Emerging World Fund plc] and 1004133 belongs to [AIG Dynamic Emerging World Fund plc EUR] respectively. Therefore, the fuzzy logics are as follow.

Round#2 Fuzzy logic matching.

1. Holding [Fund Flow DB] as the master key DB.
2. Iterate from obs=1 to last obs of [Allocation DB]
3. If this obs has a ShareID already then skip, else proceed to (4)
4. Check within the same **Month** and **Year**,
   If fundname.AllcationDB is a subset of fundname.FundFlowDB and diff size-eow<10%
   then match the ShareID from FundFlowDB to Allocation DB
5. If (4) fails, check within the same **Year**
   If fundname.AllcationDB is a subset of fundname.FundFlowDB and diff size-eow <10%
   then match the ShareID from FundFlowDB to Allocation DB
6. If (5) fails, check the whole [Fund Flow]
   If fundname.AllcationDB is a subset of fundname.FundFlowDB and diff size-eow <10%
   then match the ShareID from FundFlowDB to Allocation DB
7. If (6) fails, cut the last token of [fundname.AllcationDB] then repeat (4)-(6)

Note: This fuzzy logic mechanism is done with **SAS.** During the string comparison, blanks space within fundname and character case are already taken care of.

Round#2 Matching results.

After the round#2 bits, the success rate of matching ***ShareID*** in each DB are as follows:

- Fund Flow DB – 80% success rate
- Monthly Allocation DB – **76** % success rate

Round#3 Dummy ShareID

After round#1 and round#2, the rest of #N/A shareid are fill with dummy ShareID with the following logic.

1. Retrieve all #N/A-fundname from both FundFlowDB and AllocationDB.
2. Generate dummy ShareID
3. Attach dummy to FundFlowDB first, then fuzzy logic AllocationDB against FundFlowDB again.
   (At this point, Allocation DB – **78** % success rate)
4. Attach the rest AllocationDB with dummy ShareID

After processing the above Round#1-Round#3 logic, the final DBs are

- **ffdata5.sas7bdat** – FundFlow DB at Weekly Frequency
- **fadata5.sas7bdat** – Allocation DB at Monthly Frequency

MergedDB @ Weekly Freq(No accumulate)

Having attached ShareID into both FundFlow DB and Allocation DB , the 2 db are merged by using ShareID/Month/Year as a key.

File: **mergedb_weekly_noacc_final.sas7bdat**

MergedDB @ Montly Freq (Accumulate 4-week fundflow into 1 month fundflow before merging)

The 2 db are merged by using ShareID/Month/Year.

File: **mergedb_monthly_acc_final.sas7bdat**

Additional DBs

- **fadata5_pct_sumavg.sas7bdat** – Allocation DB - Presenting in %allocation by country
- **mth_acc_pct_sumavg.sas7bdat** – Allocation DB - Presenting in %allocation by country
- **wk_noacc_pct_sumavg.sas7bdat** – Allocation DB - Presenting in %allocation by country

Flags and other calculated variables

There are a number of flags in the above DBs:

ffdata5.sas7bdat – FundFlow DB at Weekly Frequency

Flags	Description
fid_sid_org	Indicate whether this is provided by EPFR
frm_vlkup	Indicate whether this is from vlookup logic
dmySID	Indicate whether this is a dummy

fadata5.sas7bdat , ***_pct_sumavg.sas7bdat** – Allocation DB at Monthly Frequency

Flags	Description
sid_org	Indicate whether this is provided by EPFR
frm_vlkup	Indicate whether this is from vlookup logic
dmySID	Indicate whether this is a dummy
frm_ffdb	Indicate whether this is from fuzzy logic
diff_eow	If [frm_ffdb] is true, this is the different between **Size[FundFlowDB]** variable and **EoW[AllcationDB]** variable in %
avg	Average weight allocation across country (%)
sum	Sum allocation (%)

Summary Statistics of Each Database

From the above databases, some statistic are derived as follows

Database	Summary Statistics
FundFlow DB	1. Total number of fundnames by Year/Geo 2. Total number of fund families(advisor) by Year/Geo 3. Average/Max/Median number of fundname of a fund family by Year/Geo 4. Total/Average/Std of **EoW** by Year/Geo
Allocation DB	1. Total number of fundnames by Year/Geo 2. Total number of fund families(advisor) by Year/Geo 3. Q1/Median/Max number/Q3 of **AvgWeightAllocationCountry**(%) by Year/Geo
MergeDBs	1. Total number of fundnames by Year/Geo 2. Total number of fund families(advisor) by Year/Geo 3. Average/Median/Max number of fundname of a fund family by Year/Geo 4. Total/Average/Std of **EoW** by Year/Geo 5. Q1/Median/Max number/Q3 of **AvgWeightAllocationCountry**(%) by Year/Geo