INTERNATIONAL REAL ESTATE REVIEW

Global Liquidity, Capital Inflows and House Prices in ASEAN Economies

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The quantitative easing policy adopted by the advanced economies since 2009 has led to an abundance in global liquidity. In the same period, the ASEAN-5 economies (Indonesia, Malaysia, the Philippines, Singapore and Thailand) have recorded strong capital inflows, particularly portfolio inflows. The asset prices, in particular, the house prices of these economies, have also experienced excess buoyancy. In this paper, the relationships among global liquidity, house prices and capital flows are studied. Empirically, capital inflows have a positive effect on the residential house prices of Indonesia, Malaysia, the Philippines and Singapore. After accounting for their own domestic demand (by using real GDP growth as a proxy), the capital inflows still have a positive impact in Indonesia and Singapore. The authorities of these economies have implemented similar macroprudential measures to safeguard financial stability and cool down speculative activities. The effectiveness of the measures is mainly the reduction in the transaction volume.

Keywords

Capital Flows, Residential House Price, Macroprudential, ASEAN Economies

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1.   Introduction

The onset of the global financial crisis (GFC) in 2008/09 plunged the major advanced economies into a severe economic recession. In response, the major central banks implemented the quantitative easing (QE) policy as the primary tool to stimulate their domestic demand and revitalize impaired financial channels. For example, the QE measures adopted by the U.S. Federal Reserves (U.S. Fed) continued from early 2009 to the end of 2014 in three phases[1] and mainly involved a series of asset purchase programs to expand the holding of longer-term securities by the U.S. Fed. From March 2009 to April 2013, the increase in the holdings of securities in all three QE phases reached around USD2.2 trillion.

Other major central banks also implemented the QE policy for similar reasons. The Bank of Japan (BOJ) has been the forerunner in implementing unconventional monetary policies through its introduction of the QE, credit easing and stock purchases since the early 2000s. From October 2010 to April 2013, the total assets of the BOJ increased by 35 percent. The BOJ balance sheet continues to expand further, in view of the implementation of further easing policies (labeled as qualitative and quantitative monetary easing (QQME) in the Abenomics) aimed to boost the monetary base at an annual pace of about ¥60 to 70 trillion. The Bank of England (BOE) and the European Central Bank (ECB) have administered a series of QE programs in staggered and at times, overlapping periods with the QE programs of the U.S. Fed. After the first implementation of its QE program in March 2009, the total assets of the BOE had grown by almost 2.5 times, equivalent to 26 percent of the GDP, at the end of 2012. Before 2015, the QE policy of the ECB aimed to provide liquidity to mitigate the massive deleveraging being undertaken by Eurozone banks and safeguarding financial stability. In January 2015, the ECB announced an asset-purchase program to buy 60 billion euros (around US$68 billion) of assets each month, including government bonds through to September 2016.

An immediate consequence of all these QE programs in the major advanced economies is the abundant global liquidity. The total liquidity generated by the three central banks (U.S. Fed, BoE and BoJ) is estimated to be US$3.95 trillion in the period from early 2009 to early 2013. Due to the yield seeking behavior of international investors, a significant part of the liquidity went to the regions with higher growth differentials. Among the desired destinations, the ASEAN economies in the Asian region were the popular choice until the US taper talk in late May 2013. The ASEAN-5[2] economies had an average GDP growth of 4.7% from 2009 to 2012. Consequently, the liquidity has led to large capital inflows to the ASEAN-5 economies.

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[1] The U.S. Fed started to reduce the amount of monthly asset purchases under its so-called QE3 phase in January 2014 and the US QE program ended at the end of 2014.
[2] The ASEAN-5 refers to Indonesia, Malaysia, the Philippines, Singapore and Thailand.

While capital inflows may help to deepen and broaden the financial markets in the ASEAN economies and provide more funds for the economy, they may also create excessive increases in asset price and at the same time destabilize financial markets. In the countries with relatively shallow asset markets, large capital inflows can easily translate into asset price inflation and eventually to price bubbles, and thus a sudden reversal of capital flows can result in destabilizing asset markets (Balakrishan et al., 2012).

With both large capital inflows and strong domestic demand (due to continuous urbanization and robust growth), residential property prices in the ASEAN-5 economies saw rapid growth from the second quarter of 2009 to the first quarter of 2013. Although the bulk of the capital inflows was in portfolio investment, particularly into the local currency (LCY) debt securities, a relationship between capital inflows and house prices in the ASEAN-5 can be empirically found because local corporates deposit the proceeds from issuing LCY bonds into the local banking system and local banks are under pressure to lend mortgage loans and loans related to the real estate sector, since the local corporations, the traditional customers of local banks, do not need to borrow as much as before (Aziz and Shin, 2013).

In order to cool down speculative activities and avoid building large price bubbles, the authorities of the ASEAN-5 economies have resorted to the so-called sector-specific macro-prudential measures to ensure financial stability. Common measures are loan-to-valuation (alongside the imposition of special and/or introduction of stamp duties/additional stamp duties on buyers and/or sellers) and debt-to-income (including imposition of the requirement for financial institutions to conduct credit affordability assessments based on a prudent debt-service ratio) regulations, as well as caps on credit growth. Some of these measures appear to have successfully reduced the speculative activities and maintained financial stability.

In this paper, the main objective is to study the relationship between capital inflows (due to the abundant global liquidity resultant of the QE programs of the major central banks) and house prices in the ASEAN-5 economies, as there are very few similar studies in the literature. Moreover, we review the effectiveness of the sector-specific macro-prudential measures on mitigating the risks to financial stability. The structure of the paper is as follows: first we look at the global liquidity resultant of the QE in advanced economies and capital flows to the ASEAN region. Secondly, we review the residential house price movements in the ASEAN-5 economies. Thirdly, we empirically investigate whether the recent rapid price increases in the ASEAN-5 residential property markets are related to the capital inflows. Then, we discuss the effectiveness of the property sector-specific macro-prudential measures taken by the authorities. Finally, we provide a conclusion.

2.   Quantitative Easing in Advanced Economies

Although the primary purpose of the unconventional monetary policy adopted by the major central banks is to maintain financial stability and boost growth in their respective economies, there are spillover effects. Aside from taking into account the domestic driving forces and the impact of these various measures, there are spillovers to other countries, especially given the significantly large size of the liquidity injections and asset purchases (IMF, 2013).

The QE programs in the unconventional monetary policy of the three major central banks have provided significant liquidity to their economies in order to stimulate growth. As shown in Table 1, the U.S. Fed, BOE and BOJ engaged in significant asset purchases. Such asset purchases accounted for as much as 90 percent of the balance sheet of the U.S. Fed and BOE, and up to 70 percent of that of the BOJ as of April 2013. This form of unconventional monetary policy is most likely to spill over to other countries due to its size and nature (Morgan, 2011). The large amounts of money that the respective central banks pump into their domestic economies may not be fully absorbed by domestic entities, and some would likely find its way to other economies in the form of capital inflows. When comparing the QE periods by using the QE dates of the U.S. Fed, it is seen that the period of March to October 2009 (known as QE1) had the highest amount of dollar value boost.

The QE programs were implemented in staggered and sometimes overlapping periods (Table 2). The launch of the BOE Asset Purchase Facility coincided with the QE1 of the U.S. Fed; however, the re-opening of this facility occurred in the interim between QE2 and QE3 (between October 2011 and July 2012). For the BOJ, asset purchases (which included Japanese government bonds (JGBs), commercial papers, corporate bonds, exchange-traded funds (ETFs), and Japanese real estate investment trusts (J-REITs)) have been steadily rising since the launch of the Asset Purchase Program (APP) in October 2010 (Figure 1).

There could be several factors to explain why liquidity that is not absorbed in the advanced countries could spill over into other economies. The low interest rate environment in advanced countries has resulted in lower yields, which could drive fund managers to other jurisdictions that offer higher returns (the so-called push factors). Characteristics of the region could have also played a part in attracting capital flows, as countries in the region have better growth prospects and offer higher returns (the so-called pull factors).

Table 1   Changes in the Major QE Instruments for Selected Periods

	Pre-QE: Sep'08 to Feb'09	Mar'09 to Oct'09[a]	Nov'09 to Oct'10[b]	Nov'10 to Jun'11[c]	Jul'11 to Aug'12[d]	Sep'12 to Apr'13[e]
U.S. Fed (USD bn)						
Changes in securities held outright	102.1	1,108.5	254.2	604.1	-72.4	474.1
Total assets (end of period)	1,916.5	2,161.8	2,295.5	2,865.4	2,813.0	3,318.6
BOE (£ billion)						
Changes in Gilts	0.0	174.8	16.1	-0.3	148.7	27.1
Total assets (end of period)	177.1	235.3	244.2	236.2	386.7	403.9
BOJ (¥ trillion)						
Change in JGBs & Others	0.0	0.0	22.9	16.7	22.4	13.9
Total assets (end of period)	122.2	111.4	120.3	129.6	150.0	164.3

Notes: (a) Period refers to U.S. Fed QE1 and start of the BOE Asset Purchase Facility; (b) October 2010 was the start of BOJ's asset purchase program; (c) Period refers to U.S. Fed QE2; (d) Re-launch of the BOE Asset Purchase Facility; (e) Period refers to U.S. Fed QE3. Period is to April 2013 only due to data availability even though QE3 was still in effective afterwards. Securities held outright by the U.S. Fed include Federal Agency Debt Securities mainly by Fannie Mae and Freddie Mac, and mortgage-backed and U.S. Treasury securities. For the BOE, the instrument is mainly purchases of debt securities called gilts. BOJ bond purchases include Japanese government bonds (JGBs), commercial papers, corporate bonds, exchange-traded funds (ETFs), and Japanese real estate investment trusts (J-REITs) (this includes operations under the following programs: Funds-Supplying Operations against Pooled Collateral, Fund-Provisioning Measure to Support Strengthening the Foundations for Economic Growth, Funds-Supplying Operation to Support Financial Institutions in Disaster Areas and Asset Purchase Program).
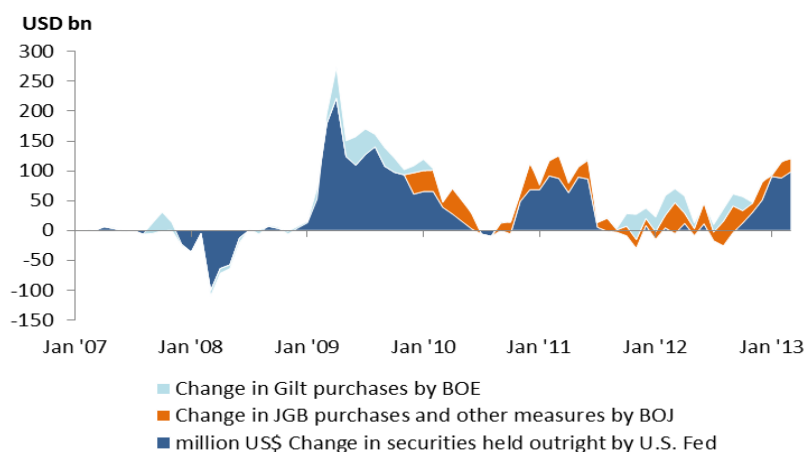
Sources: U.S. Fed, BOE and BOJ

Table 2   Consolidated QE Amounts for Selected Periods (USD Billion)

USD bn	Pre-QE: Sep'08 to Feb'09	Mar'09 to Oct'09[a]	Nov'09 to Oct'10[b]	Nov'10 to Jun'11[c]	Jul'11 to Aug'12[d]	Sep'12 to Apr'13[e]
U.S. Fed (changes in securities held)	102.1	1,108.5	354.1	604.1	-72.4	474.1
BOE (changes in Gilts)	0.0	274.4	25.1	-0.5	235.1	42.7
BOJ (changes in JGBs & Others)	0.0	0.0	255.7	203.2	284.2	162.1
Total	**102.1**	**1,382.9**	**634.8**	**806.7**	**446.9**	**678.9**

Notes: (a) Period refers to U.S. Fed QE1 and start of BOE Asset Purchase Facility; (b) October 2010 was the start of BOJ's asset purchase program; (c) Period refers to U.S. Fed QE2; (d) Re-launch of the BOE Asset Purchase Facility; (e) Period refers to U.S. Fed QE3. QE3 was still in effect after April 2013 but period is to April 2013 only due to data availability.

Sources: U.S. Fed, BOE and BOJ

Figure 1   Evolution of the Main QE Instruments Over Time

Sources: U.S. Fed, BOE and BOJ

To gauge the possible impact of the QE measures on the capital flows to the ASEAN[4] region, correlations between the consolidated QE of the US Fed, BOJ and BOE against various measures of capital flow to the region are shown in Table 3.

Table 3   Correlation Coefficients between QE and Capital Flows

	Level		Volatility	
	QE	QE$_{t-3}$	QE	QE$_{t-3}$
Gross portfolio flow	+0.54	+0.41	+0.26	+0.22
Portfolio equity	+0.48	+0.25	+0.17	+0.26
Portfolio debt	+0.45	+0.52	+0.20	+0.05
BIS cross border flow data	+0.39	+0.24	+0.43	+0.19
EPFR tracked flow of equity	+0.28	+0.02	+0.14	+0.12
EPFR tracked flow of debt securities	-0.06	+0.08	-0.14	-0.26

Note: The correlation coefficients are computed by using data between October 2008 and Q4 2012 for the balance of payment and Bank for International Settlements (BIS) international banking statistics, and March 2013 for those of Emerging Markets Portfolio Research (EPFR; a private data provider of institutional and individual investor flows and fund manager allocations that drive global markets). Volatility is computed with the use of a 6-month rolling standard deviation. To allow for the computation of a 6-month rolling standard deviation, quarterly data on balance of payments and BIS international banking statistics are converted to monthly frequency through interpolation. For level data, no such conversion is performed.

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[4] The ASEAN region is composed of the following ten countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam.

All of the correlation coefficients are positive, with the exception of the flow of debt securities tracked by the Emerging Markets Portfolio Research (EPFR), thus providing some evidence that there are co-movements between QE and capital flows to the region for the period under consideration. Co-movements in the level data of the QE and capital flows are in the range of the correlation coefficients between +0.28 to +0.54. The lagged effect (3-month lag) of the QE on capital flows is also computed (QEt-3), which shows some weakening of the co-movement of a particular QE episode on future capital flows.[5]

To gauge the spillover, the volatility of the variables and the QE are also computed by using a 6-month rolling standard deviation, as the increase in the correlation of volatility is considered as empirical evidence for contagions and spillovers (Yiu et al., 2010). We report them in Table 3. As shown, the correlation coefficients computed by this method are much weaker, which range from +0.1 to +0.3, with only the Bank for International Settlements (BIS) cross-border flows registering a correlation above this range at +0.43. The weaker correlations can point to the fact that many factors can impact capital flows to the region, such as market sentiment, search for yield amid a low interest rate environment and better growth prospects in the region. However, the weak correlations point to some spillovers that emanate from the QE towards capital flows.

Figure 2   Volatility of Consolidated QE and Portfolio Flows to the Region
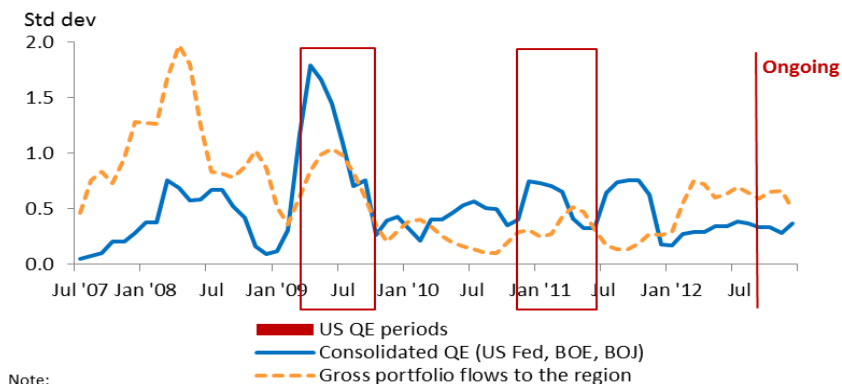
Note:
Data are only available for China, Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam.
Sources: U.S. Fed, BOE, BOJ, EPFR & AMRO Staff Calculations

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[5] This could be expected as an unannounced QE that changes the dynamics of monetary policy in a major economy or is designed to address severe weakness that arise from a crisis would have a significant contemporaneous impact on sentiment driven capital flows, especially if such a QE was seen as building confidence and triggering a "risk-on" environment. However, as economic agents adjust, some other factors could be driving capital flows other than the QE, thus leading to a weaker lagged relationship (IMF 2013).
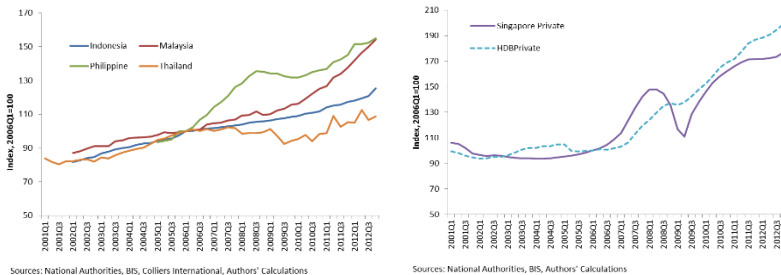
By mapping out the volatility across the various QE periods, we can visually gauge the co-movement of QE and capital flows to the region (Figure 2). For simplicity, we only focus on measures by the U.S. Fed, chronologically known as QE1, QE2 and QE3. As with Table 3 above, we use a 6-month rolling standard deviation to gauge volatility in the following charts to determine possible spillovers and contagions through changes in the co-movement or correlation of the respective variables. The figure shows that heightened volatility during the periods of the QE generally correspond to heightened volatility in the gross portfolio flows to the region, particularly for the QE1 of the U.S. Fed.

3.   House Prices in the ASEAN-5 Economies and Capital Inflows

This section is a review on the residential house prices in the ASEAN-5 economies (Indonesia, Malaysia, the Philippines, Singapore and Thailand) amid the period of strong capital inflows after the GFC. These countries are the major economies of the ASEAN region, accounting for about 72 percent of all ASEAN population and 90 percent the GDP of all of ASEAN. Moreover, the ASEAN-5 economies also have relatively open and more developed financial and real estate markets compared to the other five ASEAN economies. Following the GFC in 2008-2009, the ASEAN-5 economies have in general seen sharp increases in house price, particularly in 2011-2012 (Figure 3).

Figure 3   House Price Index in ASEAN-5 Economies

Sources: National Authorities, BIS, Colliers International, Authors' Calculations

Sources: National Authorities, BIS, Authors' Calculations

Indonesia is emerging as one of the major property markets in the ASEAN region supported by strong economic growth (above 6 percent GDP growth per year from 2007-2012), a large population (242 mn people in 2011 and the largest ASEAN country in population), high domestic consumption, growing urbanisation and an emerging middle class. The main authority responsible for the housing policy in Indonesia is the Ministry of Housing and, based on the guidelines provided by the ministry, local governments issue local and regional programs on housing and urban development, as well as development and building permits. Due to both strong domestic and external demand, residential

house prices in Indonesia increased by 6.01 percent annually, in 2011 and 2012 (Figure 4).

Figure 4: ASEAN-5 Economies: House Price Growth and Capital Inflows
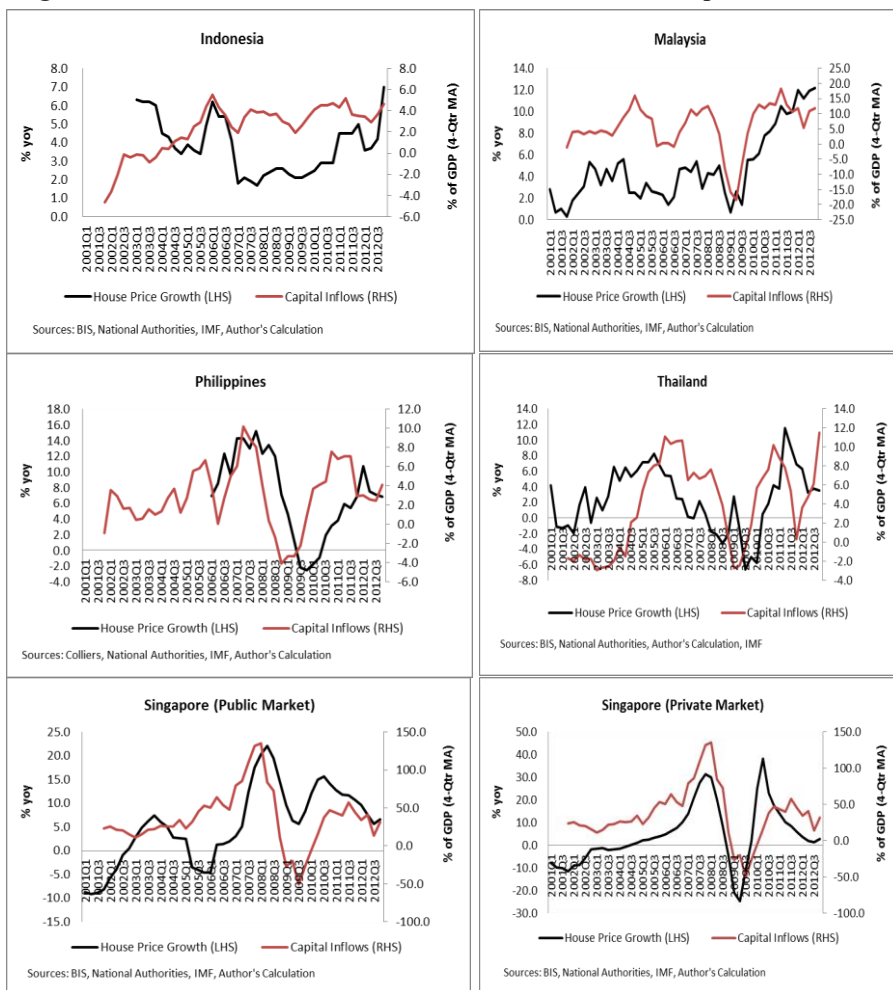
Malaysia is one of the most vibrant economies in the ASEAN region with a population of almost 30 million people and GDP per capita of US$10,578 in 2012. It is also one of the key tourist destinations in the region. In terms of economy expansion in recent years, the GDP of Malaysia grew by around 4.7% in 2013 compared with 5.6% and 5.1% in 2012 and 2011 respectively. The Ministry of Urban Wellbeing, Housing and Local Government is the housing policy authority. Due to continuing urbanisation (an estimated annual increase of the urbanisation population of 2.4% from 2010-2015), strong economic

growth[6] and foreign investment, the national residential house price increased by 11.1 percent in 2011-2012, and only turned modest in late 2013 (Figure 4).

Over the past several years, the Philippine economy has gained expansion momentum and achieved a healthy growth rate attributable to the robust remittances from overseas Filipinos, the strong growth of the offshoring and outsourcing industry and the relatively prudent fiscal policy. The positive effects of these have made the Philippine residential market vibrant from the late-2000s. The average price of a luxury 3-bedroom condominium in the Makati central business district (CBD) in Manila was up by 6.8 percent per annum in 2011 to 2012, thus reflecting the strong demand from both domestic and foreign investors (Figure 4). The main authority for the housing policy in the Philippines is the Housing and Urban Development Coordinating Council.

In Singapore, the residential property market is segregated into the private and the public sectors. Owner-occupied flats built by the Housing Development Board (HDB) of the public sector account for about 80 percent of the total housing stock, while the private market accounts for the rest, or 20 percent. HDB flats are only available to Singapore citizens and permanent residents. The Ministry of National Development (MND) is the key government ministry responsible for national land use planning and development, and together with the HDB and Urban Redevelopment Authority (URA) provide a suitable home for Singaporeans and all those who go to Singapore. Due to the high population growth and strong demand from foreign investors, in 2010-2012, the residential house prices in both the private and public sectors grew 8.6 and 10.4 percent respectively, as depicted in Figure 4.

After the political unrest from 2008-2010, the Thai economy returned to robust growth. In Thailand, residential property demand increased due to continued urbanisation and the rapid increase in house prices in 2010-2012 amid capital inflows into the economy. The Ministry of Social Development and Human Security is the policy making government agency most directly related to the housing policy. As shown in Figure 4, the house price index constructed based on the residential property in Bangkok and vicinities grew 4.9% annually during 2011 to 2012.

After the GFC, the ASEAN-5 economies have witnessed resurgence in capital inflows. The drop in capital inflows to the region during the GFC was followed by a rebound in capital inflows during the period of 2010-2012 (Figure 4). Gross capital inflows to Indonesia in 2010-2012 increased to 4.3 percent of the GDP from 1.3 percent of the GDP during the period of 2008Q4-2009Q2. Malaysia saw a surge in gross capital inflows to 11.7 percent of the GDP in 2010-2012 after seeing 19.4 percent of GDP capital outflows in 2008Q3-

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[6] Ong and Chang (2013) investigate the macroeconomic determinants of the Malaysian housing market and find out that real GDP growth is the most significantly factor of house price movement in Malaysia.

2009Q2. In the Philippines, gross capital inflows increased to 4.7 percent of the GDP following a 3.4 percent outflow in 2008Q1-2009Q2. Gross capital inflows to Singapore surged to 40.8 percent of their GDP in 2010-2012 from capital outflows of 25 percent of the GDP in 2008Q2-2009Q4. Thailand saw a rebound of gross capital inflows in 2010-2012 to 6.2 percent of their GDP from capital outflows of 1.6 percent of their GDP 2008Q2-2009Q2.

4.   Method and Results

After observations have been made of the capital inflows and residential prices, how house prices are related to capital inflows in the ASEAN-5 countries needs to be determined. In other words, we need to determine whether the developments in house prices in the ASEAN-5 during 2011-2012 (or for a longer period) are related to the strong capital inflows to the region. A common hypothesis is that capital inflows are positively correlated to house prices either because of the direct effect of capital inflows into house prices through liquidity and lower interest rate or through common factors that drive up both capital inflows and house prices (Favilukis et al., 2012). Larger credit supply or lower interest rates may lead to higher demand in housing and drive up house prices. Meanwhile, a stronger domestic economy may also drive both house prices and capital inflows.

A number of studies have examined the factors that drive the movements in the house prices in Asia. Glindoro et al. (2011), for example, examine the determinants of house prices in the Asia-Pacific economies, including Malaysia, the Philippines, Singapore and Thailand. With the use of a panel regression, they find that the increase in house prices in the Asia-Pacific as a group is mainly a response to stronger fundamentals. However, their study differs from this study in that: (1) it does not directly investigate the impact of capital inflows on house prices; and (2) their sample period (from 1993 to 2006) does not include the period of abundant global liquidity resultant of the unprecedented QE programs of the major central banks from 2009 to 2012. With the use of a panel vector autoregression (VAR) on a group of five emerging Asian economies (namely, Korea, Hong Kong, Malaysia, Thailand and Taiwan), Tillmann (2013) investigates how house prices respond to capital inflows, and finds that capital inflows significantly result in higher house prices. The study by Tillmann, however, does not look at the impact of capital inflows on house prices in individual countries separately, while this study directly investigates the relationship in each of the ASEAN-5 economies.

With the broader economies covered, Aizenman and Jinjarak (2009) find that the role of current account variations in explaining real estate valuation in a sample of 43 countries in advanced and emerging economies is larger than other factors, such as real interest rate and inflation. This suggests that house price movements can be attributed to the movements in capital flows. On the other

hand, Favilukis et al. (2012) find that house price increase is driven by a relaxation in credit constraints and a decrease in costs of housing transactions. Their empirical results show that, if anything, the role of capital inflows in house price movements is very small. The positive effect of capital inflows on housing prices through lower interest rates is dampened by an increase in housing risk premium and higher residential investment and housing stock.

All the aforementioned studies have used a panel data approach. While the panel data approach may overcome the small sample size problem, it could also mask the differences between the economies. In this paper, instead of using a panel data approach, we look at the relationship between house prices and capital inflows in each of the ASEAN-5 economies separately. Leung et al. (2013) also look at the global commodity price impacts on house prices in Australia and New Zealand separately in light of the heterogeneities of the two economies, such as in the institutional settings of the house market, conduct of the monetary policy as well as the economic structures.

To examine the relationship between capital inflows and house price movements in ASEAN-5, we utilise regression analysis.[7] We follow Favilukis et al. (2012) in that the regression analysis here is used to examine the association between house prices and capital inflows instead of estimating a structural equation for house prices. In their models, Favilukis et al. (2012) employ regression without including the lag of the dependent variable as an explanatory variable. Aizenman and Jinjarak (2013), however, find that the largest factor that accounts for real estate valuation is the lag of the real estate valuation itself. Thus in this study, we include the lags of house price growth as an explanatory variable. This would capture the importance of 'momentum' or 'persistence' in house prices.

Our regression is based on the following equation:

$$Y_{j,t} = \sum a_{j,i} Y_{j,t-i} + b_j K_{j,t} + c_j GDP_{j,t} + \varepsilon_{j,t} \quad j = 1, \dots, n \ and \ t = 1, \dots, T$$

(1)

where $Y_{j,t}$, $K_{j,t}$ and $GDP_{j,t}$ denote respectively the house price growth, gross capital inflows as a percentage of the GDP and real GDP growth of country j at

[7] By using an augmented Dickey-Fuller test, we study the stationarity of the two variables (house price growth and capital flows) and find that all capital flows and house price growth series are stationary, except for Thailand. On the other hand, the house price growth and capital flows series of Thailand pass the Phillip-Perron test. Thus, we have decided that these two series are also stationary. If one would like to study the long-term relationship in the case of the mixed interest rate series of I(0) and I(1), because of the difficulty of determining I(0) or I(1), the bounds tests by Pesaran et al. (2001) can be used. However, the bounds tests will give inconclusive inference if the test statistic falls within the bounds. Cheung et al. (2008) used the Pesaran bounds test to study the long-term relationship between the Chinese and US interest rates amid a mixed interest rate series of I(0) and I(1).

time t on a quarter-to-quarter basis. The regressions are estimated by using quarterly data that range from Q1:2001 to Q4:2012, depending on the availability of the house price data for each country. Descriptions of the house prices and sources of data are provided in the Appendix. In this study, we use nominal house prices instead of real house prices. Except for Indonesia, the growth of nominal house prices move closely with the growth of real house prices measured by subtracting nominal house prices with inflation. In Indonesia, however, given certain high and volatile inflation periods, real house prices tend to fluctuate in the opposite direction with inflation rate.

The estimation results in Table 4 show that, for Indonesia and Singapore (both the private and public markets), the coefficients of the capital inflow variables are positive and significant at the 5 percent level while those for Malaysia and the Philippines are significant at the 10 percent level. These suggest that the increase in house prices in Indonesia, Malaysia, the Philippines and Singapore is associated with the size of capital inflows. The coefficients of some of the lags of house price growth are positive and significant at least at the 10 percent level, thus suggesting some persistence in house price growth in the ASEAN-5 economies. Singapore (the public market) has a negative sign coefficient for the second lag of the house price growth variable, thus indicating some degree of mean reverting dynamics in this market. Thailand is the only country in which capital inflows statistically have no effect on house price growth in the sample period. This may be due to the political crisis between 2008 and 2010 which caused significant uncertainty in the economic environment of the housing market for both overseas and domestic investors.

To look at the robustness of the regression results, we add the GDP growth variable into the estimation to control for the condition of the domestic economy. House prices are expected to rise during a period of strong economic growth and slowdown during a period of weak economic growth.[8] After adding GDP growth into the model, in general, the estimation results do change to some extent (Table 5). The coefficients of the capital inflows for Indonesia and Singapore (the private market) remain positive and significant at least at the 10 percent level. The coefficient of the GDP growth itself is significant for Singapore (the public market) at a 1 percent significance level and for Malaysia and the Philippines at the 5 percent level, thus indicating that domestic demand may be the main force of the house price growth in the sample period. The coefficients of GDP growth of the other countries, however, are not statistically significant. For Thailand, the capital inflows and GDP growth do not have a statistically significant effect on house prices in the country. The coefficients of some of the lags of the house price growth remain significant for all five countries.

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[8] Some empirical studies have shown the importance of economic growth for house price movements. For the Asia-Pacific economies see, for example, Glindoro et al. (2011).

Table 4   Regression Results

(Dependent variable: house price growth, Independent variables: lags of house price growth, gross inflows)

	Indonesia	Malaysia	Philippines	Singapore (Private)	Singapore (Public)	Thailand
Capital Inflows to GDP Ratio	0.093**	0.023*	0.089*	0.010**	0.024**	-0.021
	(0.038)	(0.013)	(0.044)	(0.004)	(0.009)	(0.053)
Lag 1 of House Price Growth	0.343*	--	0.097	0.608***	0.683***	-0.093
	(0.165)		(0.152)	(0.117)	(0.142)	(0.148)
Lag 2 of House Price Growth	--	0.233	0.271*	--	-0.408***	0.125
		(0.136)	(0.146)		(0.142)	(0.143)
Lag 3 of House Price Growth	0.394**	0.246*	0.381**	0.153	--	-0.217
	(0.156)	(0.140)	(0.149)	(0.109)		(0.161)
Lag 4 of House Price Growth	--	0.292*	--	--	--	0.487***
		(0.145)				(0.161)
Lag 5 of House Price growth	--	0.236	--	--	--	--
		(0.153)				
Adj. R2	0.085	0.254	0.377	0.457	0.437	0.282
Residual test (Q-stat, up to Lag 20)	Passed	Passed	Passed	Passed	Passed	Passed

Note: Numbers in parentheses denote standard errors: ***, **,* denote significant at 1, 5, and 10 percent, respectively.

Table 5   Regression Results

(Dependent variable: house price growth, Independent variables: lag of house price growth, gross inflows, GDP growth)

	Indonesia	Malaysia	Philippines	Singapore (Private)	Singapore (Public)	Thailand
Capital Inflows to GDP Ratio	0.144***	0.013	0.004	0.008*	0.006	-0.010
	(0.051)	(0.015)	(0.047)	(0.004)	(0.009)	(0.064)
Lag 1 of House Price Growth	0.315*	-0.255	0.381**	0.602***	0.716***	-0.097
	(0.185)	(0.160)	(0.183)	(0.117)	(0.124)	(0.149)
Lag 2 of House Price Growth		0.236	0.274**		-0.377***	0.194
	--	(0.140)	(0.132)	--	(0.124)	(0.164)
Lag 3 of House Price Growth	0.317*	0.281*	0.421***	0.157		-0.267
	(.0148)	(0.1143)	(0.143)	(0.109)	--	(0.171)
Lag 4 of House Price Growth	0.116	0.334**	-0.414**			0.470***
	(0.192)	(0.144)	(0.186)	--	--	(0.163)
Lag 5 of House Price growth		0.235				
	--	(0.152)	--	--	--	--
GDP Growth	-0.151	0.298**	0.418**	0.099	0.721***	0.162
	(0.192)	(0.135)	(0.179)	(0.097)	(0.191)	(0.183)
Adj. R2	0.127	0.331	0.526	0.458	0.572	0.278
Residual test (Q-stat, up to Lag 20)	Passed	Passed	Passed	Passed	Passed	Passed

Note: Numbers in parentheses denote standard errors: ***, **,* denote significant at 1, 5, and 10 percent, respectively.

Although in general the results in Table 5 show a positive association between capital inflows and house prices in some of the ASEAN-5 economies, the magnitude of the relationship varies across countries. The differences could be due to the diversity in factors such as per capita income, consumer confidence, and population number. Moreover, as the increase in house prices reflect the combination of stronger demand and limited supply, the condition of the housing supply in each economy may also contribute to the dynamics of the house prices in each economy. In addition, institutional factors (such as ownership, mortgage contract, real estate taxes and housing financing system) may also play a role in the development of real estate markets. Lastly, the intensive use of macroprudential measures on house markets could affect the dynamics, such as the mean reverting dynamics in the subsequent second quarter in the public house market in Singapore.

5.   Property-Sector Macroprudential Measures

The resurgence in capital inflows to the ASEAN region in the period from 2009 to 2012 brought renewed concern to policymakers since the associated adverse effect could cause a rapid increase in bank credit growth and asset prices, thus increasing financial fragility. The traditional interest rate policy is, however, not effective amid strong capital inflows because raising interest rates will attract more inflows and lead to more appreciation pressure, which serves as a dilemma to policymakers. ASEAN policymakers have been relying on macroprudential measures to ensure financial stability against the risks of asset bubbles, particularly for real estate markets.[9] This section therefore outlines the property-sector specific measures adopted by the ASEAN economies, such as loan-to-value (LTV) ceilings on mortgage loans and stamp duties on property transactions, and reviews the effectiveness of some of these measures. [10]

All of the ASEAN-5 economies have used macroprudential measures to reduce the systemic risks that stem from the boom-bust cycle of property markets. Among them, Singapore in particular has undertaken several rounds of tightening the LTV limits based on property values and borrower's net worth. This is because the property market in Singapore is easily subjected to large price swings given the fact that there is limited land supply. The Singaporean Monetary Authority has also lowered the limits on the debt-to-service ratio (SDR) of mortgage borrowers several times to 40 percent and the stressed debt servicing ratio (DSR) to 50 percent. In June 2013, the Authority introduced a Total Debt Servicing Ratio (TDSR) framework for all property loans granted by financial institutions to individuals. The framework requires financial

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[9] A literature review of macroprudential policy can be found in Galati and Moessner (2011) and Moreno (2011) discusses the policymaking from a "macroprudential" perspective in emerging market economies.

[10] Ahuja and Nabar (2011) discuss the use of macroprudential policies for banking stability during property booms with a cross-country analysis for Asian economies.

institutions to assess the debt servicing ability of borrowers who are applying for property loans, taking into consideration all of their other outstanding debt obligations. In Singapore, property buyers also have to pay a Special Stamp Duty (SSD) on a sliding scale if their holding period is within certain periods less than the total period of 36 months.

Indonesia, Malaysia, the Philippines and Thailand all use LTV regulations to limit credit risks and maintain financial stability. They also adopt other macroprudential measures to cool down their booming markets and curb speculation. Indonesia has imposed an LTV ratio for residential property borrowings at a maximum of 70 percent to raise the minimum down payment on housing loans to 30 percent. Malaysia has imposed a maximum LTV ratio for third mortgages and LTV caps for housing loans by non-individuals to streamline the requirement across all borrowers. Besides LTV regulations, Malaysia has raised real property gain taxes from the disposal of properties made within a period not exceeding 2 years and with a period of 2 to 5 years from the date of purchase. The Philippines has limited real estate loans (bank loans to real estate are capped at 20 percent of total lending) and imposed a maximum LTV ratio. The Filipino authorities have implemented general loan-loss provisions and large exposure limits. Thailand has tightened the maximum LTV ratio for high value mortgages (above THB10 mn) and imposed higher risk-weights for both high value and residential mortgages (less than THB10 mn) with an LTV above the regulatory cap.

The macroprudential measures taken by the ASEAN-5 economies so far have shown mixed effects. [11] After several rounds of implementation of macroprudential measures, Singapore has seen a marked reduction in residential property transactions and a slower rate of expansion in housing/mortgage loans. On the house prices, the fall of prices only started in the third quarter of 2013 partly due to the effect of the anticipation that the US QE would taper around the end of 2013. In the HDB resale market, house prices fell by 0.9 percent, 1.5 percent and 1.5 percent in the third and fourth quarters of 2013 and first quarter of 2014 respectively. In the private property market, private home prices dropped by 0.9 percent and 1.3 percent in the last quarter of 2013 and the first quarter of 2014 respectively.

Among the other four ASEAN economies, it has been observed that the annual growth in lending to borrowers with three or more housing loans in Malaysia has moderated sharply but the nationwide average growth in residential property prices is still on an upward trend albeit at a slower pace since the imposition of the new LTV regulation for third residential mortgages in late 2010. In Indonesia and the Philippines, the rate of credit growth notably peaked in mid-2012, and then moderated afterward. In Thailand, it is ambiguous

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[11] We have empirically investigated the effect of the macroprudential measures and find that the measures have no statistically significant effect on house price changes in the sample period, although the results are not reported in the paper.

whether the tightening of the maximum LTV ratio in 2009 and 2010 has had an immediate effect on dampening credit growth, particularly those driven by the real estate sector.

6.   Conclusion

Since early 2009, the QE policy adopted by major advanced economies has created abundant global liquidity and the ASEAN region has experienced strong portfolio inflows, particularly in the first phase of the US QE program. Local corporations in the ASEAN region have deposited the proceeds from issuing local currency bonds into the local banking system and local banks were under pressure to lend to other sectors, such as the housing market sector.

The residential housing markets in Indonesia, Malaysia, the Philippines, Singapore and Thailand have been very vibrant in the period of strong capital inflows associated with the QE programs in the US, EU and Japan. These major ASEAN economies saw their residential house prices increase in a range of 4 to 11 percent per annum in 2011 and 2012. The pressure on house prices only started to mitigate in the wake of the May 2013 "US tapering episode".

We have investigated the relationship between house price movements and capital inflows in the five major ASEAN economies by using a simple linear regression model. The empirical results show a general positive association between capital inflows and house prices in the ASEAN-5 economies with variations across countries. The only exception is Thailand where the capital inflows have no statistically significant effect on house prices. The insignificance may be due to the political crisis that took place between 2008 and 2010 which caused significant uncertainty in the economic environment of the house market for both overseas and domestic investors. Lastly, if GDP growth is accounted for, the positive relationship between house prices and capital inflows will be somewhat weakened.

These ASEAN-5 economies have resorted to macroprudential measures to reduce systemic risks that stem from the boom-bust cycle of their house markets amid strong capital inflows. Although it is not easy to clearly measure the effectiveness of the sector-specific macroprudential measures implemented in these economies, our observations indicate that they have successfully reduced markedly residential property transactions and moderated the growth of mortgage loans. As a result, so far, speculative activities have receded and financial stability has been maintained.

The crucial step in the implementation of macroprudential measures is the calibration of parameters, in particular the timing of introduction, subsequent changes and withdrawal. A reliable real-time stamping method of house price movement will be a useful tool to policy makers in using macroprudential measures to manage the boom-bust cycle in their property markets. Thus,

economists and researchers, in both the public and private sectors, have been searching for such a reliable tool. Phillips, Shi and Yu (2011) propose an advanced method to time stamp asset price movements based on the idea of identifying explosiveness in the dynamic behaviour of the asset price after taking into account the fundamental value. Yiu et al. (2013) have successfully applied this method on identifying bubbles in the Hong Kong residential property market. A future study from this paper could be the use of this method to investigate the price dynamics of house price movement under the influence of property-sector macroprudential policies in these ASEAN economies amid a strong capital inflow episode.

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References

Ahuja, A. and Nabar, M. (2011), "Safeguarding Banks and Containing Property Booms: Cross-Country Evidence on Macro-prudential Policies and Lessons from Hong Kong SAR", *IMF Working Paper, WP/11/284*.

Aizenman, J. and Jinjarak, Y. (2009), "Current Account Patterns and National Real Estate Markets", *Journal of Urban Economics*, 66 (2), 75-89.

Aizenman, J. and Jinjarak, Y. (2013), "Real Estate Valuation, Current Account and Credit Growth Patterns before and after the 2008-9 Crisis", *NBER Working Paper No. 19190*.

Aziz, I.J. and Shin, H.S. (2013), "How Do Global Liquidity Phases Manifest Themselves in Asia", ISBN: 978-92-9254-277-1, Manila, Asian Development Bank.

Balakrishan, R., Nowak, S., Panth, S. and Wu, Y. (2012), "Surging Capital Inflows to Emerging Asia: Facts, Impacts and Responses", *IMF Working Paper, WP/12/130,* Washington.

Favilukis, J., Kohn, D., Ludvigson, S. and Nieuwerburgh, S.V. (2012), "International Capital Flows and House Prices: Theory and Evidence", *NBER Working Paper, No. 17751*.

Cheung, Y.W., Tam, D. and Yiu, M.S. (2008), "Does the Chinese Interest Rate Follow the US Interest Rate?" *International Journal of Finance and Economics,* 13, 53-67.

Galati, G. and Moessner, R. (2011), "Marcoprudential Policy—a Literature Review", *BIS Working Papers, No. 337.*

Glindoro, E.T. Subhanij, T., Szeto, J. and Zhu, H. (2011), "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking*, 7(3). 163-204.

International Monetary Fund (IMF), (2013), "Unconventional Monetary Policies: Recent Experience and Prospects", April, Washington.

Leung, C.K.Y., Shi, S. and Tang, E. (2013), "Commodity House Prices", *Regional Science and Urban Economics*, 43, 875-887.

Moreno, R. (2011), "Policymaking from a 'Macroprudential' Perspective in Emerging Market Economies", *BIS Working papers, No. 336.*

Morgan, P. (2011), "Impact of US Quantitative Easing Policy on Emerging Asia", *ADBI Working Paper, No. 321*, Tokyo.

Ong, T.S. and Chang, Y.S. (2013), "Macroeconomic Determinants of Malaysian Housing Market", *Human and Social Science Research*, 1(2), 119-127.

Pesaran, H.M., Shin, Y. and Smith, R. (2001), "Bounds Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics¸* 16, 289-326.

Phillips, P., Shi, S. and Yu, J. (2011), "Detecting Multiple Bubbles", *Yale University, Cowles Foundation Discussion Paper, No.1843.*

Tillmann, P. (2013), "Capital Inflows and Asset Prices: Evidence from Emerging Asia", *Journal of Banking and Finance*, 37, 717-729.

Yiu, M.S., Ho, A. and Choi, D. (2010), "Dynamic Correlation Analysis of Financial Contagion in Asian Markets in Global Financial Turmoil", *Applied Financial Economics*, 20(4), 345-354.

Yiu, M.S., Yu, J. and Jin, L. (2013), "Detecting Bubbles in Hong Kong Residential Property Market", *Journal of Asian Economics*, 28, 115-124.

Appendix   Description of House Price Indexes and Their Sources

Country	Period	Index and Source
Indonesia	Q1:2002-Q4:2012	Residential property prices, new houses (large cities) Source: Bank Indonesia
Malaysia	Q1:2001-Q4:2012	Residential property prices, all dwellings Source: Ministry of Finance
Philippines	Q1:2005-Q4:2012	Prices of residential luxury 3 bedroom apartments in Makati CBD, Metro Manila. Source: Colliers International
Singapore	Q1:2001-Q4:2012	Private residential prices. Source: Urban Redevelopment Authority
Thailand	Q1:2001-Q4:2012	Housing price index. Sources: Government Housing Bank, Bank of Thailand