

Global Liquidity, Capital Inflows and House Prices in ASEAN Economies

Matthew S. Yiu¹

Hong Kong Monetary Authority and ASEAN+3 Macroeconomic Research Office

Sahminan Sahminan

Bank Indonesia and ASEAN+3 Macroeconomic Research Office

September 2014

Abstract

The Quantitative Easing (QE) policy adopted by the advanced economies since 2009 leads to abundant 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. This paper studies the relationship among global liquidity, house prices and capital flows. Empirically, the capital inflows have a positive effect on the residential house prices of Indonesia, the Philippines and Singapore, even after their own domestic demand (real GDP growth as a proxy) has been accounted for. 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 of transaction volume and moderation of price growth.

JEL Classification Numbers: E44, E58, G28, R31

Keywords: Capital flows, residential house price, macroprudential, ASEAN economies

Author's E-Mail Address:

msfyiu@hkma.gov.hk; sahminan@bi.go.id

The views and analysis expressed in this paper are those of the authors, and do not necessarily represent the views of their associated institutions.

¹ We thank Jun Yu, Charles Leung, Lei Lei Song and the participants of the 2013 AsRES International Conference for their comments.

1. Introduction

The onset of the global financial crisis in 2008/09 plunged major advanced economies into severe economic recession. In response, the Quantitative Easing (QE) policy has been the main tool used by major central banks to stimulate their domestic demand and to 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 present in three phases² and mainly involve a series of asset purchase programs to expand the U.S. Fed's holding of longer-term securities. From March 2009 to April 2013, the increase in holdings of securities in all the three QE phases has thus far reached around USD2.2 trillion.

Other major central banks also use the QE policy for similar reasons. The Bank of Japan (BOJ) is the forerunner in implementing unconventional monetary policies through its introduction of QE, credit easing and stock purchases since early 2000s. From October 2010 to April 2013, total assets of BOJ have increased by 35 percent. BOJ's balance sheet continues to expand further, in view of the implementation of further easing policies (labeled as Qualitative and Quantitative Easing, QQE, in the Abenomics) aimed at boosting 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 staggered and at times, overlapping with the U.S. Fed's QE programs. Since the first implementation of its QE program in March 2009, total assets of the BOE have grown by almost 2.5 times, equivalent to 26 percent of GDP as of the end 2012. The QE policy of the ECB aims to provide liquidity to mitigate the massive deleveraging being undertaken by Eurozone banks and safeguarding financial stability.

An immediate consequence of all these QE programs in major advanced economies is the abundant global liquidity. The total liquidity generated by the three central banks (US Fed, BoE and BoJ) is estimated to be US\$3.95 trillion in the period from early 2009 to early 2013. Because of 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 till the US taper talk in late May 2013. The ASEAN-5³ economies have average GDP growth of 4.7% from 2009 to 2012. Consequently, the liquidity has led to large capital inflows to the ASEAN-5 economies.

While capital inflows may help deepen and broaden 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 translates into asset price inflation and

² The U.S. Fed started to reduce the amount of monthly asset purchases under its so-called QE3 phase in January 2014.

³ The ASEAN-5 refers to Indonesia, Malaysia, the Philippines, Singapore and Thailand.

eventually to price bubbles, and thus a sudden reversal of capital flows can result in destabilizing asset markets (Balakrishnan *et al.*, 2012).

Combining 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, the relationship between capital inflows and house prices in the ASEAN-5 can be found empirically because local corporates deposit the proceeds from issuing LCY bonds into the local banking system and local banks are under pressure to lend to 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 that 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. The common measures are loan-to-valuation regulation (alongside the imposition of special and/or introduction of stamp duties/additional stamp duties on buyers and/or sellers), the debt-to-income regulation (including imposition of the requirement for financial institutions to conduct credit affordability assessment based on prudent debt-service ratio), as well as caps on credit growth. Some of these measures appear to have successfully reduced the speculative activities and maintained the financial stability.

The structure of the paper is as follows: First we look at the global liquidity resulted from 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 investigate empirically whether the recent rapid price rises in the ASEAN-5 residential property markets are related to the capital inflows; Fourthly we discuss the effectiveness of the property sector-specific macro-prudential measures taken by the authorities; Lastly 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. Beyond taking into account the domestic driving forces and the impact of these various measures, there are spillovers to other countries especially given the huge size of the liquidity injections and asset purchases (IMF, 2012).

The QE programs in the unconventional monetary policy of the three major central banks have provided huge liquidity to their economies in order to stimulate growth. As shown in Table 1,

the U.S. Fed, the BOE and the BOJ engaged in significant asset purchases. Such asset purchases account for as much as 90 percent of the U.S. Fed's and BOE's balance sheet, and up to 70 percent of the BOJ's balance sheet. This form of unconventional monetary policy is most likely to spill on other countries due to its size and nature (Morgan, 2011). The huge amounts of money pumped in by the respective central banks into their domestic economies may not be fully absorbed by domestic entities, and some of them would likely find its way to other economies in the form of capital inflows. When comparing the QE periods using the U.S. Federal Reserve's QE dates, it is seen that the period from March to October 2009 (known as QE1) had the highest amount of dollar value boost.

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)						
<i>Changes in securities held outright</i>	102.1	1,108.5	254.2	604.1	-72.4	474.1
<i>Total assets (end of period)</i>	1,916.5	2,161.8	2,295.5	2,865.4	2,813.0	3,318.6
BOE (£ billion)						
<i>Changes in Gilts</i>	0.0	174.8	16.1	-0.3	148.7	27.1
<i>Total assets (end of period)</i>	177.1	235.3	244.2	236.2	386.7	403.9
BOJ (¥ trillion)						
<i>Change in JGBs & Others</i>	0.0	0.0	22.9	16.7	22.4	13.9
<i>Total assets (end of period)</i>	122.2	111.4	120.3	129.6	150.0	164.3

Notes: (a) Period refers to U.S. Fed QE1 and start of BOE Asset Purchase Facility; (b) October 2010 is 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 is still continuing, however, period is up to April 2013 only due to data availability. Securities held outright by the U.S. Fed includes Federal Agency Debt Securities mainly by Fannie Mae and Freddie Mac, Mortgage-backed securities and U.S. Treasury securities. For BOE the instrument was mainly purchases of debt securities called gilts. BOJ bond purchases includes JGBs, Commercial Papers, Corporate Bonds, ETFs, and J-REITs (this include 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

QE programs were implemented in staggered and sometimes overlapping periods (Table 2). The BOE's launch of the Asset Purchase Facility coincided with the U.S. Fed's QE1, however, the re-opening of this facility occurred in the interim between QE2 and QE3 (between October 2011 to July 2012). For the BOJ, asset purchases (which include JGBs, Commercial Papers, Corporate Bonds, ETFs, and J-REITs) have been steadily rising since the launching of the Asset Purchase Program (APP) in October 2010 (Figure 1).

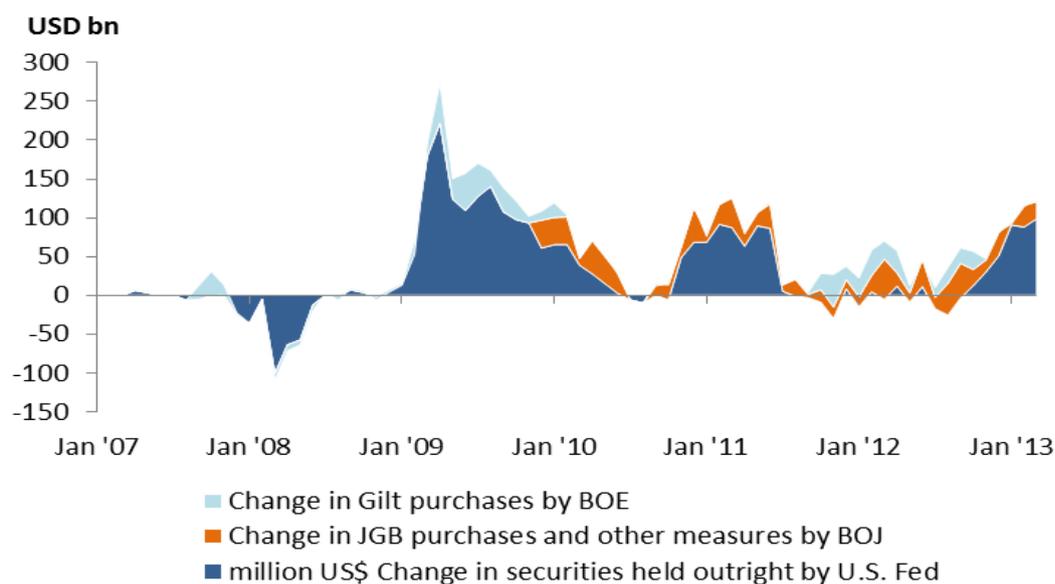
Table 2: Consolidated QE amounts for selected periods (USD billion)

<i>USD bn</i>	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 is 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 is still continuing, however, period is up to April 2013 only due to data availability;

Sources: U.S. Fed, BOE and BOJ

Figure 1: Evolution of the main QE instruments across time



Sources: U.S. Fed, BOE and BOJ

There could be several factors why liquidity that is not absorbed in the advanced countries could spillover on 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 (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 (so-called pull factors).

To gauge the possible impact of the QE measures on capital flows to the ASEAN region, correlations between the consolidated QE of the U.S. Federal Reserve, BOJ and BOE against various measures of capital flow to the region are shown in Table 3.

Table 3 Correlation coefficients between the QE and capital flows

	Levels		Volatility	
	QE	QE _{t-3}	QE	QE _{t-3}
Gross portfolio flows	+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 flows	+0.39	+0.24	+0.43	+0.19
EPFR equity flows	+0.28	+0.02	+0.14	+0.12
EPFR debt security flows	-0.06	+0.08	-0.14	-0.26

Note:

Correlation coefficients were computed by using data between October 2008 and Q4 2012 for Balance of Payment and BIS international banking statistics, and March 2013 for EPFR. Volatility was computed using 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 converted to monthly frequency through interpolation. For level data, no such conversion was performed

All the correlation coefficients are positive, with the exception of EPFR debt security flows, 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 QE and capital flows are in the range of the correlation coefficients between +0.28 to +0.54. The lagged effect (3-months lag) of QE on capital flows is also computed (QE_{t-3}), showing some weakening of the co-movement of a particular QE episode on future capital flows.⁴

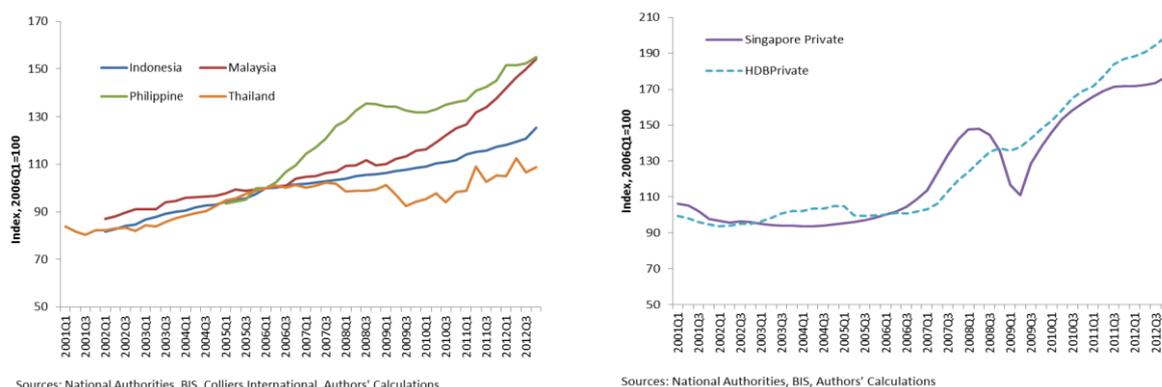
To gauge the spillover, the volatility of the variables and the QE are also computed using a 6-month rolling standard deviation, as the increase in the correlation of volatility is considered as empirical evidence for contagion and spillover (Yiu *et al.*, 2010). We report them in Table 3. As shown,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

⁴ This could be expected as unannounced QE that change the dynamics of monetary policy in a major economy or that is designed to address severe weakness arising from a crisis would have a significant contemporaneous impact on sentiment driven capital flows, especially if such QE were 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 QE leading to a weaker lagged relationship (IMF 2013).

3. House prices in the ASEAN-5 economies and capital inflows

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

Figure 3: House Price Index in ASEAN-5 Economies



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 in 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 housing policy in Indonesia is 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. Because of both strong domestic and external demand, residential house prices in Indonesia increased by 6.01 percent annually, in 2011-2012 (Figure 4).

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 region's key tourist destinations. In terms of economy expansion in recent years, Malaysia's GDP grew by around 4.7% in 2013 compared with 5.6% and 5.1% in 2012 and 2011, respectively. Ministry of Urban Wellbeing, Housing and Local Government is the housing policy authority. Due to continuing urbanisation (an estimated annual increase of urbanisation population to be 2.4% in 2010-2015),

strong economic growth⁵ and foreign investment, in 2011-2012 the national residential house price increased by 11.1 percent, only turned modest in late 2013 (Figure 4).

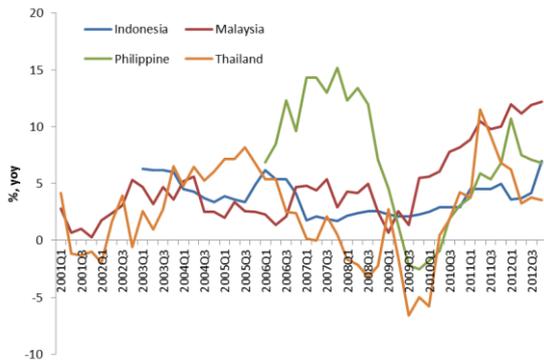
Over the past several years, the Philippine economy gained expansion momentum and achieved a healthy growth rate attributable to the robust remittances from overseas Filipinos, the strong growth of the offshoring and outsourcing industry, and the relatively prudent fiscal policy. The positive effects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

In Singapore, the residential property market is segregated into the private sector and the public sector. Owner-occupied flats built by the public sector's Housing Development Board (HDB) account for about 80 percent of the total housing stock, while the private market accounts for the rest 20 percent. The 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 HDB and Urban Redevelopment Authority (URA) the suitable home for Singaporeans and all those who come to Singapore are provided. Due to high population growth and strong demand from foreign investors, in 2010-2012 the residential house prices in both private and public sectors grew 8.6 and 10.4 percent respectively, as depicted in Figure 4.

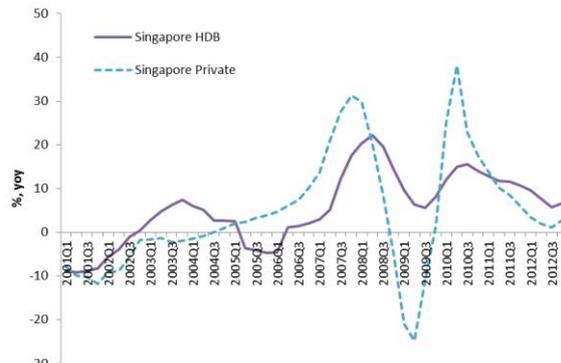
After the 2008-2010 political unrest, the Thai economy returned to robust growth. In Thailand, residential property demand increased due to the continued urbanisation and house prices were rising at a fast pace in 2010-2012 amid capital inflows into the economy. The Ministry of Social Development and Human Security is the policy making government agency most directly related to 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.

⁵ Ong and Chang (2013) investigate the macroeconomic determinants of Malaysian housing market and find out that real GDP growth is the most significantly factor of house price movement in Malaysia.

Figure 4: House Price Growth in ASEAN-5 Economies



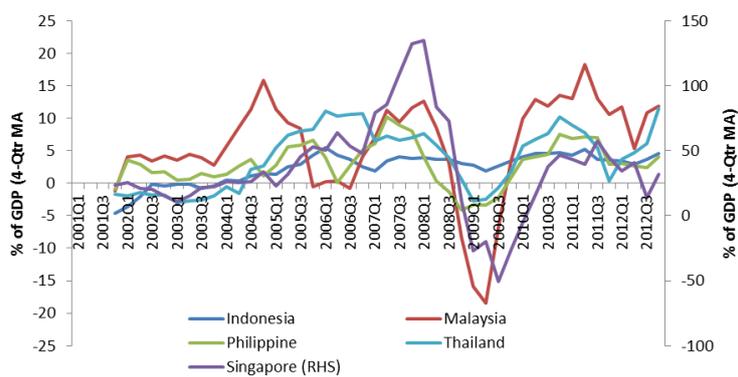
Sources: National Authorities, BIS, Colliers International, Authors' Calculations



Sources: National Authorities, BIS, Authors' Calculations

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 5). Gross capital inflows to Indonesia in 2010-2012 increased to 4.3 percent of GDP from 1.3 percent of GDP during the period of 2008Q4-2009Q2. Malaysia saw a surge in gross capital inflows to 11.7 percent of GDP in 2010-2012 after seeing 19.4 percent of GDP capital outflows in 2008Q3-2009Q2. In the Philippines, gross capital inflows increased to 4.7 percent of GDP following a 3.4 percent outflows in 2008Q1-2009Q2. Gross capital inflows to Singapore surged to 40.8 percent of GDP in 2010-2012 from capital outflows of 25 percent of GDP in 2008Q2-2009Q4. Thailand saw a rebound of gross capital inflows in 2010-2012 to 6.2 percent of GDP from capital outflows of 1.6 percent of GDP 2008Q2-2009Q2.

Figure 5: Gross Financial Inflows to ASEAN-5 Countries



Source: IMF, Authors' Calculations

4 Method and Results

After the observations of capital inflows and residential prices, the question is how are the house prices related to capital inflows in ASEAN-5 countries? In other words, are the developments in house prices in ASEAN-5 during 2011-2012 (or in a longer period) related to the strong capital inflows to the region? A common hypothesis is that capital inflows correlate positively with house prices either because of 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 factors driving the movements in the house prices in Asia. Glindro *et al.* (2011), for example, examine the determinants of house prices in Asia-Pacific economies, including some ASEAN countries. They found that the increase in house prices in Asia-Pacific was mainly a response to stronger fundamentals. Tillmann (2013) investigates how house prices in emerging Asian countries respond to capital inflows, and he found that capital inflows significantly result in higher house prices.

With broader economies covered, Aizenman and Jinjark (2009) found 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 use panel data approach. While panel data approach may overcome the small sample size problem, it could 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. 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 institutional settings of house market, the conduct of monetary policy as well as economic structures.

To examine the relationship between capital inflows and house prices in ASEAN-5, we utilise regression analysis.⁶ Following Favilukis *et al.* (2012), instead of estimating a structural equation for house prices, the regression analysis here is used to look at the association between house prices and capital inflows. In their models, Favilukis *et al.* (2012) employ regression without including lag of the dependent variable as an explanatory variable. Aizenman and Jinjarak (2013), however, find that the largest factors accounting for real estate valuation is the lag of the real estate valuation itself. In this study, we also include the lags of house price as an explanatory variable. This variable would capture the importance of ‘momentum’ in house prices.

Our regression is based on the following equation:

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

where $Y_{j,t}$, $K_{j,t}$ and $GDP_{j,t}$ denote respectively the house price growth, gross capital inflows as percentage of GDP and real GDP growth of country j at time t . The regressions are estimated using quarterly data ranging from 2001Q1 to 2012Q4, depending on the availability of house price data for each country. Description of the house prices and sources of data are exhibited in Appendix. In this study we use nominal house prices instead of real house prices. Except for Indonesia, 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.

Estimation results in Table 4 show that, for Indonesia, the Philippines and Singapore, coefficients of capital inflows variable are positive and significant at least at 5 percent level while that for Malaysia is only significant at 10 percent level. These suggest that the rise in house prices in Indonesia, Malaysia, the Philippines and Singapore is associated with the size of capital inflows. The coefficients of first lag of house price growth are positive and significant at 1 percent level, suggesting a strong persistence in house price growth in ASEAN-5 economies. Singapore is the country needs the addition of the second lag of house price growth (but with a negative sign coefficient, indicating some degree of mean reverting dynamics in the Singapore’s private house market). Thailand is the only country in which capital inflows have statistically no effect on house prices in the sample period. This may due to the political crisis in the period between 2008 and 2010 which caused a large uncertainty in the economic environment of the house market for both overseas and domestic investors.

⁶ We have also studied the stationarity of the two variables (house price and capital flow) and found that most capital flow series and some house price series are stationary. Thus, it is not advisable to use cointegration test to investigate the long-term relationship between the two variables because the necessary condition of cointegration test is that both series must be non-stationary I(1). If one would like to study the long-term relationship, bounds tests by Pesaran *et al.* (2001) can be used. However, bounds tests will give inconclusive inference if the test statistic falls within the bounds. Cheung *et al.* (2008) used Pesaran’s bounds test to study the long-term relationship between Chinese and US interest rates amid the mixed series of I(1) and I(0).

Table 4: Regression Results

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

	Indonesia	Malaysia	Philippines	Singapore	Thailand
Constant	-0.132 (0.521)	0.300 (0.372)	-0.700 (0.879)	0,217 (0.829)	0.606 (0.480)
Lag 1 of House Price Growth	0.927*** (0.103)	0.728*** (0.141)	0.843*** (0.187)	1.346*** (0.111)	0.780*** (0.098)
Lag 2 of House Price Growth	--	0.231 (0.150)	0.117 (0.197)	-0.642*** (0.103)	--
Capital Inflows to GDP Ratio	0.131** (0.064)	0.031* (0.017)	0.253*** (0.087)	0.036** (0.015)	-0.024 (-0.56)
Adj. R ²	0.686	0.839	0.840	0.883	0.579
Residual test (Q-stat, up to lag 20)	passed	passed	passed	passed	passed

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

To look at the robustness of the regression results, we add GDP growth variable into the estimation to control for the condition of domestic economy. House prices are expected to rise during the period of strong economic growth and to slowdown during the period of weak economic growth.⁷ After adding GDP growth into the model, in general the estimation results do not change substantially (Table 5). Coefficients of the first lag of the house price growth remain significant for all five countries and the coefficients of the capital inflows for Indonesia, the Philippines and Singapore remain positive and significant at least at the 10 percent level. However for Malaysia, the coefficient becomes not significant even at the 10 percent significant level.⁸ Coefficient of GDP growth itself is significant for Singapore at the 1 percent significant and for the Philippines at the 10 percent level, while GDP growth of other countries is not significant. On Thailand, the capital inflows and GDP growth do not have a statistical significant effect on house prices in the country.

⁷ Some empirical studies have shown the importance of economic growth for house price movements. For Asia-Pacific economies see, for example, Glindoro et al. (2011).

⁸ Leung *et al.* (2013) also find that capital inflows do not affect Australian house prices after controlling for macroeconomic variables.

Table 5: Regression results

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

House Price	Indonesia	Malaysia	Philippines	Singapore	Thailand
Constant	-0.228 (1.133)	-0.025 (0.466)	-2.567 (1.296)	-1.912 (0.956)	0.218 (0.587)
Lag 1 of House Price Growth	0.929*** (0.106)	0.663*** (0.152)	0.711*** (0.190)	1.114*** (0.119)	0.797*** (0.099)
Lag 2 of House Price Growth	--	0.282 (0.156)*	0.244 (0.198)	-0.454*** (0.106)	--
Capital Inflows to GDP Ratio	0.129* (0.067)	0.026 (0.017)	0.197** (0.087)	0.027** (0.013)	-0.050 (0.063)
GDP Growth	0.016 (0.171)	0.087 (0.075)	0.418* (0.222)	0.495*** (0.142)	0.106 (0.093)
Adj. R ²	0.676	0.829	0.857	0.908	0.582
Residual test (Q-stat, up to lag 20)	passed	passed	passed	passed	passed

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

Although in general the results in Table 5 show a positive association between capital inflows and house prices in ASEAN-5 economies, the magnitude of the relationship varies across countries. The differences could be due to the diversities in factors such as per capita income, consumer confidence, and number population. Moreover, as the increase in house prices reflect the combination of stronger demand and limited supply, the condition of house supply in each economy may also contribute to the dynamics of the house prices in each economies. In addition, institutional factors (such as ownership, mortgage contract, real estate taxes and housing financing system) may also play a role in the developments 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 private 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 has brought renewed concern to policymakers since the associated adverse effect could cause a rapid increase in bank credit growth and asset prices, increasing financial fragility. The tradition interest rate policy is, however, not effective amid strong capital inflows because raising interest rates will attract more inflows and lead to more appreciation pressures, giving a dilemma to policymakers. ASEAN policymakers have been relying on macroprudential measures to ensure financial stability

against the risks of asset bubbles, particularly real estate markets.⁹ This section outlines the property-sector specific measures adopted by 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 ASEAN-5 economies use macroprudential measures to reduce the systemic risks stemming from the boom-bust cycle of property markets. Among them, Singapore in particular has several rounds of tightening to the LTV limits based on property values and borrower's net worth. It is because Singapore's property market is easily subject to big swings in prices given the fact of limited land supply. The Singaporean Monetary Authority has also lowered several times of the limits on debt-to-service ratio (SDR) of mortgage borrowers till to 40 percent and the stressed 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 requests financial institutions to assess the debt servicing ability of borrowers applying for property loans, taking into consideration 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 a 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 mortgage and LTV caps for housing loans by non-individuals to streamline the requirement across all borrowers. Besides LTV regulation, Malaysia has raised real property gains tax 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's loans to real estate are capped at 20 percent of total lending) and imposed a maximum LTV ratio. The Pilipino 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 mortgages and residential mortgages (less than THB10 mn) with LTV above the regulatory cap.

The macroprudential measures taken the ASEAN-5 economies so far have shown mixed effects. 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 price only started in the third quarter of 2013 due partly to the effect of the anticipation of US QE tapering around the end of 2013. In the

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.

HDB resale market, house prices fell by 0.9 percent, 1.5 percent and 1.5 percent in the third quarter and fourth quarter 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.

Among the other four ASEAN economies, since the imposition of the new LTV regulation for third residential mortgage in late 2010, Malaysia has been observed that the annual growth in lending to borrowers with three or more housing loans has moderated sharply but the nationwide average growth in residential property prices is still on an upward trend albeit on a slower pace. In Indonesia and the Philippines, the rate of credit growth has notably peaked in mid-2012, and then moderated afterward. In Thailand, it is ambiguous 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 the early 2009, the Quantitative Easing (QE) policy adopted by major advanced economies has created abundant global liquidity and the ASEAN region had experienced strong portfolio inflows, particularly in the first phase of the US QE program. Local corporations in the ASEAN region 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 increased in a range of 4 to 11 percent per annum in 2011-2012. 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 prices 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. Furthermore, if the 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 stemming 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 been 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 (PSY, 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 account the fundamental value. Yiu *et al.* (2013) have successfully applied the method on identifying bubbles in the Hong Kong residential property market. One future study from this paper could be the use of PSY method to investigate of price dynamics of house price movement under the influence of property-sector macroprudential policy in these ASEAN economies amid a strong capital inflow episode.

References:

- Ahuja, Ashvin and Malbar Nabar, 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, Joshua and Yothin Jinjark, 2009, "Current Account Patterns and National Real Estate Markets", *Journal of Urban Economics, Vol 66 (2), pp. 75-89*.
- Aizenman, Joshua and Yothin Jinjark, 2013, "Real Estate Valuation, Current Account and Credit Growth Patterns before and after the 2008-9 Crisis", *NBER Working Paper No. 19190*.
- ASEAN+3 Macroeconomic Research Office (AMRO), 2013, "Global Liquidity, Asset Price Movements, and Macroprudential Measures in ASEAN+3 Economies", *AMRO Thematic Study, No. 1/2013*, Singapore.
- Aziz, Iwan J. and Hyun Song Shin, 2013, "How Do Global Liquidity Phases Manifest Themselves in Asia", ISBN: 978-92-9254-277-1, Manila, Asian Development Bank.
- Balakrishnan, Ravi., Sylvia Nowak, Sanjaya Panth and Yiqun Wu, 2012, "Surging Capital Inflows to Emerging Asia: Facts, Impacts and Responses", *IMF Working Paper, WP/12/130*, Washington.
- Favilukis, Jack, David Kohn, Sydney Ludvigson, and Stijn Van Nieuwerburgh, 2012, "International Capital Flows and House Prices: Theory and Evidence", *NBER Working Paper, No. 17751*.
- Cheung, Y.W., Dickson Tam and Matthew S. Yiu, 2008, "Does the Chinese Interest Rate Follow the US Interest Rate?" *International Journal of Finance and Economics, Vol. 13, pp. 53-67*.
- Galati, Gabriele and Richhild Moessner, 2011, "Macroprudential Policy—a Literature Review", *BIS Working Papers, No. 337*.
- Glindoro, Eloisa T. Tientip Subhanij, Jessica Szeto, and Haibin Zhu, 2011, "Determinants of House Prices in Nine Asia-Pacific Economies", *International Journal of Central Banking, Vol.7 No.3. pp. 163-204*.
- International Monetary Fund (IMF), 2013 "Unconventional Monetary Policies: Recent Experience and Prospects", April, Washington.
- Leung, Charles K.Y., Song Shi and Edward Tang, 2013, "Commodity House Prices", *Regional Science and Urban Economics, Vol. 43, pp. 875-887*.
- Moreno, Ramon, 2011, "Policymaking from a "macroprudential " Perspective in Emerging Market Economies", *BIS Working papers, No. 336*.
- Morgan, Peter, 2011, "Impact of US Quantitative Easing Policy on Emerging Asia", *ADB Working Paper, No. 321*, Tokyo.
- Ong, Tze San and Yee Shan Chang, 2013, "Macroeconomic Determinants of Malaysian Housing Market", *Human and Social Science Research, Vol. 1 (2), pp. 119-127*.

Pesaran, Hashem M., Yongcheol Shin and Richard Smith, 2001, "Bounds Testing Approaches to the Analysis of Level Relationships", *Journal of Applied Econometrics*, Vol. 16, pp. 289-326.

Phillips, Peter, Shu-ping Shi and Jun Yu, 2011, "Detecting Multiple Bubbles", *Yale University, Cowles Foundation Discussion Paper, No.1843*.

Tillmann, Peter, 2013, "Capital Inflows and Asset Prices: Evidence from Emerging Asia", *Journal of Banking and Finance*, No. 37, pp. 717-729.

Yiu, Matthew S., Alex Ho and Daniel Choi, 2010, "Dynamic Correlation Analysis of Financial Contagion in Asian Markets in Global Financial Turmoil", *Applied Financial Economics*, Vol. 20 (4), pp. 345-354.

Yiu, Matthew S., Jun Yu and Lu Jin, 2013, "Detecting Bubbles in Hong Kong Residential Property Market", *Journal of Asian Economics*, Vol. 28, pp115-124.

Appendix: Description of House Price Indexes and their Sources

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