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Abstract

In this study, we review the recent trends in capital inflows to East Asian economies and investigate the impact of these inflows on asset price fluctuations in the region. We focus on five emerging economies in East Asia (Korea, Hong Kong, Thailand, Malaysia, and Indonesia) over the period 2000–2010 and estimate a vector autoregression (VAR) model for each economy. We study the impacts of various types of capital inflows on two types of asset prices: equity and housing prices. Our main results are as follows. Firstly, capital inflows significantly increase equity prices in all five economies. All types of capital inflows do not always increase equity prices in all economies. Equity inflows and bond inflows increase equity prices in all countries except for bond inflows in Thailand. Secondly, the responses of housing prices to capital inflows differ among economies and inflow category types. We find positive impacts on housing prices only for Hong Kong and Korea. Finally, the plunges and surges in capital inflows in emerging economies during and after the global financial crisis have contributed to equity price depreciation in Korea and to housing price appreciation in Hong Kong.

Keywords: Capital inflows, Housing prices, Equity prices, VAR, Asian economy

JEL Classification Numbers: F21; F32; F41; G21

1. Introduction

Despite the contraction of international capital flows following the global financial crisis, capital inflows to emerging economies in Asia have recovered substantially. The ratio of the international financial balance surplus to GDP in certain Asian economies achieved levels seen only before the Asian economic crisis (Balakrishnan et al., 2012). Prior to the financial crisis in the United States, which began around the time Lehman collapsed, capital inflow into this country was very high. Similarly, just before the Asian economic crisis of the latter half of the 1990s, capital inflow into the crisis-hit economies was also very high.

How do capital inflows affect the economies that receive them? In principle, capital inflows can contribute toward improving economic efficiency and risk sharing in both the source and destination economies. Nevertheless, capital inflows often have many undesirable effects. They can lead to an exchange rate appreciation that reduces international competitiveness and can cause a significant build-up of imbalances and resource misallocation, leading to a boom in the economy followed by a bust. Surges in capital inflows to emerging Asian economies and their effects on asset markets have attracted the attention of economists and policy makers. Frankel (2010) considers the procyclicality of capital flows in developing countries caused by their exchange rate policy and fiscal policy. Ostry et al. (2010, 2011) examine how to handle surges in capital inflows effectively from the perspective of prudential and macroeconomic policy. This study focuses on the latter impact of capital inflows, that is, an economic slowdown.

We have witnessed many interesting economic developments since the early 2000s in certain Asian economies. The first development was an increase in foreign exchange reserves. Capital inflows can contribute to exchange rate appreciation. If the monetary authority intervenes in foreign exchange markets, capital inflows cause a liquidity increase instead of exchange rate appreciation. Hence, in this case, the link between capital inflows and an economic boom can be strengthened.

The second development is related to household finance. After the Asian crisis, the recovery of corporate investment was slow, and the need for external finance of corporate

sector was sluggish. While corporate sectors have moved away from bank credit, bank sectors have expanded their provision of credit to household sectors since 2000. The strength of this trend varied among Asian economies; it was stronger in NIE economies than in ASEAN economies (Enya, 2012). Hence, in an economy with highly developed household credit, an increase in bank loan inflows can contribute to expanding the demand for housing through an increase in household credits.

The purpose of this study is to review the recent trends in capital inflows to East Asian economies and to investigate the impact of these inflows on asset price fluctuations in the region. This study focuses on five emerging economies in East Asia (Korea, Hong Kong, Thailand, Malaysia, and Indonesia) over the period 2000–2010. The main questions posed by this study are as follows. (1) What kind of influence do capital inflows have on asset prices, such as equity prices and housing prices? (2) What types of capital inflows have significant effects on equity prices and housing prices? (3) Does the effect of capital inflows on asset prices vary among economies, and if so, why?

To answer these questions, we estimate a vector autoregression (VAR) model for each economy. Our VAR model uses quarterly data on the following: gross capital inflows relative to GDP, the real interest rate, real bank credit, real asset prices, the real GDP, and the inflation rate. To assess the role of different types of capital inflows, we allow gross capital inflows to represent foreign direct investment (FDI) inflows, equity inflows, bond inflows, and bank loan inflows. We also assess the differences between the responses of equity prices and housing prices to capital inflows. Therefore, real asset prices represent either real equity prices or real housing prices.

This study differs in several ways from previous studies that examine the impacts of capital inflows on asset prices. First, this study focuses not on the impacts of net capital inflows on asset prices, but on the impacts of gross capital inflows on them. We define “gross capital inflow” as an increase in external financial liabilities, “gross capital outflow” as an increase in external financial assets, and “net capital inflow” as the difference between a gross capital inflow and a gross capital outflow. Many studies have investigated the impact

of net capital inflows on asset prices. Although capital outflows from Asian economies were small during the 1990s, they have increased recently under financial globalization. Focusing on the impacts of net capital inflows could lead to a misinterpretation of the link between capital inflows and asset prices if the impact of capital inflows on asset prices differs from the impact of capital outflows on them. Therefore, to avoid that risk, we focus not on net capital inflows—that is, gross inflows minus gross outflows—but on gross inflows.

The second difference is that this study focuses on the impacts of various types of capital inflows. This study decomposes capital inflows into four types: FDI inflows, equity investment inflows, bond investment inflows, and bank loan inflows. We investigate the impact of each type of inflow.

The third difference is that this study focuses on the impacts on two types of asset prices: equity prices and housing prices. As household credit has increased, the link between housing prices and the real economy has gained importance in some Asian economies. Economic boom–bust cycles tend to be associated with housing price boom–bust cycles but not equity price boom–bust cycles (Enya, 2012).

The structure of this paper is as follows. Section 2 reviews the trends of capital flows in emerging Asia and identifies certain typical features in capital flows, especially during the recent surges. Section 3 provides a review of the literature on the relationship between capital flows and asset prices. In Section 4, we empirically examine the impact of gross capital inflow shocks on asset prices and then check the robustness of our results. In Section 5, we investigate when and which types of capital inflows contribute to asset price fluctuations using a counterfactual simulation analysis to evaluate the effects of recent surges and contractions in capital inflows around the global financial crisis period. Finally, Section 6 concludes.

2. Recent Trends of Capital Flows in East Asia

Table 1 shows the ratio of the international financial balance to GDP over the period 1990–2010 for five economies in East Asia. Table 1 shows the mean over time. The ratio of

the financial balance to GDP is a small surplus or deficit during the 2000s, with a surplus of 1.2–1.3% during the 1990s. Hong Kong and Malaysia have large deficits of -4.9% during the 2000s. The average ratios over the periods immediately before the Asian crisis and after the global financial crisis are larger than the average ratios over other periods. The average ratio over the periods immediately before the Asian crisis is 11% for Thailand and 3–4% for Korea and Indonesia, while this ratio over the periods after the global financial crisis is 7% for Hong Kong and 2–3% for Korea, Thailand, and Malaysia. There are two capital surges during 1990–2010. The first surge is over the periods immediately before the Asian crisis, while the second is over the periods after the global financial crisis. In addition, the average ratio in the 2000s is smaller than that in the 1990s.

Have capital flows in East Asia become smaller between the 1990s and the 2000s? Table 2 shows the ratios of gross capital inflows to GDP and gross capital outflows to GDP over the period 1990—2010 for each capital flow type and for each economy. Table 2 shows the mean over time. The gross capital inflows are defined as increases in external financial liability, while gross capital outflows are defined as increases in external financial assets. A negative value of gross capital inflows (outflows) denotes a decrease in external liabilities (assets). Hence, A negative value of gross capital inflows (outflows) implies that foreign (domestic) investors have withdrawn from the destination economy.

The left side of Table 2a shows the ratio of gross FDI inflows to GDP. The gross FDI inflow is 22% of GDP for Hong Kong, about 3% of GDP for Malaysia and Thailand, and less than 1% of GDP for Korea and Indonesia. For some economies, the ratio of GDP decreases between the 1990s and the 2000s. The right side of Table 2a shows the ratio of gross FDI outflows to GDP. The gross FDI outflow is 23% of GDP for Hong Kong, about 3% of GDP for Malaysia, and about 1% for Korea, Thailand, and Indonesia. The left and right halves of Table 2b show gross equity inflows and gross equity outflows over GDP, respectively. They are less than or equal to 1%, which is not very large, except in the case of Hong Kong. For Korea, the average of gross equity inflows in the period after the global financial crisis is 2.6%, which is higher than that in the other periods. The left and right

halves of Table 2c show gross bond inflows and gross bond outflows over GDP, respectively. Gross bond inflows are less than 1% of GDP, which is not very high, except in the case of Korea. However, they are higher in the periods immediately before the Asian crisis and after the global financial crisis than in the other periods. Finally, the left and right halves of Table 2d show gross bank loan inflows and gross bank loan outflows over GDP, respectively. The bank inflow ratio in the 2000s is lower than in the 1990s. In particular, in the periods immediately before the Asian crisis, they are remarkably high for Korea and Thailand. In the periods after the global financial crisis, the economies of Hong Kong and Thailand have high ratios.

In summary, we can observe the following main features of capital flows in the 2000s. First, financial balance surplus decreased in the 2000s as compared to the 1990s. This may have been due to an increase in capital outflow rather than a decrease in capital inflow. Second, the type of capital inflow in the periods after the global financial crisis varies among economies. The dominant types of capital inflows are equity and bond inflows for Korea, bank loan inflows for Hong Kong, bond and bank loan inflows for Thailand and Indonesia, and bond inflows for Malaysia. Indonesia also receives large FDI inflows.

3. Related Literature

A number of studies have examined the impacts of capital flows on asset prices, and many of them use the VAR approach¹. Kim and Yang (2009) investigate the impacts of capital inflows on asset prices by using the VAR approach for Korea. Their VAR model uses capital inflow, two types of asset prices (housing and equity prices), and various control variables for 1999M1–2007M7. Their empirical results suggest that capital inflow shocks

¹ Favilukis et al (2012) investigate the empirical relationship between house price changes and international capital flows using a regression approach. They suggest that changes in international capital flows play a small role in driving house price movements. They also argue that the key causal factor is financial market liberalization. Olaberria (2012) investigates the empirical link between capital inflows and booms in asset prices using a regression approach and finds that the link varies across capital inflow categories and across countries. He also finds that the cross-category and cross-country differences are caused by differences in financial development, the quality of institutions, and exchange rate regimes.

contribute to equity price increases in Korea, but do not contribute substantially to increases in land and housing prices.

Kim and Yang (2008) investigate the effects of capital inflows on asset prices for five emerging Asian economies: Indonesia, Malaysia, Philippines, Thailand, and Korea. They estimate a panel VAR model by using panel data for the five economies over the period 1999Q1–2006Q1. Their model consists of capital and portfolio inflows, equity prices, land prices, and control variables. Their empirical results suggest that capital inflows contribute to asset price appreciation. Positive capital shocks increase equity prices immediately and land prices increase with a small delay.

These empirical results are mixed. Therefore, we investigate the effects of capital inflows on asset prices through the following analysis. First, we estimate the VAR model for each economy, recognizing that effects differ from economy to economy. Hence, we do not use a panel VAR model. Second, this study also estimates the VAR model for each type of capital inflow, recognizing the different effects between inflow types. We decompose capital inflows into four inflow types: FDI inflows, equity inflows, bond inflows, and bank loan inflows.

Our interest is close to that of Tillmann (2012), who finds cross-country differences in the responses of asset prices to capital inflow shocks. He suggests that the effects of inflow shocks on housing prices in Hong Kong, Korea, and Singapore are stronger than those in Malaysia, Thailand, and Taiwan. Moreover, he suggests that the heterogeneity in the response to capital inflows across countries is due to differences in monetary policy. His approach uses a panel VAR with sign restrictions. To assess country j 's contribution, he compares the impulse response functions of the overall model with that obtained without country j . We estimate the VAR model for each country to address cross-country heterogeneity.

4. Methodology and Estimation Results

4.1. Methodology

In this section, we estimate a VAR model with six variables to examine the relationship between capital flows and asset prices. The variables are the real GDP growth rate, inflation, capital flow, short-term interest rate, credit volume, and asset price. The countries included are Korea, Hong Kong, Malaysia, Thailand, and Indonesia. We use quarterly data for a sample period extending from the first quarter of 2000 (2000Q1) to the fourth quarter of 2011 (2011Q4). In this study, our aim is to investigate the relationship between capital flows and asset prices in the 2000s, which financial intermediation has changed since the Asian financial crisis; therefore, the sample period is constrained after 2000.

Although past research has focused on net capital flows, this study focuses on gross capital flows. This is because surges and sudden stops of capital inflows, which are relatively large in comparison to the scale of financial markets, cause macroeconomic instabilities in emerging countries. Therefore, we distinguish between capital inflows (domestic asset holdings by foreign investors) and capital outflows (foreign asset holdings by domestic investors). We first investigate the effects of capital inflows on asset prices and then the effects of capital outflows².

We also focus on capital flows in the private sector (private flow, hereafter). A private flow is composed of equity and bond flows (equity securities and bond securities in portfolio investment), bank loan flows (banks in other investments), and FDI flows (direct investment). In emerging economies, these flows play important roles in economic development as well as in macroeconomic instabilities due to surges and sudden stops. Therefore, we first examine the effects of private flows on asset prices and then the effects of individual flows.

We obtained capital flow data from the Balance of Payments section of the IMF's *International Financial Statistics* (IFS). The asset prices used in this study are equity price and housing price. The definition of the housing price index differs according to the details of the various countries. The housing price index used in this study is the average residential

² To check the robustness, we estimate the VAR model using net capital flows in Section 5.

housing price for the entire country³. The equity price and housing price are obtained from IFS and the CEIC database. The VAR model includes the credit volume (Claims on Private Sector: line 22D) and a short-term interest rate (Money Market Rate) as additional financial variables and real GDP growth and CPI inflation as real variables. Most of these data are obtained from IFS, while real GDP in Indonesia is obtained from Abeyasinghe and Rajaguru (2004)⁴.

Essentially, asset price, credit volume, real GDP, and inflation are de-trended by applying log differences. The capital flow is transformed into a GDP ratio by division by a nominal GDP in U.S. dollar terms. The short-term rate, credit volume, equity price, and housing price are all deflated by the consumer price index (CPI). The nominal and real GDP are seasonally adjusted.

This study uses the Cholesky decomposition to calculate impulse responses. The order of variables is as follows: real GDP, inflation, capital flow, short-term rate, credit volume, and asset price. We place the real variables first in order to capture the effects of real shocks on capital flow and asset price without delay⁵. Although capital flow is affected by global factors such as global risk, the global interest rate, and world economic growth and domestic factors such as institutions, country risk, and macroeconomic fundamentals (Forbes and Warnock, 2011; Forbes and Warnock, 2012; Fratzscher, 2011), we set capital flow second in order to capture the effects on asset prices without delay. Among the financial variables, we set the short-term rate first since the monetary authority adjusts the money market rate. Credit volume is featured next and asset price last because our aim is to examine the effects on the asset price⁶. We determined the number of lags of the VAR model by the Akaike

³ See Table 3.

⁴ Abeyasinghe and Rajaguru (2004) calculate the quarterly real GDP from the annual real GDP using macroeconomic data such as exports, imports, and money equity for ASEAN4 and China. They start from 1975Q1 for ASEAN4 and from 1978Q1 for China.

⁵ We check the robustness of the ordering in Section 5.

⁶ Central banks are able to adjust the money market rate in Indonesia, Korea, and Thailand because they have adopted inflation targeting policy. In contrast, Hong Kong has adopted a currency board policy.

Information Criterion (AIC).

4.2. Estimation Results

4.2.1. Effects of Capital Inflow

Figure 1 shows the impulse responses of asset prices to capital inflow shocks over seven quarters following a shock. The upper panel of Figure 1 shows the results of the impulse responses of equity prices to private inflow shocks (i.e., Equity + Bond + Bank + FDI). A private inflow shock increases equity prices significantly in all countries and regions. However, the effect is limited to the short run. After significant increases, equity prices decrease significantly in Korea and Malaysia. This is probably because the equity price response depends on the capital flow type.

The lower panel of Figure 1 shows the impulse responses of housing prices to the private inflow shocks. A private inflow shock increases the housing price significantly only in Hong Kong. Compared with the effects on equity prices, the effects on housing prices show persistence. On the other hand, a private inflow shock decreases housing prices significantly in Indonesia and Malaysia. This result is puzzling because normally, capital inflow into the private sector increases housing prices through market liquidity expansion. Moreover, a private inflow shock does not appear to have significant effects on housing prices in Korea and Thailand.

In summary, a private inflow shock increases the equity price significantly in all countries, with clear patterns emerging. However, the responses of housing prices to a private inflow shock differ among countries: housing prices increase in Hong Kong, decrease in Indonesia and Malaysia, and do not respond in Korea and Thailand. The effects on equity price do not persist, but the effects on housing prices do.

The upper panel of Table 4 reports the results of forecast error variance decomposition on asset prices (the equity price and housing price) over the whole sample period. The values show the relative contributions of four variables, including the private inflow, to forecast the error variance of the asset prices over 10 quarters following a shock.

As for the equity price, private inflow accounts for over 6% of equity price variances in all countries. In particular, the contributions of private inflow are over 10% in Indonesia, Korea, and Malaysia. Except in Indonesia, the largest contribution to equity price in all countries is real GDP.

Regarding housing prices, the contribution of private inflow to housing price variance is 17% in Hong Kong, which is high. In Korea and Thailand, where private inflow does not have significant effects on housing prices in the impulse response, the contribution of private inflow is low. In Indonesia and Malaysia, although a private inflow shock decreases housing prices significantly, the contribution of private inflow is relatively high.

4.2.2. Effects of Individual Inflows

In order to examine the effects of individual inflows on asset prices, we estimate the VAR model with equity inflow, bond inflow, bank inflow, and FDI inflow instead of private inflow. Figure 2 shows the impulse responses of equity prices for each economy. In the results of an impulse response, equity inflow shocks increase equity prices significantly in all countries. The effects of equity inflow occur in the short run. Bond inflow shocks also increase equity prices significantly in all countries except Thailand. Similar to equity inflow, the effects of bond inflow occur in the short run. However, after the increase, equity prices decrease significantly in Hong Kong, Korea, and Malaysia, which may seem perplexing since the response to equity price of a private inflow shock stems from bond inflow shocks. Bank inflow shocks appear to have had significant effects on equity prices, although the directions of the responses differ among countries. Bank inflow shocks increase equity prices significantly in Hong Kong, Indonesia, and Thailand, but decrease them in Korea and Malaysia. Similar to the case of bank inflow, FDI inflow shocks decrease equity prices in Korea and Malaysia. FDI inflow does not appear to have significant effects on equity prices in Hong Kong and Indonesia.

Thus, equity inflows and bond inflows increase equity prices in all countries except for bond inflows in Thailand. However, bank inflows and FDI inflows have no significant

effects on equity prices in some economies. They also have negative effects on equity prices in Korea and Malaysia. These findings suggest that all types of capital inflows do not always increase equity prices in all economies.

The lower panel of Table 4 reports the results of forecast error variance decomposition on asset prices. Regarding equity price (II.A of Table 4), in Hong Kong, bond inflows and bank inflows contribute substantially to equity price fluctuation. Their contributions account for 10.9% and 6.7% of the equity price variance, respectively. FDI inflows contribute little to equity prices. In all economies except Thailand, the bond contributions are large. The contributions of bond flows are 10.9% for Hong Kong, 14.1% for Indonesia, 20.5% for Korea, and 12.2% for Malaysia. The contributions of equity inflows are large in some economies. They are 8.7% for Indonesia, 22.5% for Malaysia, and 11.7% for Thailand. Thus, bond inflows and equity inflows contribute substantially to equity prices in all economies except for Thailand, while FDI inflows contribute little to equity prices in all economies.

Figure 3 shows the impulse responses of housing prices for each economy. The results of housing prices are more complicated. In Hong Kong, bond and bank inflow shocks increase, but an equity inflow shock decreases the housing price significantly. In Indonesia, all types of inflow shocks decrease the housing price significantly. In Korea, although private inflow does not have significant effects on the housing price, bank inflow increases it, and an FDI inflow shock decreases it significantly. In Malaysia, an equity inflow shock increases the housing price significantly, but the other inflow shocks decrease it. In Thailand, only an FDI inflow shock decreases the housing price significantly. Thus, the effect of an individual inflow shock on housing prices varies by both country and flow type. We found positive impacts on housing prices only for Hong Kong and Korea. For Hong Kong, both bond and bank inflow shocks increase housing prices. For Korea, bank inflow shocks increase housing prices.

The lower panel of Table 4 reports the results of forecast error variance decomposition on asset prices. The results for housing prices (II.B of Table 4) differ among

the countries. Generally, the contribution of each inflow shock to housing price fluctuation is relatively limited. In Hong Kong and Malaysia, the contributions of debt-type inflows (bond and bank inflows) are large. The contributions of bond inflows are 12.7% for Hong Kong and 12.1% for Malaysia, and those of bank inflows are 17.5% for Hong Kong, 10.2% for Malaysia, and 6.8% for Korea. However, in Malaysia, their effects on housing prices are negative. Equity inflows contribute substantially to housing prices in Indonesia, Korea, and Thailand, although their effects are negative. Their contributions are 7.0% for Indonesia, 10.0% for Korea, and 6.2% for Thailand.

4.3. Robustness Check

Our main results are as follows. Firstly, capital inflows significantly increase equity prices in all five economies. All types of capital inflows do not always increase equity prices in all economies. Equity inflows and bond inflows increase equity prices in all countries except for bond inflows in Thailand. Secondly, the responses of housing prices to capital inflows differ among economies and among inflow category types. We found positive impacts on housing prices only for Hong Kong and Korea. For Hong Kong, both bond and bank inflow shocks increase housing prices. For Korea, bank inflow shocks increase housing prices. However, these effects are not large, but limited.

In this section, we check the robustness of our main results. Firstly, we estimate the VAR model using the alternative order of variables. This study used the Cholesky decomposition to calculate the impulse responses, which depends on the order of variables. Thus far, our benchmark model treated real economic variables as most exogenous, followed by capital flow, and financial variables as most endogenous. To check the robustness, we estimate the VAR model with a different ordering of variables and calculate the impulse responses, first, when capital flow was set last, and second, when capital flow was set first and real economic variables set last. Capital flow appears to have lost significant effects on equity prices in the former case, while real economic variables appear to have lost significant effects on equity prices in the latter case. However, the effects on housing prices

were not lost in either case. This means that the effects on equity prices occur in the short run and are not persistent, while the effects on housing prices are persistent. Except for this finding, the results of the VAR models with orderings were qualitatively very similar to the results in the previous section.

Secondly, taking into consideration the fact that volatilities of GDP growth and inflation are larger in emerging economies than in advanced economies, we estimated the VAR model with other versions in which the volatilities of these series were adjusted. This was first conducted with GDP growth year-on-year, then with the real interest rate calculated by inflation smoothed by the Hodrik–Prescott (HP) filter in order to lower inflation volatility during the global financial crisis, and finally with the interest rate differenced. These results for the VAR models also showed similar trends to the results in the previous section.

Finally, although this study examined the effects of gross capital inflows, we also examined the effect of net capital inflows according to the literature. The results for net capital inflows are similar to the results for gross capital inflows. Therefore, this suggests that gross capital inflows play a dominant role in asset price fluctuations⁷.

In conclusion, we checked the robustness of the estimation results by examining alternative identifications of the VAR model, smoothed real economic variables, and net capital flow, thus confirming that our estimated results are robust.

5. Counterfactual Simulation

In the previous section, we examined the average impact of asset prices on gross capital inflows over the sample periods. In this section, we investigate when and which type of capital inflows contribute to asset prices most substantially. To investigate this issue, we employ counterfactual simulation analysis.

⁷ We also examine the effects of gross capital outflows on asset prices. The results of the effects of gross capital outflows are shown in the Appendix. The responses of asset prices to capital outflows are different from those to capital inflows; however, we could not find clear common patterns in the responses of asset prices to outflows among economies or among capital outflow types.

In the first step, the baseline scenario step, the responses of equity and housing prices to positive shocks are generated using the VAR model estimated in Section 4. The baseline scenario shows the total effect of all the shocks we considered in our VAR model, including a positive capital inflow shock, on equity and housing prices. That is, the total effects on equity and housing prices under the baseline scenario include the effects of a capital inflow shock. In the second step, the counterfactual step, the impacts are simulated under the counterfactual scenario, in which the effects of a capital inflow shock are eliminated by setting the value of the capital inflow shock to zero. In other words, the effects on equity and housing prices under the counterfactual scenario exclude the effects of a capital inflow shock. The difference between the equity price and housing price responses under the two scenarios shows the measure of the contribution of a capital inflow shock.

Figure 4 shows the results of the counterfactual simulation on an equity price. The line charts in Figure 4 show the quarter-to-quarter percentage change in actual equity prices, while the bar charts in Figure 4 show the quarterly contribution of a capital inflow shock to equity prices. The contribution of a capital inflow shock to an equity price is the difference between the simulated equity price with a capital inflow shock and that without a capital inflow shock. The capital inflows are not classified, but aggregated. The increases and decreases in an equity price around the global financial crisis (GFC) period could be caused by a capital inflow shock for some economies⁸. The contribution of a capital inflow shock to the decline in the equity price for Korea during the GFC is large, while the contribution to the increase in an equity price after the GFC is large for Indonesia and Korea.

The upper panel of Table 5 shows the results of the counterfactual simulation on an equity price based on the estimation by capital inflow type. Only three average-over-period contributions of any capital inflow type are shown in Table 5 for each economy. For Korea, the following features are interesting. Firstly, the average percentage change in an equity price over the period 2008Q3–2009Q1 is -15.6%. The contribution of the private inflow (that

⁸ The increases and decreases in an equity price around the dot-com bubble burst period could also be caused by a capital inflow shock for some economies.

is, aggregate inflow) to this decline is large (-9.6%). Of the private inflow, the bond inflow's contribution is large (-12.2%). Secondly, although the average percentage change in an equity price over the period 2009Q2–2009Q4 is 11.0%, the key factor that contributes to the rise in an equity price is equity inflow (2.5%). For the other economies, the contribution of a capital inflow to an equity price is limited except for Indonesia.

Figure 5 shows the results of the counterfactual simulation on housing prices. The line charts in Figure 5 show the quarter-to-quarter percentage change in actual housing prices, while the bar charts in Figure 5 show the quarterly contribution of a capital inflow shock to housing prices. For the four economies other than Hong Kong, the contribution of a capital inflow to housing prices is limited. For Hong Kong, its contribution to the decline in the housing price in 2001–2004 and 2006 and its contribution to the increase in the housing price in 2008 and 2010 are large. The lower panel of Table 5 shows the results of the counterfactual simulation on a housing price based on estimation by capital inflow type. For Hong Kong, although the housing price increased by 4.3% in 2007Q3–2008Q2 and by 6.5% in 2009Q2–2009Q4, the key factor that contributes to the increase in the housing price is bank inflow (2.9% in 2007Q3–2008Q2, 1.5% in 2009Q2–2009Q4).

6. Concluding Remarks

The purpose of this study is to review the recent trends in capital inflows to East Asian economies and to investigate the impact of these inflows on asset price fluctuations in the region. This study focuses on five emerging economies in East Asia (Korea, Hong Kong, Thailand, Malaysia, and Indonesia) over the period 2000–2010. The main questions posed by this study are as follows. (1) What kind of influence do capital inflows have on asset prices, such as equity prices and housing prices? (2) What types of capital inflows have significant effects on equity prices and housing prices? (3) Does the effect of capital inflows on asset prices vary among economies, and if so, why?

The recent trends in capital inflows to Asian economies are as follows. Firstly, the financial balance surplus decreased in the 2000s from the 1990s. This may have been due to

an increase in capital outflow rather than a decrease in capital inflow. Secondly, the type of capital inflow in the periods after the global financial crisis varies among economies. The dominant types of capital inflows are equity and bond inflows for Korea, bank loan inflows for Hong Kong, bond and bank loan inflows for Thailand and Indonesia, and bond inflows for Malaysia. Indonesia also receives large inflows of FDI.

The answers to our three main questions are as follows. Firstly, we found that capital inflows significantly increase equity prices in all five economies. However, all types of capital inflows do not always increase equity prices in all economies. Equity inflows and bond inflows increase equity prices in all countries except for bond inflows in Thailand. Secondly, the responses of housing prices to capital inflows differ among economies and among inflow category types. We found positive impacts on housing prices only for Hong Kong and Korea. For Hong Kong, both bond and bank inflow shocks increase housing prices. For Korea, bank inflow shocks increase housing prices. However, these effects are not large, but limited.

Thirdly, we found heterogeneity in the effects on housing prices across countries and inflow categories. Bank inflows increase housing prices for Korea, both bond and bank inflows increase them for Hong Kong, and no inflows increase them for the other economies. A number of factors could be responsible for the cross-country differences in the responses of housing prices. The first factor is the differences in exchange rate systems: in Hong Kong, the monetary authority maintains the currency board. The second factor is the differences in household credit. While corporate sectors have moved away from bank credit, bank sectors have expanded their provision of credit to household sectors since 2000. The strength of this trend varied among Asian economies; it was stronger in NIE economies, including Korea, than in ASEAN economies (Enya, 2012). These differences could be key factors in determining the strength and significance of housing price responses. However, we do not check whether these differences are key factors in this study.

Finally, we discuss the link between the recent surges in capital inflows and the recent appreciation of housing prices in emerging Asia. We found that the dominant inflow

types of the recent surges are equity and bond inflows for Korea and bank loan inflows for Hong Kong. According to our examination, bank loan inflows can lead to housing price appreciation for Hong Kong, although equity and bond inflows cannot lead to housing price appreciation for Korea. The recent surge in capital inflows to Hong Kong can contribute to housing price appreciation. We find from the results of our counterfactual simulation analysis that the plunges and surges in capital inflows in emerging economies during and after the global financial crisis contribute to equity price depreciation in Korea and to housing price appreciation in Hong Kong.

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Table 1: Ratio of financial balance to GDP
(average ratio over a certain period of time)

	Financial Accounts	
	1990Q1-1999Q4 <i>94Q1-96Q4</i> <i>(previous surge)</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i> <i>(recent surge)</i>
Korea	1.3% 3.3%	0.2% 2.0%
Hong Kong	n.a. n.a.	-4.9% 7.0%
Malaysia	n.a. n.a.	-4.9% -7.1%
Thailand	1.3% 10.8%	0.5% 3.2%
Indonesia	1.2% 4.0%	-0.4% 2.3%

This table reports the ratio of the net capital flow to GDP. The values in the left column are the period averages in the 1990s; the whole period (1990Q1–1999Q4) is given in the upper row and the period just before the Asian financial crisis (1994Q1–1996Q4) is given in the lower row. The values in the right column are the period averages in the 2000s; the whole period (2000Q1–2011Q4) is given in the upper row and the period after the global financial crisis (2009Q1–2010Q4) is given in the lower row.

Source: IMF, *International Financial Statistics*, CD-ROM, July 2012.

Table 2: Gross capital inflows and outflows (relative to GDP)

a FDI Inflows and FDI Outflows (relative to GDP)				
	FDI Inflows		FDI Outflows	
	1990Q1-1999Q4 <i>94Q1-96Q4</i> <i>(previous surge)</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i> <i>(recent surge)</i>	1990Q1-1999Q4 <i>94Q1-96Q4</i> <i>(previous surge)</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i> <i>(recent surge)</i>
Korea	0.6% <i>0.3%</i>	0.2% <i>0.2%</i>	-0.7% <i>-0.7%</i>	-1.3% <i>-2.1%</i>
Hong Kong	n.a. <i>n.a.</i>	22.4% <i>27.8%</i>	n.a. <i>n.a.</i>	-23.0% <i>-35.3%</i>
Malaysia	n.a. <i>n.a.</i>	3.0% <i>2.2%</i>	n.a. <i>n.a.</i>	-3.3% <i>-4.6%</i>
Thailand	3.8% <i>4.8%</i>	3.4% <i>2.4%</i>	-0.2% <i>-0.1%</i>	-0.9% <i>-1.6%</i>
Indonesia	0.2% <i>-0.7%</i>	0.7% <i>1.4%</i>	-0.1% <i>0.0%</i>	-0.6% <i>-0.4%</i>
b Equity Inflows and Equity Outflows (relative to GDP)				
	Equity Inflows		Equity Outflows	
	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>
Korea	1.0% <i>0.9%</i>	0.5% <i>2.6%</i>	0.0% <i>-0.1%</i>	-0.7% <i>-0.2%</i>
Hong Kong	n.a. <i>n.a.</i>	7.5% <i>5.9%</i>	n.a. <i>n.a.</i>	-14.1% <i>-16.1%</i>
Malaysia	n.a. <i>n.a.</i>	0.1% <i>-0.3%</i>	n.a. <i>n.a.</i>	-0.8% <i>-1.9%</i>
Thailand	1.1% <i>0.6%</i>	0.9% <i>0.7%</i>	0.0% <i>0.0%</i>	-0.2% <i>-0.3%</i>
Indonesia	-0.5% <i>0.9%</i>	0.3% <i>0.2%</i>	0.0% <i>0.0%</i>	0.0% <i>0.0%</i>
c Bond Inflows and Bond Outflows (relative to GDP)				
	Bond Inflows		Bond Outflows	
	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>
Korea	1.0% <i>2.0%</i>	1.6% <i>2.3%</i>	-0.2% <i>-0.7%</i>	-0.4% <i>0.3%</i>
Hong Kong	n.a. <i>n.a.</i>	0.0% <i>0.7%</i>	n.a. <i>n.a.</i>	-8.0% <i>-13.6%</i>
Malaysia	n.a. <i>n.a.</i>	0.9% <i>2.8%</i>	n.a. <i>n.a.</i>	-0.4% <i>-1.2%</i>
Thailand	0.9% <i>1.6%</i>	0.1% <i>1.1%</i>	-0.2% <i>0.0%</i>	-0.6% <i>-1.1%</i>
Indonesia	0.7% <i>1.3%</i>	0.8% <i>1.9%</i>	0.0% <i>0.0%</i>	-0.3% <i>-0.1%</i>
d Bank Loan Inflows and Bank Loan Outflows (relative to GDP)				
	Bank Inflows		Bank Outflows	
	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>	1990Q1-1999Q4 <i>94Q1-96Q4</i>	2000Q1-2011Q4 <i>09Q1-10Q4</i>
Korea	1.0% <i>3.9%</i>	0.6% <i>-0.2%</i>	-1.3% <i>-2.3%</i>	-0.7% <i>-0.7%</i>
Hong Kong	n.a. <i>n.a.</i>	13.5% <i>25.9%</i>	n.a. <i>n.a.</i>	-5.8% <i>10.6%</i>
Malaysia	n.a. <i>n.a.</i>	-0.2% <i>0.5%</i>	n.a. <i>n.a.</i>	-5.1% <i>-8.8%</i>
Thailand	-1.6% <i>8.3%</i>	-1.3% <i>2.3%</i>	-0.6% <i>-2.4%</i>	-1.0% <i>-0.5%</i>
Indonesia	0.0% <i>0.1%</i>	-0.6% <i>0.6%</i>	-0.1% <i>0.0%</i>	-0.8% <i>-1.2%</i>

This table reports the ratio of the gross individual flow to GDP. The values in the left column are the period averages in the 1990s; the whole period (1990Q1–1999Q4) is given in the upper row and the period just before the Asian financial crisis (1994Q1–1996Q4) is given in the lower row. The values in the right column are the period averages in 2000s; the whole period (2000Q1–2011Q4) is given in the upper row and the period after the global financial crisis (2009Q1–2010Q4) is given in the lower row.

Source: IMF, *International Financial Statistics*, CD-ROM, July 2012.

Table 3: Definitions and sources of housing prices

	Sources	Definitions	Availability
Korea	CEIC	Housing Price Index: Total (Kookmin Bank)	1986Q1–present
Hong	CEIC	Property Price Index: Domestic Premise (DP) (Rating & Valuation Department)	1979Q1–present
Malaysia	CEIC	House Price Index: Malaysia (Valuation and Property Services Department)	1998Q4–present
Thailand	CEIC	Housing Price Index: Single Detached House: including Land (Government Housing	1991Q1–present
Indonesia	CEIC	(DC) Residential Property Price Index: BI: (Bank of Indonesia)	1994Q1–2001Q4
	CEIC	Residential Property Price Index: BI: 14 City (Bank of Indonesia)	2002Q1–present

Note: The price index is at the end of the period.

Table 4: Variance decomposition (%): Capital inflows

I. Contributions of capital inflow				
	Real GDP	Capital inflow	Short-term rate	Credit volume
A. Contributions to equity price				
Hong Kong	27.2	8.2	0.8	2.1
Indonesia	0.9	20.6	1.5	0.8
Korea	22.4	11.5	6.5	4.4
Malaysia	17.4	14.3	2.1	0.2
Thailand	12.0	6.4	9.3	6.0
B. Contributions to housing price				
Hong Kong	17.8	17.2	10.7	3.6
Indonesia	2.0	7.4	2.5	18.3
Korea	13.4	1.7	0.0	10.7
Malaysia	12.2	11.0	5.0	3.7
Thailand	11.1	0.4	0.1	3.1
II. Contributions of individual inflow				
	Equity	Bond	Bank	FDI
A. Contributions to equity price				
Hong Kong	3.1	10.9	6.7	2.0
Indonesia	8.7	14.1	6.1	1.8
Korea	3.4	20.5	4.8	4.5
Malaysia	22.5	12.2	8.9	3.4
Thailand	11.7	1.1	2.7	2.6
B. Contributions to housing price				
Hong Kong	2.2	12.7	17.5	0.2
Indonesia	6.7	2.6	1.8	7.0
Korea	0.1	1.7	6.8	10.0
Malaysia	3.4	12.1	10.2	2.7
Thailand	0.7	2.9	0.4	6.2

Note: This table reports the estimated results of the forecast error variance decomposition that shows the relative contributions of the capital inflow and other shocks to the asset prices (the equity price and housing price). We show the value 10 quarters after a shock. The upper panel shows the results of the private inflow and other shocks and the lower panel shows the results of the individual inflow shocks.

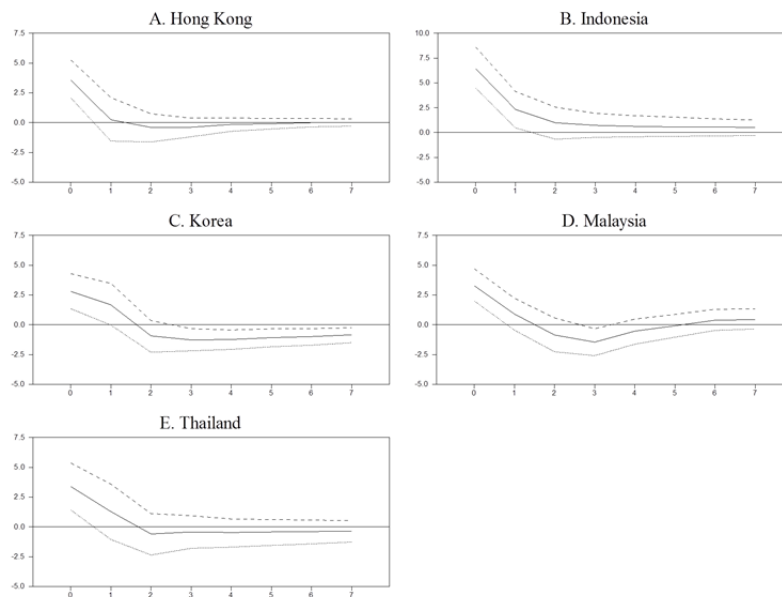
Table 5: Counterfactual simulation: Contribution of capital inflow to asset prices

I. Contribution to equity prices						
	Actual equity price	(1) Private inflow	(2) Equity inflow	(3) Bond inflow	(4) Bank inflow	(5) FDI inflow
Hong Kong						
2007Q3–2008Q2	2.5	0.2	0.2	-0.9	0.1	0.5
2008Q3–2009Q1	-20.3	0.7	1.8	1.2	0.3	-0.2
2009Q2–2009Q4	16.3	0.0	0.1	-0.8	0.5	-1.2
Indonesia						
2007Q3–2008Q2	0.2	1.1	3.0	0.0	0.4	0.4
2008Q3–2009Q1	-18.3	-2.2	-0.2	-4.0	1.6	0.8
2009Q2–2009Q4	18.2	4.2	-0.9	4.3	1.2	0.3
Korea						
2007Q3–2008Q2	1.2	-2.8	-2.8	3.7	-4.1	3.7
2008Q3–2009Q1	-15.6	-9.6	0.2	-12.2	-6.7	1.5
2009Q2–2009Q4	11.0	3.4	2.5	1.1	-1.1	0.3
Malaysia						
2007Q3–2008Q2	-2.9	-0.8	-5.5	0.8	-2.5	-0.4
2008Q3–2009Q1	-12.0	-1.5	0.4	-2.5	-0.1	-0.2
2009Q2–2009Q4	11.4	0.6	0.6	2.3	1.0	0.2
Thailand						
2007Q3–2008Q2	-2.1	-1.5	-4.5	-0.7	0.7	-1.1
2008Q3–2009Q1	-17.8	-3.1	-3.3	0.0	0.2	-1.5
2009Q2–2009Q4	16.8	1.3	1.5	-0.5	2.6	-2.1
II. Contribution to housing prices						
	Actual housing price	(1) Private inflow	(2) Equity inflow	(3) Bond inflow	(4) Bank inflow	(5) FDI inflow
Hong Kong						
2007Q3–2008Q2	4.3	2.7	0.3	0.9	2.9	0.2
2008Q3–2009Q1	-5.1	0.4	0.4	-1.6	0.6	0.1
2009Q2–2009Q4	6.5	1.6	-0.3	0.2	1.5	0.0
Indonesia						
2007Q3–2008Q2	-1.8	-0.1	-0.1	0.0	0.0	-0.1
2008Q3–2009Q1	-1.2	0.2	0.3	0.3	0.0	-0.1
2009Q2–2009Q4	-0.2	-0.1	0.1	-0.1	0.0	-0.1
Korea						
2007Q3–2008Q2	-0.1	0.3	0.1	0.0	0.7	0.6
2008Q3–2009Q1	-0.8	-0.2	0.1	0.6	-0.4	0.6
2009Q2–2009Q4	0.1	-0.3	0.0	-0.2	-0.5	0.5
Malaysia						
2007Q3–2008Q2	-0.1	-0.1	-0.3	-0.3	-0.3	-0.1
2008Q3–2009Q1	-0.3	0.2	0.1	0.1	0.1	-0.1
2009Q2–2009Q4	1.3	0.0	0.0	-0.3	0.1	-0.1
Thailand						
2007Q3–2008Q2	-1.9	0.0	0.1	0.0	0.0	0.1
2008Q3–2009Q1	2.4	0.1	0.3	-0.1	0.0	0.2
2009Q2–2009Q4	-3.0	0.0	-0.1	0.0	0.1	0.0

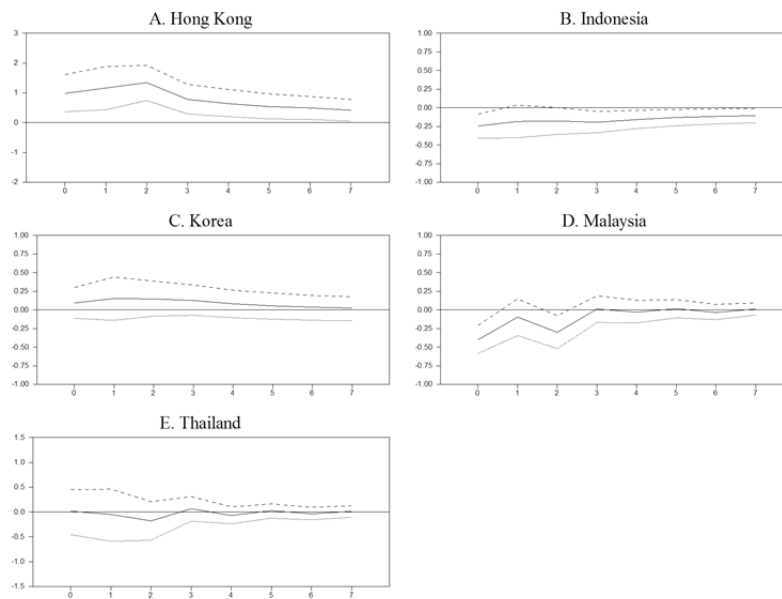
Note: The figures in this table show the average-over-period contributions of any capital inflow type to equity prices and housing prices. The contribution is the difference between the two equity and housing price responses under the base (with a capital inflow shock) and counterfactual (without a capital inflow shock) scenarios.

Figure 1: Impulse responses of asset prices to capital inflow shocks

(1) Responses of equity prices

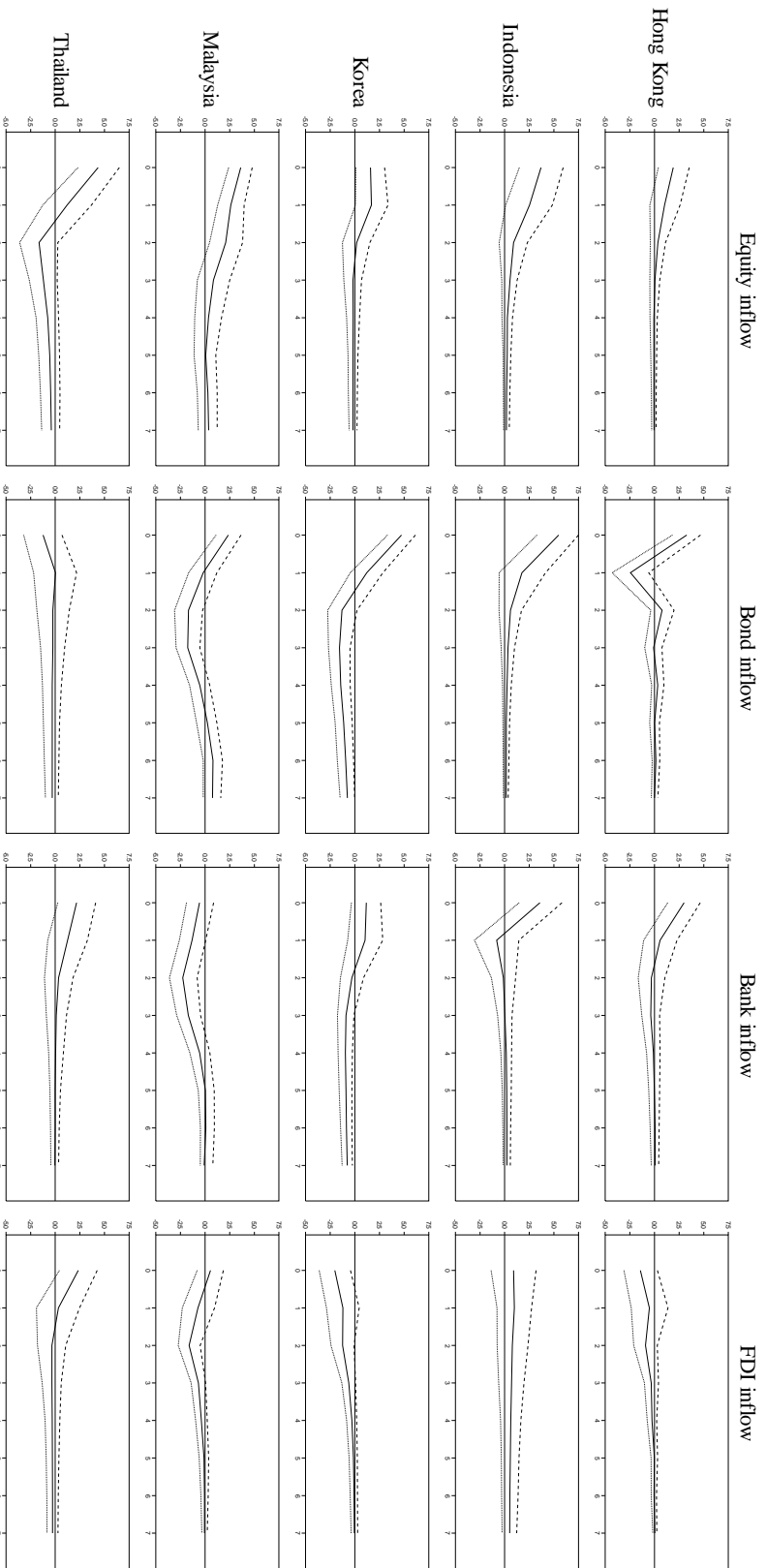


(2) Responses of housing prices



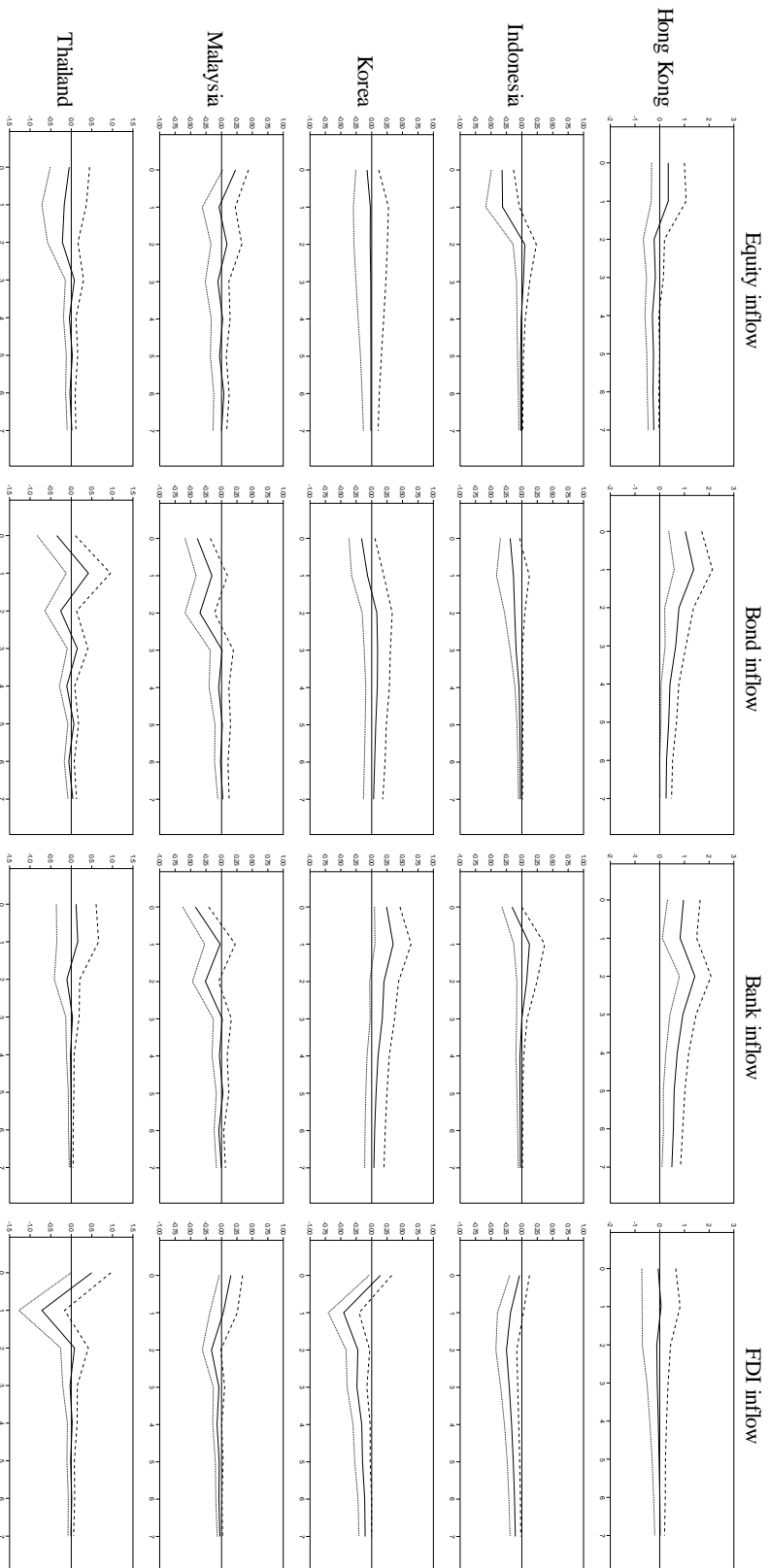
Note: This figure shows the impulse responses of the asset prices to the capital inflow shocks. The solid line in the center of each graph is a point estimate of the impulse responses and the dotted lines are confidence bands with one standard error.

Figure 2: Impulse responses of equity prices to individual inflow shocks



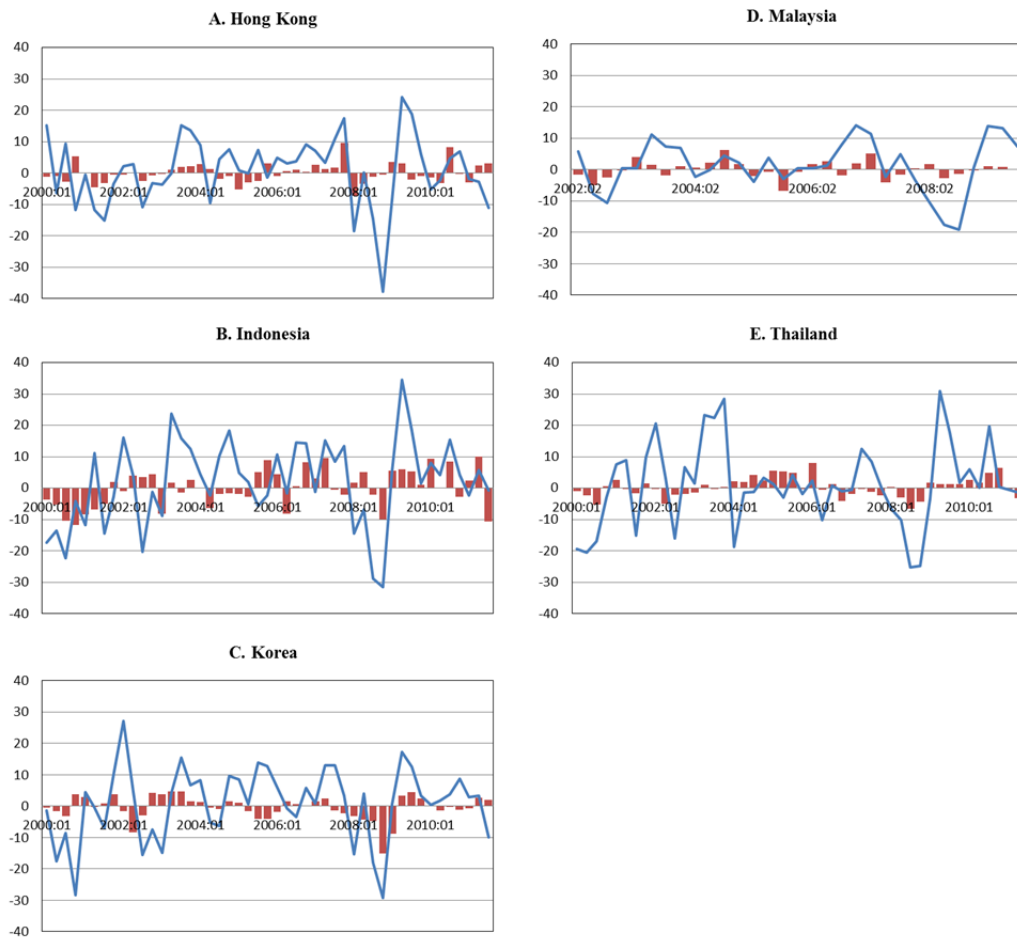
Note: This figure shows the impulse responses of the equity prices to the individual inflow shocks. The solid line in the center of each graph is a point estimate of the impulse responses and the dotted lines are confidence bands with one standard error.

Figure 3: Impulse responses of housing prices to individual inflow shocks



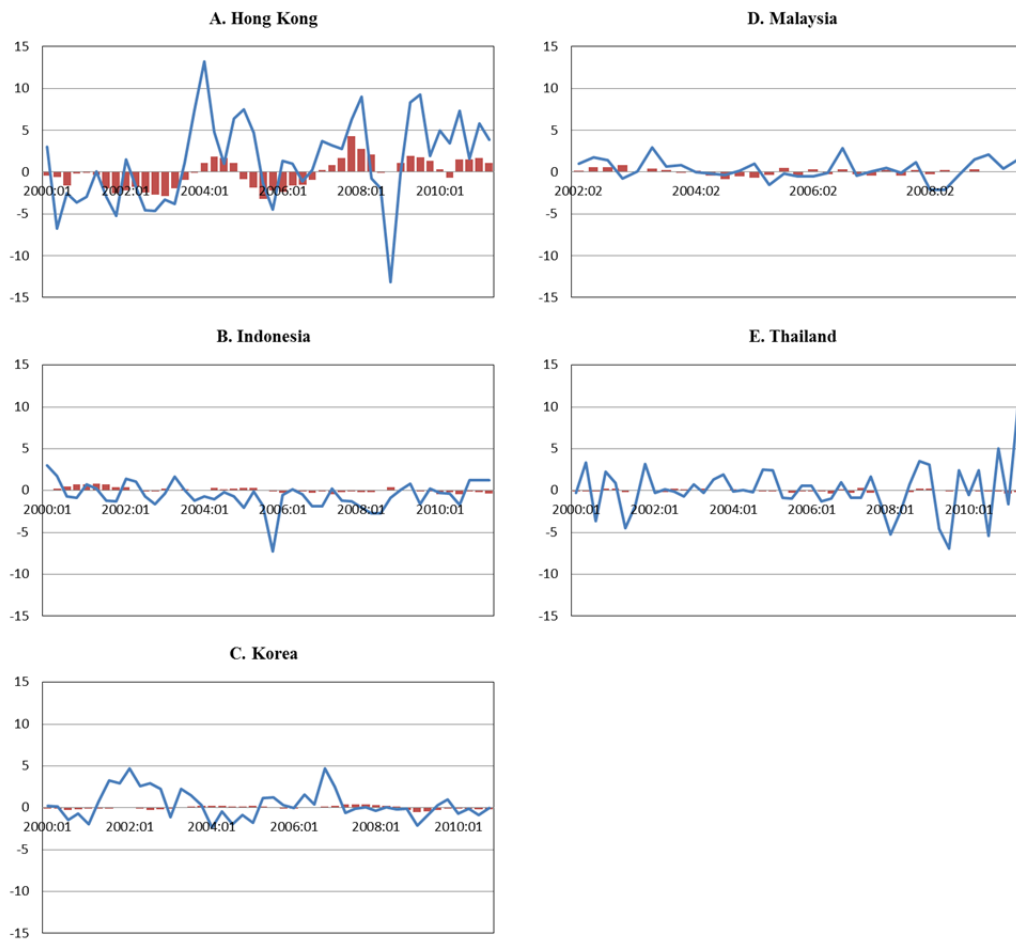
Note: This figure shows the impulse responses of the housing prices to the individual inflow shocks. The solid line in the center of each graph is a point estimate of the impulse responses and the dotted lines are confidence bands with one standard error.

Figure 4: Contribution of capital inflow to equity prices



Note: The line charts show the quarter-to-quarter percent changes in actual equity prices. The bar charts show the quarterly contribution of a capital inflow shock to an equity price. The contribution of the capital inflow shock to an equity price is the difference between the simulated equity price with a capital inflow shock and the simulated equity price without a capital inflow shock. Capital inflows are aggregated but not classified.

Figure 5: Contribution of capital inflow to housing prices



Note: The line charts show the quarter-to-quarter percent changes in actual equity prices. The bar charts show the quarterly contribution of a capital inflow shock to a housing price. The contribution of the capital inflow shock to a housing price is the difference between the simulated housing price with a capital inflow shock and the simulated housing price without a capital inflow shock. Capital inflows are aggregated but not classified.

Appendix

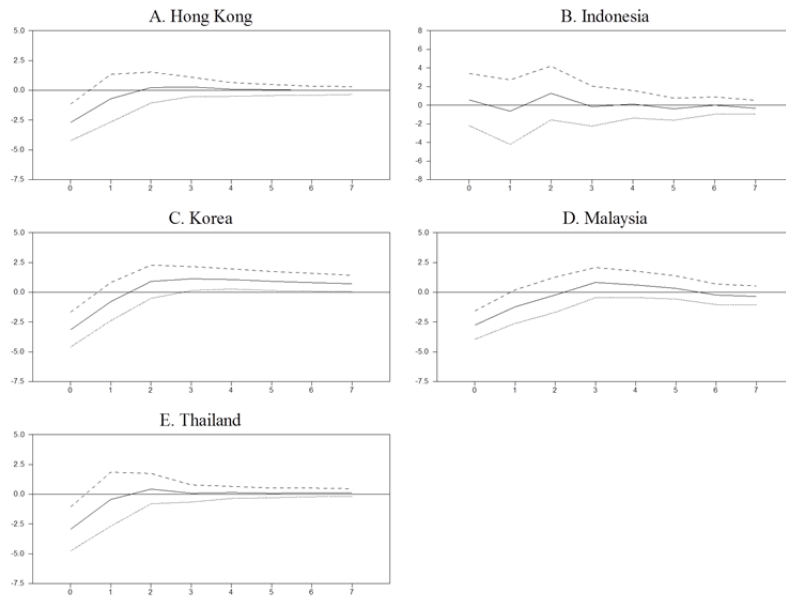
Table A: Variance decomposition (%): Capital outflow

I. Contributions of capital outflow				
	Real GDP	Capital	Short-term	Credit Volume
A. Contributions to equity prices				
Hong Kong	27.3	5.0	0.7	2.4
Indonesia	6.9	0.9	3.5	26.9
Korea	23.1	10.6	6.4	4.5
Malaysia	14.0	10.9	1.6	0.9
Thailand	12.3	3.7	8.6	7.1
B. Contributions to housing prices				
Hong Kong	17.3	15.4	10.3	3.5
Indonesia	3.7	32.9	1.2	13.0
Korea	13.3	0.1	0.2	8.9
Malaysia	6.1	4.0	5.7	3.2
Thailand	10.2	3.7	0.1	3.4
II. Contributions of individual outflow				
	Equity	Bond	Bank	FDI
A. Contributions to equity prices				
Hong Kong	1.7	0.7	7.6	0.5
Indonesia	12.7	0.3	0.7	0.5
Korea	13.4	13.2	3.1	13.0
Malaysia	2.6	7.2	13.3	2.3
Thailand	3.0	5.0	3.0	1.5
B. Contributions to housing prices				
Hong Kong	6.2	5.5	10.0	0.6
Indonesia	2.4	0.7	21.9	12.4
Korea	0.6	10.9	2.4	10.3
Malaysia	4.5	1.9	4.1	8.8
Thailand	1.3	13.6	6.2	10.1

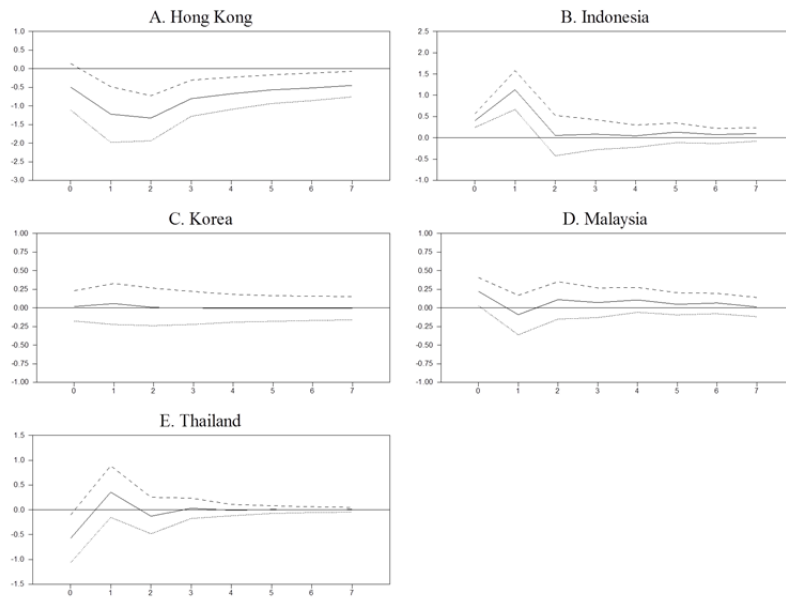
Note: This table reports the estimated results of the forecast error variance decomposition that shows the relative contributions of the capital outflow and other shocks to the asset prices (the equity price and housing price). We show the value 10 quarters after a shock. The upper panel shows the results of the private outflow and other shocks and the lower panel shows the results of the individual outflow shocks.

Figure A: Impulse responses of asset prices to capital outflow shocks

(1) Responses of equity prices



(2) Responses of housing prices



This figure shows the impulse responses of the asset prices to the capital outflow shocks. The solid line in the center of each graph is a point estimate of the impulse responses and the dotted lines are confidence bands with one standard error.