HONG KONG INSTITUTE FOR MONETARY RESEARCH

THE NEXUS OF OFFICIAL AND ILLICIT CAPITAL FLOWS – THE CASE OF HONG KONG

Yin-Wong Cheung, Kenneth K. Chow and Matthew S. Yiu

HKIMR Working Paper No.25/2015

December 2015

Hong Kong Institute for Monetary Research
香港金融研究中心
(a company incorporated with limited liability)

The Nexus of Official and Illicit Capital Flows – The Case of Hong Kong*

Yin-Wong Cheung
City University of Hong Kong

and

Kenneth K. Chow
Hong Kong Institute for Monetary Research

and

Matthew S. Yiu
Hong Kong Institute for Monetary Research

December 2015

Abstract

The revival of strong capital flows to emerging economies in the aftermath of the 2008-9 Global Financial Crisis has rekindled the debate on the adverse effects of excessive capital inflows. In this study, we study effects of official and illicit capital flows on Hong Kong, which is a small and open economy with minimal restrictions on cross-border fund movements and is susceptible to international capital flows. To illustrate the differential impacts of different types of capital flow, we study the effects of two measures of official flows and two measures of illicit flows on Hong Kong's equity and residential housing markets.

It is found that these official and illicit capital flow measures reflect different facets of flow movements and have different effects on the economy. Specifically, they exhibit differential effects on the equity and residential housing markets. The results highlight the complexity of managing capital flight, and the relevance of polices targeting specific sectors.

Further, it is found that, compared with capital flows, economic variables tend to offer a relatively higher level of explanatory power. Anecdotal evidence suggests that Hong Kong manages the effects of capital flows using various macro-prudential policies, which are deemed to be effective. One interpretation is

* The views expressed in this paper are those of the authors, and do not necessarily reflect those of the Hong Kong Monetary Authority, Hong Kong Institute for Monetary Research, its Council of Advisers, or the Board of Directors.

Corresponding addresses:
Yin-Wong Cheung: Hung Hing Ying Chair Professor of International Economics, City University of Hong Kong, Hong Kong. E-mail: yicheung@cityu.edu.hk
Kenneth K. Chow: Hong Kong Institute for Monetary Research, Hong Kong Monetary Authority, E-mail: kkochow@hkma.gov.hk
Matthew S. Yiu: Hong Kong Institute for Monetary Research, Hong Kong Monetary Authority, E-mail: msfyiu@hkma.gov.hk

that an effective governance framework and prudential regulatory environment improve market confidence and reduce vulnerability to economic and financial risks. In other words, it is important to keep one's house in order, practice pre-emptive macro-prudential policies, and have an efficient infrastructure to accommodate capital flows. Our results indicate that Hong Kong has done quite well in the last few decades in enhancing its market efficiency and conducting macro-prudential policies.

Acknowledgments: We would like to thank an anonymous referee, CHIA Wai Mun, Willem Thorbecke, and participants of the Inaugural International conference on "Evolving Trade and Investment in Asia" organized by the Centre on Asia and Globalization, Lee Kuan Yew School of Public Policy, National University of Singapore for their comments. Cheung gratefully thanks The Hung Hing Ying and Leung Hau Ling Charitable Foundation for their support.

1. Introduction

The onset of the 2008-9 global financial crisis (GFC) caused major advanced economies to plunge into severe economic recession. In response, accommodative monetary policies dubbed Quantitative Easing (QE) were introduced to stimulate domestic demand and revitalize impaired financial channels. The QE programs adopted by advanced economies have raised concerns about overabundance of global liquidity. It is estimated that, over the period from early 2009 to early 2013, the central banks in the US, Britain, and Japan generated liquidity of US$3.95 trillion.[1] The excess liquidity has led to capital flows to the rest of the world in search of good returns. Economies in the Asian region, especially emerging ones, were among the most popular destinations for yield seeking capital.

The revival of strong capital flows into emerging economies in the aftermath of the GFC has rekindled the debate on the adverse effects of excess capital flows.[2] While capital inflows help to deepen and broaden financial markets and provide additional funds for the economy, policymakers in Asian emerging economies are extremely concerned about the economic threats caused by unchecked/excessive capital flows that undermine the structural integrity and the medium to long term economic prospects of their economies. These threats are not only triggered by quantitative easing, but also by a reversal and withdrawal of such a policy. The responses of emerging markets to rumors and discussions in mid-2013 about US Fed tapering illustrate the potential economic turmoil arising from a scaling down of the US QE policy.

Studies of capital flows cover a wide range of issues, including their determinants, benefits and costs, and policies to manage capital flow effects. In general, it is agreed that capital flows, especially gross capital flows, have non-negligible impacts on monetary and financial stability, and on the real economy. The effect on economic performance conceivably depends on both the nature of the flows and the economic and institutional environment of the economy under consideration. Empirical studies, however, yield inconclusive evidence on the net benefits of capital flows.[3]

1 The U.S. generated US$2.2 trillion liquidity between March 2009 to April 2013 (Yiu and Sahminan, 2015).
2 For brevity, capital flows and cross-border capital flows are used interchangeable here.
3 See, for example, Levine and Carkovic (1999), Obstfeld (2007), and Reisen and Soto (2001).

The literature has quite diverse viewpoints on policies for managing capital flows and capital controls. Indeed, capital controls were not uncommon even among developed economies up until the 1980s. Then, capital controls were associated with market interventions that cause capital mis-allocation and inefficient uses of resources, which have severe costs in terms of long-term growth and welfare. Further, when a country adopts capital controls, it has to bear the political stigma associated with interventionism. Despite this, capital controls are quite commonly used in developing countries.

The devastating effects of capital flight during the 1997-8 Asian Financial Crisis (AFC) and the 2008-9 GFC have prompted a reassessment of the costs and benefits of capital controls. Fernald and Babson (1999) and Yu (2009), for example, note that restrictions on cross-border capital movements helped insulate China – a country with an underdeveloped financial sector - from global financial volatility in recent global finance crises. The IMF modified its policy stance on capital controls in the early 2010s. In a series of studies it acknowledged that, under certain circumstances, developing and emerging economies could implement capital control measures and macro-prudential policies to protect themselves against macroeconomic and financial instabilities (Ostry *et al.*, 2010, 2011; The Strategy, Policy, and Review Department, IMF, 2011).[4] However, capital controls should not replace structural reforms that enhance the efficiency and stability of the domestic financial sector. Gochoco-Bautista and Rhee (2013), for instance, argue that the new IMF framework is hard to implement because of the lack of explicit guidelines.

In sum, the emerging general consensus recognizes the positive roles of macro-prudential policies and capital controls in managing macroeconomic and financial instability.

Given the unfavorable experiences of capital inflows and outflows, especially those associated with crisis, policy makers have become vigilant in monitoring the scope and scale of capital flows. The standard approach to measuring capital movements is based on Balance of Payments (BoP) statistics; that is, the transactions between residents and non-residents (the so-called resident-based approach). The approach has been commonly used in empirical studies on capital flows and their effects on

[4] Some economists, including Joseph Stiglitz, have suggested that emerging economies need capital controls to curb and manage capital flows.

asset prices.[5] However, for surveillance purposes, the resident-based approach suffers from the drawback of a lack of timeliness since BoP statistics are typically available only at the quarterly frequency with a time-lag of a few months. Because of its currency board arrangement, Hong Kong avails itself a timely measure of capital flows – the so-called currency-based approach – that is based on changes in the monetary base and the net spot foreign currency position.

Another limitation of BoP statistics is that, for various reasons, some cross-border transactions are not recorded officially. While the official balance of errors and omissions captures discrepancies in officially recorded fund movements, other measures are perceived to offer better gauges of cross-border illicit flows.[6] Two commonly used measures of illicit capital movements are a) the World Bank Residual (WBR) measure based on BoP data, and b) the trade mis-invoicing (TMI) measure which is derived from bilateral trade data. Conceivably, both the magnitude of illicit flows and their effects can be different from official flows.

Against this backdrop, we study the effects of capital flow on Hong Kong. Since October 17, 1983, Hong Kong has adopted a Linked-Exchange-Rate (LER) System that effectively limits the variability of the Hong Kong-US dollar nominal exchange rate around the linked rate of Hong Kong dollars 7.80 to one US dollar. Given the openness and size of its economy, there is no doubt that local (asset) prices and the real economy are susceptible to excessive capital movements. Further, as an international financial center with minimal capital controls, measuring and managing capital movement are imperative for Hong Kong.

In the next section, we describe in the context of Hong Kong two measures of official capital flows and two measures of illicit capital flows. The effects of capital flow are examined in Section 3, and Section 4 describes some macro-prudential policies recently adopted by the Hong Kong authorities. Section 5 offers some concluding remarks.

[5] See, for example, Yiu and Sahminan (2015), Tillman (2013) and Kim and Yang (2008).

[6] In the current study, illicit capital flows refer to cross-border capital transactions that are either intentionally or due to technical reasons not (completely) recorded in official statistics.

2. Measuring Capital Flow

Even before acquiring its current official name "Hong Kong Special Administrative Region of the People's Republic of China" in 1997, Hong Kong was a renowned international financial center and an exemplary free-market economy.[7] After the reunification with Mainland China, Hong Kong is allowed to retain its own currency, legal structure and financial system, and free capital mobility policy. Together with its well-known laissez-faire economic policy, Hong Kong maintains a sound economic and financial infrastructure, with the backing of prudential fiscal and monetary policies, and a high level of foreign exchange reserves.

Hong Kong is quite conscientious about the effects of capital flow, despite the general soundness of its economy. For instance, Hong Kong has instituted specific policy measures to curb the effects of capital flow during both crisis and non-crisis periods. We will describe some of these measures in Section 4. Before managing capital flows, we have to measure them accurately. As an international financial centre with minimal capital controls, the scope and scale of capital flows in and out of Hong Kong are quite complex.

One popular approach to measuring capital movements is based on data from the BoP. By construction, BoP data capture transactions between resident and non-residents. A typical measure of capital flow comprises four entries under the non-reserve financial and capital account, namely *Direct Investment, Portfolio Investment, Other Investment, and Financial Derivatives*.[8] We call this measure the residency-based measure. Tables 1a and 1b present an abridged version of some recent annual and quarterly BoP data which highlight Hong Kong's overall capital flow and its components. Annual and quarterly data confirm that capital flows into and out of Hong Kong are large relative to other items on the BoP account and are quite volatile over time.

[7] Milton Friedman, for example, cited Hong Kong as the place to witness the benefits of laissez-faire capitalism.

[8] In general, direct investment transactions are those involve a lasting interest in an enterprise unit in another economy; portfolio investment transactions are those in financial instruments, including equity securities, debt securities and money market instruments; financial derivatives transactions are those in financial derivatives, including options and warrants; and other investment transactions are those involve trade credits, loans, currency and deposits, and other assets and liabilities, including miscellaneous accounts, receivables and payables.

The tables also illustrate the importance of examining gross, instead of net, flows.[9] The net flow figure based on BoP balances could easily hide the sheer size and the degree of variability of gross flows. Taking the 2014 data, for example, the annual net flow is 1.9% of GDP, while the range of individual components is from minus 53% to plus 43%.

The components contribute differently to the gross flow over time and respond to different economic incentives that vary over time. Table 2 summarizes the correlation coefficient estimates of various capital flow measures and their components considered in the empirical exercise. The sample period is from 2002Q2 to 2014Q4.[10] The degree of co-movements between the gross flow and its components and among the components is variable. The sample correlation estimates of the residency based measure and its components range from 0.02 to 0.93 (Table 2, upper left corner). In view of this, it is worth considering not only the aggregated flow but also its components.

One advantage of using BoP data is that these data offer a detailed record of fund movements between residents and non-residents, and a breakdown of capital flows into different transaction categories. A limitation, however, is that for an international finance center, such as Hong Kong, these transactions may not involve the exchange of the local currency for foreign currencies. Similarly, capital flows into and out of the Hong Kong dollar may not correspond exactly to fund movements between residents and non-residents. Thus, the BoP data are not necessarily the most appropriate data if we want to examine the effects of capital flows that work directly or indirectly via currency conversion.

To gauge the capital flows into and out of the Hong Kong dollar, we use a measure based on the sum of the monetary base and the net spot foreign currency position of the banking system. The monetary base in Hong Kong comprises the Aggregate Balance, Exchange Fund Bills and Notes, Certificates of Indebtedness, and Coins in Circulation. Essentially, Exchange Fund Bills and Notes[11] are the debt instruments issued by the Hong Kong Monetary Authority and held by the banking sector, and Certificates of Indebtedness give the amount of currency in circulation.

9 Academics and policy makers are increasingly aware of the salient economic impacts of gross relative to net flows (Broner, et al., 2013).

10 The Hong Kong BoP data were first published in 1999. Annual data and quarterly data are available, respectively, from 1997 and the first quarter of 1999.

11 All the Exchange Fund Bills and Notes are backed by US dollar assets of equivalent amount.

The Aggregate Balance is the total amount of Hong Kong deposits the banks keep with the Hong Kong Monetary Authority and is a component of the monetary base. When there is an inflow of, for example, the US dollar, this can lead to an increase in the net US dollar position of the banking sector, or the Aggregate Balance, or both. When the banking sector is willing to absorb the inflow, it increases its US dollar positions. When the banking sector is not willing to increase its US dollar holdings, it could sell dollars to the Hong Kong Monetary Authority, which leads to a change in the Aggregate Balance. Under its LER system, the Hong Kong Monetary Authority is obliged to buy US dollars at the exchange rate of 7.75 Hong Kong dollars to one US dollar. That is, capital inflows affect the positions of either the Hong Kong Monetary Authority or the banking sector (The Research Department, 2012).

Figure 1a graphs the monetary base and its components in first differences normalized by GDP. The quantity of outstanding Exchange Fund Bills and Notes and the Aggregate Balance displayed large variations between 2008 and 2010, probably due to yield seeking capital flows triggered by the ultra-accommodative monetary policies adopted by developed economies including the US.

The currency-based capital flow measure and the monetary base are depicted in Figure 1b. Since the net spot foreign currency position is given by the difference between these two lines, we can infer that it is more volatile than the monetary base, and can be attributed to the international finance center status of Hong Kong, where capital moves in and out quickly for different types of financial transaction.[12] Again, the degree of co-movement between the monetary base and the net spot foreign currency position is low - the correlation coefficient is -0.05 for the period 2002Q2 to 2014Q4 (Table 2).

We now have two measures of official capital flows: one emphasizes cross-border transactions between residents and nonresidents, and the other emphasizes the conversion into and out of Hong Kong dollars. For brevity, we shall henceforth refer to the former as the ‘residency-based measure’,

[12] Conceivably, the valuation effect and the sector’s desire to alter its overall currency position for business reasons also alter the reported net spot foreign currency position.

and the latter as the 'currency-based measure'. Note that the term "residency-based" carries no policy connotations but only arises from an inherent characteristic of BoP data.

Figure 2 plots the two GDP normalized measures, which are used in the empirical investigation of their economic implications. These capital flow measures do not appear to move strongly together. Indeed, the two normalized measures have a correlation coefficient estimate of 0.14.

When one measure indicates strong flows, it does not necessarily mean that the other measure gives a similar signal. Possibly, different types of capital flows are driven by different factors, and behave differently as transactions based on residency and currency-conversion have different information contents. For instance, as an international financial center, there are offshore loans booked through Hong Kong involving only inflows and outflows of foreign currency. These transactions are recorded under the BoP statistics but have no implications for the Hong Kong dollar exchange rate. Alternatively, when switching between the Hong Kong dollar and foreign currency involves only residents due to, for example, portfolio re-balancing, this is captured by the currency-based measure but not the BoP based measure (He, *et al.*, 2009; The Research Department, 2012).

While the residency-based measure based on the Balance of Payments data is commonly used, the currency-based measure can provide a good alternative and complementary perspective. Indeed, the currency-based measure is quite commonly used by practitioners in the Hong Kong financial market (Lam, 2014; Tang and Lau, 2014).[13]

Due to technical and incentive issues, the BoP statistics do not necessarily record all cross-border transactions. Some of these unreported transactions may be captured by the Errors and Omissions component of the BoP account. However, there are unrecorded transactions that are purposefully avoided being recorded or traced.[14] In this study, we use two common measures in the literature, namely the World Bank residual (WBR) model and the trade mis-invoicing (TMI) model, to gauge the illicit capital flows in and out of Hong Kong.

[13] The changes in the Aggregate Balance, Exchange Fund paper and in net spot foreign currency positions are also tracked by the Half-Yearly Monetary and Financial Stability Report prepared by the Hong Kong Monetary Authority.

[14] Some reasons of capital movements not captured by official data in developing countries, and methods to estimate them are discussed in detail by, for example, Kar and Cartwright-Smith (2009) and Kar and Spanjer (2014).

The WBR measure has been widely used in empirical studies to measure illicit capital flows. Using information from the BoP statistics, the net value of illicit flows is given by the discrepancy of the uses and sources of funds. There are outward (inward) flows when the total source of funds is larger (less) than the total use of funds. The model uses the following formula:

$$WBR = -(\Delta ExD + NFDI - CAD - \Delta IR) \quad (1)$$

where the sources of funds are given by the change in external debts (ΔExD) and the net foreign direct investment (*NFDI*), and the uses of funds are the current account deficit (*CAD*) and the change in international reserves (ΔIR). The negative sign (-ve) for the whole formula is to maintain consistency with the convention that inflows have a positive sign as in the above two measures for official flows. If all transactions are reported appropriately, the double entry accounting principle should make the sources of funds equal the uses of funds.

Note that the external debt of Hong Kong is huge relative to its nominal GDP. For instance, the ratio was around 440% in 2014. The high level of external debt is attributed to the high volume of short-term foreign deposits, which accounted for around two thirds of total external debt in 2014 in the banking system. These short-term foreign deposits are typically for funding loans outside Hong Kong – a common phenomenon observed in international financial centres. Thus, the variation of short-term foreign deposits can be related to the international financial center role of Hong Kong rather than illicit capital movements. In view of this, we construct an adjusted WBR measure that excludes short-term deposits and currency from the external debt component. Figure 3a shows the unadjusted WBR and adjusted WBR series (normalised by GDP) in the period from 2002Q2 to 2014Q4. The two series are similar and indicate more quarters having outflows than inflows. However, for obvious reasons, the adjusted WBR is of smaller magnitude.

Trade mis-invoicing (TMI) is a well-documented way to circumvent regulations and taxes, and has long been recognised as a major conduit for illicit flows. To move assets illicitly abroad, residents can over-invoice imports or under-invoice exports. On the other hand, imports under-invoicing and exports

over-invoicing facilitate illicit capital inflows. The degree of trade mis-invoicing is commonly derived from data from the Directions of Trade Statistics (DOTS). However, there is one technical issue in using DOTS data that exports data and imports data are reported at f.o.b. (free on board) prices and c.i.f. (cost, insurance and freight) prices respectively. Following the literature, we incorporate a 10% CIF factor to adjust for the discrepancy for a fair comparison of exports and imports data.

The DOTS-based TMI measure comprises two components: export under-invoicing (EUI) and import over-invoicing (IOI), and is given by the following formula:

$$TMI = -(EUI + IOI) \quad (2)$$
$$= -(\sum_{1}^{p}[XW_{i,t} - XC_{i,t} * (1 + CIF)] + \sum_{1}^{q}[MC_{i,t} - MW_{i,t} * (1 + CIF)])$$

where $XW_{i,t}$ is country i's reported value of imports from Hong Kong, $XC_{i,t}$ is Hong Kong reported value of exports to country i, p is the number of economies imported from Hong Kong, $MC_{i,t}$ is Hong Kong's reported value of imports from country i, $MW_{i,t}$ is country i's reported value of exports to Hong Kong. The TMI measure captures illicit capital flows of Hong Kong via the trade channel.

Similar to the WBR calculation, there is a caveat in interpreting Hong Kong's TMI data. Hong Kong is a main entrepot of China trade. The exports of Hong Kong include re-exports from China to other countries. Thus, the gaps between exports from Hong Kong and imports reported by recipient countries (say, the US) are in general over-estimated. Re-exports from China through Hong Kong are not reported in the imports data of the recipient countries. Therefore, in addition to the usual TMI measure, we adjust Hong Kong's exports data by taking out re-exports from China to other countries. The unadjusted TMI series and adjusted TMI series in their first differences normalised by GDP are depicted in Figure 3b, which show a similar pattern of fund movements through the trade mis-invoicing channel.

While the WBR measure considers the totality of fund flows, the TMI measure reflects fund movement via the trade venue. The two measures evolve differently during the sample period (Figures 3a and 3b) and the two adjusted series have a very small sample correlation of 0.002, which is not statistically

significant. The two illicit measures have different correlations with the two official measures; see Table 2. The unadjusted and adjusted WBR measures are negatively correlated, with estimates of -0.86 and -0.38 respectively, with the residency-based measure and have negative sample correlations of -0.15 and -0.06 respectively with the currency-based measure. However, the unadjusted and adjusted TMI measures are positively correlated with the residency-based measure, 0.21 and 0.23 respectively, and currency-based measure, 0.27 and 0.26 respectively. These simple correlation coefficient estimates suggest that the official and illicit capital flows display different patterns, and capture different facets and types of information of cross-border fund movements.

In passing, we note that capital flows into Hong Kong are perceived to be triggered by activities undertaken by investors that include: shifting investment portfolios towards Hong Kong dollar equities; subscribing to initial public offerings in Hong Kong; conducting carry trade with Hong Kong dollar as the target currency; acquiring real estate in Hong Kong, and parking money in Hong Kong for future investment in, say, China.[15]

3. Economic Implications

For a small open economy with a fixed exchange rate, massive capital flight can trigger a confidence crisis and economic turmoil. Even equipped with its high level of foreign exchange reserves and prudential fiscal and monetary policy stances, Hong Kong is quite vigilant about international capital movements and their potential negative impacts (Hong Kong Monetary Authority, 2008).

In view of the recent surge in global liquidity and the global low-interest-rate environment, there is growing concern among developing economies about the adverse effects of excessive capital flows on their domestic economies. A typical complaint is that abundant capital influx leads to artificially underestimated credit risk and, subsequently, to asset price bubbles. Hong Kong, with its laissez-faire economic policy stance is, in general, reluctant to impose capital controls to regulate hot money flows. Under the LER System, capital inflows put upward pressure on the domestic asset markets.

[15] See, for example, Hong Kong Monetary Authority (2009, p. 50). In general, academic studies include pull factors that are home country specific determinants, such as the domestic economic reform program, and push factors that are foreign determined, such as the US quantitative easing policy (Fratzscher, 2012).

Following the usual practice, we use a GDP normalized capital flow measure to study the economic effects of capital flows. Henceforth, a GDP normalized capital flow measure is, for brevity, referred to as the capital flow measure. The pre-test results, which are available upon request, show that the residency-based measure series, the currency-based measure series,[16] and the two WBR measure series are stationary whereas the two TMI measure series are first-difference stationary. In the next two subsections, we study the effects of capital flows on the Hong Kong equity and real estate markets.

3.1 Equity Market

To empirically investigate the effect of official and illicit capital flows on the Hong Kong equity market, we use the following regression specification:

$$Y_t = \alpha + \beta Y_{t-i} + \theta X_t + \varepsilon_t, \quad (3)$$

where Y_t is the return on the Hang Seng Index, X_t is the capital flow measure, the lagged dependent variable is included to account for persistence, and ε_t is the regression error term.[17]

Figures 4 and 5 depict returns on the Hang Seng Index (HSI) and the two official normalized capital flow measures respectively. These capital flow measures have been found to track variations in the stock price index. Table 3a presents the results pertaining to the residency-based measure and its components. The estimation results indicate that there is persistence in the return of the HSI as the coefficient of the first lag is statistically significant in most cases, and the gross normalised residency-based measure of capital flows does not push up the Hang Seng Index (Model 1, Table 3a). However, among the four components, the portfolio investment is statistically significant. The results highlight the differential impact of different types of capital flows – in the current case, flows into portfolio investment have a positive effect on equity market returns (Model 3, Table 3a). The goodness of fit given by the adjusted R-squared estimate of each regression equation is in the range of 0.02 to 0.05.

[16] In order to obtain flows data, the monetary base and net spot foreign currency position stock series are first-differenced. Then, the GDP normalized currency-based measure series (sum of the two first-differenced components) is tested as stationary.

[17] Definitions of variables used in this sub-section and the rest of the paper are given in Appendix A.

Are the reported capital flow effects spurious? Table 3b presents results from the augmented regression equation that allows for a few control variables:

$$Y_t = \alpha + \beta Y_{t-i} + \theta X_t + \gamma W_t + \phi Z_t + \delta_t M_t + \varepsilon_t, \quad (4)$$

where W_t contains global and regional stock returns, Z_t Hong Kong-related factors, and M_t China-related factors.[18] The returns on the MSCI Global Index, MSCI Asia Pacific Index, and MSCI Asia Pacific (exclude Japan) Index are the proxies of global and regional stock returns. The Hong Kong related factors include real GDP growth, the change in the BoP current account balance and bank loans growth. Two China-related factors are included in our exercise: real GDP growth and net exports via Hong Kong. China's level of net exports via Hong Kong is used as a proxy of China's hot money flows via the trade mis-invoicing channel.[19]

In the presence of these control variables, the portfolio investment flow effects identified in Table 3a remain similar. The Chinese effect on the Hong Kong stock market is illustrated by the two China factors included in the regression. China's real GDP growth and China's net exports (normalised by HK's GDP) via Hong Kong are individually significant. HK real GDP growth is significant but its coefficient is smaller than those of the two significant China factors; that is, the Chinese growth effect dominates the HK output effect on the equity market, and the relative effect could reflect Hong Kong's increasing integration with China. Apparently the marginal contribution of these three variables to the overall goodness of fit of the regression equation is larger than the explanatory power of portfolio flows alone. These results reaffirm the impact of portfolio flows on the HK stock market, and the role of economic factors; and, especially, the importance of the Chinese economy.

The currency-based measure of gross capital flows is evaluated using specifications (3) and (4), and the results are presented in Tables 4a and 4b.[20] Individually, the gross currency-based measure and the net spot foreign exchange position are statistically significant (Table 4a). Their explanatory power,

[18] There is a large literature on the relationship between equity prices and economic fundamentals/policies, such as Galeotti and Schiantarelli (1994), Laopodis (2011), and Campbell et al. (2014).

[19] This is given by the difference between Hong Kong's re-exports of Chinese goods to the rest of the world and Hong Kong's re-exports of goods from the rest of the world to China.

[20] Note that both the currency-based measure after first-differenced and the HSI return are stationary.

given by the adjusted R-squared, is higher than that of the residency-based measures in Table 3a. When foreign investors invest in the local equity market, currency conversion is a crucial step in the fund transfer procedure. Thus, the currency-based measure, compared with the residency-based measure, contains clearer signals in this regard.

Similar to the case of the residency-based data, the net spot FX position is still significant in the presence of the control variables. There is a certain degree of complementarity between the currency-based measure and the control variables; the magnitude of the flow effect is larger in the presence of these control variables (Table 4b). Both China's real GDP growth and net exports via Hong Kong are significant (Models 7 and 8, Table 4b). The effects of the two Chinese variables are similar to those in Table 3b. These variables explain around one third of the variation in the Hang Seng Index. Moreover, the explanatory power of the control variables is, relatively speaking, larger than the currency-based measure of gross capital flows (Models 7 and 8, Table 4b vs. Models 1 and 3, Table 4a).

To investigate the effects of illicit capital flows on Hong Kong's equity market, we employ specification 3 with the illicit flow measures replacing the official flow measures. Table 5a presents the results pertaining to the WBR and TMI measures. The estimation results indicate again that HSI returns are persistent, and the coefficient estimate of the lag return is statistically significant. The unadjusted WBR measure and both the unadjusted and adjusted TMI measures have positive effects on the equity market, pushing up the Hang Seng Index (Models 1, 3 and 4, Table 5a). The marginal contribution of the two TMI measures to the overall goodness of fit of the regression equation is larger than the explanatory power of the unadjusted WBR measure.

In the presence of control variables (specification (4)), the unadjusted WBR and TMI measures retain their statistically significant. The two proxies of China's influences, namely China's real GDP growth and net exports via Hong Kong, are statistically significant (Models 8 and 9, Table 5b). The effects of the two Chinese variables are similar to those in Table 4b. These variables explain around one quarter of the variation in HSI returns. Again, the marginal explanatory power of the significant control variables is larger than the resident-based measure but smaller than the currency-based measure (Models 8 and 9 in Table 5b vs Models 7 and 8 in Table 3b and Models 7 and 8 in Table 4b).

3.2 Residential Property Market

The Hong Kong real estate market is one of the most expensive and least affordable one in the world. The high price and low affordability are usually attributed to overseas demand and speculative forces. In this subsection, we assess the implications of capital flows for the domestic residential property market in Hong Kong. Figures 6 and 7 graph returns on the residential property price index compiled by the Hong Kong Rating and Valuation Department against the normalized residency-based and currency-based capital inflow measures. These two measures do not appear to track variations in the property price index very well.

The stand-alone empirical effect of capital flows is assessed using specification (3) in the previous subsection. To evaluate the robustness of the capital flows effect, we modify specification (4) to:

$$Y_t = \alpha + \beta Y_{t-i} + \theta X_t + \gamma W_t + \phi Z_t + \delta_t M_t + \lambda D_t + \varepsilon_t, \quad (5)$$

where Y_t in the current case is the change in the residential property price index, W_t contains global and regional stock returns, Z_t are Hong Kong-related factors, and M_t are China-related factors, and D_t contains dummy variables that capture the effects of macro-prudential policies designed to cool off the property market.[21] More specifically, D_t includes three dummy variables corresponding to the introduction of the Special Stamp Duty in November 2010; the Buyers' Stamp Duty in October 2012; and the doubling of Ad Valorem Stamp Duties in February 2013.[22]

The results of estimating (3) with the change in the property price index as the left-hand-side variable and the GDP normalized residency-based measure on the right hand side are presented in Table 6a. Compared with the stock index case, the lagged property return variable is significant up to the second lag, and noticeably contributes to the explanatory power of the model, reflected by a higher adjusted R-squared estimate. The real estate market displays a higher level of price inertia than the equity market. It is only the aggregate residency-based capital flow measure that is statistically

[21] There is a large literature on the relationship between house prices and economic fundamentals/policies, such as Leung et al. (2014), Kwan et al. (2015), and Leung and Tang (2015).

[22] Additional information about these measures is provided in the next section and appendices.

significant and none of the four components are significant except other investment at the 10% significant level.

The results from equation (5) reported in Table 6b suggest that the capital flow effect is robust to the inclusion of these control variables and the policy dummies. Both the return on the MSCI Asia Pacific Index (excluding Japan) and HK real GDP growth (at lag 2) are significant. Apparently there is a two-quarter lag on the effect of real GDP growth on residential property prices possibly due to time lags in purchasing a residential property. The policy dummy variables have an insignificant effect on property prices. These additional variables add only marginal explanatory power to the model: the adjusted R-squared estimate increases from 45% (Model 1, Table 6a) to 48% (Model 3, Table 6b).

The currency-based measure and its components have explanatory power for variations in the property price index. These capital flow variables with a one-quarter lag are highly statistically significant in Table 7a, based on specification (3). Similar to our finding for the equity market, the currency-based variable captures the flow effect better than the residency-based one in the case of real estate prices. The regressions that include the control variables show that none of these control variables, including the dummy variables, has an effect on the return of property prices except the return on the MSCI Asia Pacific Index (excluding Japan) at a 10% significant level (Model 3, Table 7b).

The effects of the four measures of illicit capital flows derived from specification (3) are presented in Table 8a. The estimation results indicate that the four illicit measures have no effect on the property market, except the unadjusted WBR measure that has a wrong sign and is significant at the 5% level (Models 1, Table 8a). We do not have a good explanation for why the unadjusted WBR measure has a negative coefficient – perhaps the types of capital flow captured by the WBR measure do not necessarily target the property market.

We introduced a QE dummy for the US QE1 and QE3 periods to assess the effect of capital influx triggered by US quantitative easing. The QE interaction term indicates a significant illicit capital effect on property prices over the QE era. For WBR measures, the effect of the interactive term is significant when the measure is lagged by one quarter. The effect of the interactive term of the adjusted TMI

measure is almost double the effect of the interactive term of the other three illicit capital measures (compare the coefficient of the interactive term in Model 4 with those in Models 1 to 3 in Table 8a).

Under the specification (5) that allows for control variables, the QE interaction terms of the unadjusted WBR measure and the adjusted TMI measure are still statistically significant. Only one control variable (the return on MSCI Asia Pacific Index (excluding Japan)) is statistically significant (Model 3, Table 8b). The effect of the MSCI Asia Pacific Index (excluding Japan) is similar to that in Table 6b.

4. Some Macro-Prudential Policy Measures

In this section, we discuss exchange rate management and housing market management in Hong Kong.

4.1 Exchange Rate Management

For a small open economy without capital controls, global capital flows, especially during crisis periods, can lead to abnormal swings in the exchange rate and create detrimental pressures on the banking sector and the real economy. A case in point is the experience of the Hong Kong dollar during the confidence crisis triggered by talks on the return of Hong Kong to China. To calm market turbulence and restore confidence, Hong Kong instituted the Linked Exchange Rate (LER) System on October 17, 1983. The system in essence operates like a currency board and restricts the variability of the Hong Kong-US dollar exchange rate around the official Linked Rate of 7.8 Hong Kong dollars to one US dollar. Since then, the LER System has been a cornerstone of the Hong Kong monetary policy and has contributed to its stability and smooth operation.

The operation of the LER System has undergone a few modifications since 1983. For instance, in the aftermath of the 1997 financial crisis, seven technical measures were introduced in September 1998 to curb short-selling pressure. Essentially, these seven measures were meant to reinforce Hong Kong's commitment to the currency board arrangement. The weak-side Convertibility Undertaking is defined and the Hong Kong Monetary Authority is obliged to sell US dollar to the banks in exchange

for Hong Kong dollars at the rate of 7.80. The credibility of the weak-side Convertibility Undertaking is buttressed by a healthy level of foreign exchange reserves.

The most recent adjustment to the operation of the LER System was introduced in May 2005 and includes three operational refinements, namely, a) introduce the strong-side Convertibility Undertaking and the Hong Kong Monetary Authority is obliged to buy US dollars from the banks at the rate of 7.75; b) shift the rate used to conduct the weak-side Convertibility Undertaking gradually from 7.80 to 7.85; and c) define the Convertibility Zone between the rates of 7.75 and 7.85 and the Hong Kong Monetary Authority is allowed to conduct open market operations to promote the smooth operation of the LER System. These refinements establish a symmetric intervention band around the Linked Rate of 7.80, and provide explicit information on the extent to which the Hong Kong dollar exchange rate can deviate from it.[23]

Indeed, the strong-side Convertibility Undertaking has been initiated a few times in recent years in response to strong capital flows. In addition to passive buying triggered by the strong-side Convertibility Undertaking, the Hong Kong Monetary Authority bought dollars to reduce inflow pressure within the Convertibility Zone. The interventions conducted by the Hong Kong Monetary Authority in recent years are presented in Figure 8. The frequent and large interventions recorded between 2008 and 2010 mirror the huge increases in the monetary base depicted in Figures 1a and 1b. The most recent round of interventions was associated with the geopolitical fallout in Ukraine and the news about the launch of the Shanghai-Hong Kong Stock Connect program.

In addition to market operations, the Hong Kong Monetary Authority monitors unusual capital movements. For instance, it is believed that Russian corporations, in response to European Union and the US economic sanctions against Russia, diversified their foreign capital away from euro and US dollar assets. Such a move has contributed to the surge of flow into Hong Kong and activated the strong-side Convertibility Undertaking in the second half of 2014.

[23] Interested readers are referred to http://www.hkma.gov.hk/eng/key-information/press-releases/1998/980905.shtml and http://www.hkma.gov.hk/eng/key-information/press-releases/2005/20050518-4.shtml for additional information about the 1998 seven technical measures and the 2005 three refinements.

4.2 Housing Market Management

The 2008 Global Financial Crisis vividly illustrates the damage that a collapse in the real estate market can impose on an economy. In Hong Kong, housing policy is always a contentious socioeconomic issue. High real estate prices create challenges for both corporations and general citizens – housing costs contribute over 30% to the consumer price index, and banks are exposed to considerable mortgage lending risk.

One well-cited housing market risk in Hong Kong is the collapse of the real estate market with over a 50% drop of housing prices in the aftermath of the 1997 Asian Financial Crisis. The incident always serves as a good reminder of the need for prudential management of housing market risks. When Hong Kong is inundated with capital inflows and facing strong upward pressure on its real estate sector, the Hong Kong Monetary Authority customarily reminds individuals and banks about the risk of housing price volatility, and introduces macro-prudential policies to alleviate the possible spillovers into the banking system.

The loan-to-value ratio is a typical policy instrument for managing the credit risk of mortgage lending. A larger ratio implies a higher level of mortgage lending risk faced by banks. A ratio that is too small will curtail banks' mortgage business opportunities. Thus, based on an assessment of the pressure on the property market, and the degree of price misalignment, the loan-to-value ratio can be used to strike a balance between supporting the market and containing the risk.[24] The loan-to-value ratio is quite flexible. For instance, all types of real estate properties could be subject to a common maximum value or to a set of pre-assigned differential values, which can be modified over time.

In recent years, the Hong Kong Monetary Authority has imposed different official caps on the loan-to-value ratio for different types of real estate properties. For instance, for a residential property mortgage loan, the maximum loan-to-value ratio ranges from 30% to 70%. In addition to the value of the residential unit, these official maximum ratios depend on factors that include: whether it is income based or net worth based lending; whether the borrower is an individual or a company; and whether

[24] As noted by the Hong Kong Monetary Authority, its prudential supervisory measures are meant to strengthen risk management practices and the resilience of banks, and are not intended to manage the housing price. Thus, these macro-prudential measures are not included in the empirical exercise in Section 3.

the borrower has outstanding mortgage loans or not. Further, the terms of the mortgage could be restricted by limits on the debt servicing ratio and the loan tenor. Thus, the scope of the apparently simple single instrument based on the loan-to-value ratio is quite wide. Moreover, the policy sets a cap on the loan-to-value ratio while the actual ratio of a mortgage loan is determined by both parties of the mortgage contract.[25]

In view of the perceived pressure of foreign demand on property prices, the government has introduced policies based on stamp duties to arrest the strong rise in housing prices since 2010. The intent of these measures is different from the loan-to-value ratio. They are oriented toward managing demand, especially speculative demand by increasing purchasing and transaction costs and are meant to buy time for the government to increase the supply of land (and hence housing) to restore normal property market conditions.

While the policy based on the loan-to-value ratio can be dated back to 1991, the stamp duty policy has a relatively short history. On November 20, 2010, the Hong Kong government introduced a Special Stamp Duty tax, in addition to the then existing ad valorem property transaction stamp duty, on the resale of a property that is held for less than two years. The Special Stamp Duty rate has a sliding scale: 15% if the property has been held for six months or less; 10% if it has been held for more than six months but for 12 months or less; and 5% if it has been held for more than 12 months but for 24 months or less.

On October 27, 2012, the government raised the Special Stamp Duty rate to the range of 20% to 10% and extended the holding period affected by the increased rate to 3 years. In addition, non-Hong Kong permanent residents have to pay a flat rate 15% Buyer's Stamp Duty on residential properties. The Buyer's Stamp Duty, which is imposed on top of the then existing ad valorem stamp duty and Special Stamp Duty, targets the upward pressure on the property market generated by demand from foreigners and companies.

[25] Table 1A, 1B, 2A, and 2B under http://www.hkma.gov.hk/eng/other-information/pws-faq/banking-stability.shtml give some specifics of the loan-to-value macro-prudential measures.

The latest stamp duty policy was introduced on 23 February 2013. In essence, it doubled the ad valorem stamp duty rates of all types of real estate properties including parking spaces.[26] However, these do not apply to first-time buyers who are Hong Kong permanent residents. In addition to increasing transaction costs, the latest measures attempt to curb potential spillovers of buying pressures from the residential to the non-residential sector. The major macro-prudential measures targeting the property market since 2009 are presented in Appendix B.

4.3 Effectiveness

Are the exchange rate management and housing market management policies in Hong Kong effective?

The LER System was adopted to stabilize the Hong Kong dollar exchange rate during the confidence crisis in 1983. Since then, the Linked Rate of 7.8 has become the anchor of the Hong Kong dollar and survived a few significant crisis periods and speculative attacks. With the Convertibility Undertaking commitment introduced in 2005, the Hong Kong dollar exchange rate has been effectively confined to the range of 7.75 to 7.85 Hong Kong dollars to one US dollar. Despite the occasional complaints about the LER System, the stable exchange rate arrangement is perceived to be a critical element of Hong Kong's monetary regime and financial sector.

There is little doubt that Hong Kong has been managing its exchange rate quite well. The success of the Linked Exchange Rate System is usually attributed to Hong Kong's high level of international reserve holdings, strong fiscal position, and sound economic policy. Obviously, the ability of Hong Kong to defend its currency is underpinned by its international reserves. The fiscal discipline and conservative economic policy help establish confidence in its economic health. Further, with a well-developed and prudentially regulated financial system, Hong Kong is efficient in accommodating, brokering, and intermediating international capital flows. Nevertheless, we should not underestimate the role of macro-prudential policies in striking a balance between the benefits and costs of capital flows.

[26] The new stamp duty for transactions of $2 million or below is 1.5%, instead of HK$100.

Managing the housing market has recently become an important policy issue in Hong Kong. The traditional policy based on loan-to-value ratios is regularly employed to manage the banking sector's exposure to mortgage lending risk. While it does not eliminate a black swan event, the loan-to-value policy in Hong Kong is successful in alleviating the adverse impact of a collapse in the housing price. For instance, with a prudential loan-to-value policy and other policy measures, Hong Kong evaded a banking sector melt-down when it suffered a more than 50% drop in housing prices triggered by the 1997 Asian Financial Crisis.

The effectiveness of the stamp duty policy is illustrated by the empirical results presented in the previous section. Generally, these stamp duty policies have no or a short lived price impact on the property market.[27]

5. Concluding Remarks

Hong Kong is a small economy dependent on international trade and financial activities. Its openness and small size make Hong Kong susceptible to excessive international capital flows. As an international financial centre with limited capital controls, it is imperative for Hong Kong to have a good gauge of cross-border fund movements, and to be prudent in managing the effects of these flows. In this exercise, we study the effects of capital flows on the Hong Kong economy; specifically, we focus on the equity market and the real estate sector. The results of our exercise may serve as a good reference point for economies in the region that are liberalizing their capital accounts.

There are a few main observations from our exercise. First, there is an issue of which measure of capital flows should be considered? There are a few operational measures of capital flows. Some focus on transactions reported in official accounts, and some are designed to reveal capital movements not officially recorded. The alternative measures of official flow have a low degree of correlation. The same is true for illicit capital flow measures considered in our study. Even though Hong Kong is generally viewed as one of the most open economies, it is found that the common measures of official and illicit flows have comparable magnitudes, and have low degrees of correlation.

[27] He (2014) has a similar conclusion about the effect of the loan-to-value policy. However, on the stamp duty policies, the effect appeared to be able to restrain housing price growth in the first few months after introduction.

Second, the different operational measures of capital flows – official and illicit ones – have different implications for the equity market and for the real estate sector. Further, the effects of these capital measures are found to be affected by recent quantitative easing.

Third, the estimated capital effects, in general, are 1) robust to the presence of economic control variables, and 2) weaker than the influences of the selected economic variables.

The current study highlights the complexity of managing capital flows in an open economy. Authorities have to recognize that different types of official and illicit flows could have different impacts on different sectors of their economies. To achieve the desired policy effect, macro-prudential policies, for example, have to be both capital flow and economic sector specific. The real policy formulation process is further complicated by the fact that the differences in market, institutional, and legal environments can alter the implications of capital flow on the economy.

It is of interest to note that, in the case of Hong Kong, the effects of economic variables are usually larger than those of capital flows. It is an encouraging sign if the relative effect is underpinned by the strength of the Hong Kong economy and the effectiveness of its macro-prudential policies. Both an effective governance framework and prudential regulatory environment improve market confidence and reduce exposure to economic and financial risks. In other words, to alleviate the adverse effect of capital flows, it is very important to keep one's house in order, have an efficient market to accommodate capital movements, and introduce pre-emptive macro-prudential policies. Given the anecdotal evidence, Hong Kong has done well in the last few decades in enhancing market efficiency and conducting macro-prudential policies.

Our regression results show that, among the economic and policy variables, China-related variables usually show up as significant in affecting domestic equity prices. China's growth effect, captured by its GDP growth, puts upward pressures on Hong Kong equity market. Our results confirm the growing Chinese influences commonly discussed in the media.

In view of the close economic ties between Hong Kong and Mainland China, and China's expansion into international financial markets, Hong Kong should be conscientious about the capital flows to and from China. Further studies on Hong Kong efforts to monitor its exposure to China and related macro-prudential policies are warranted.

References

Broner, F., T. Didier, A. Erce and S. Schmukler (2013), "Gross Capital Flows: Dynamics and Crises," Journal of Monetary Economics, 60(1): 113-33.

Campbell, J., C. Pflueger, and L. Viceira (2014), "Monetary Policy Drivers of Bond and Equity Risks," NBER Working Papers 20070.

Fernald, J. G. and O. Babson (1999), "Why Has China Survived the Asian Crisis So Well? What Risks Remain?" International Finance Discussion Papers, No.633.

Fratzscher, M. (2012), "Capital Flows, Push versus Pull Factors and the Global Financial Crisis," *Journal of International Economics*, 88: 341-56.

Galeotti, M. and F. Schiantarelli (1994), "Stock Market Volatility and Investment: Do Only Fundamentals Matter?" Economica, 61: 147-65.

Gochoco-Bautista, M. S. and C. Rhee (2013), "Capital Controls: A Pragmatic Proposal," ADB Economics Working Paper Series, No. 337 (February). Manila: Asian Development Bank.

He, D. (2014), "The Effects of Macroprudential Policies on Housing Market Risks: Evidence from Hong Kong," *Banque de France Financial Stability Review* 18: 105-19.

He, D., F. Leung and P. Ng (2009), "A Framework for Monitoring Capital Flows in Hong Kong," Hong Kong Monetary Authority Working Paper 16/2009.

Hong Kong Monetary Authority (2008), "Capital Flows into and out of Hong Kong SAR: Implications for Monetary and Financial Stability," BIS Papers No.44, "Financial Globalization and Emerging Market Capital Flows," Bank for International Settlements, Basel: 207-19.

Hong Kong Monetary Authority (2009), "Half-Yearly Monetary and Financial Stability Report – June 2009," Hong Kong Monetary Authority.

Kar, D. and D. Cartwright-Smith (2009), "Illicit Financial Flows from Developing Countries: 2002-2006," Washington DC: Global Financial Integrity.

Kar, D. and J. Spanjer (2014), "Illicit Financial Flows from Developing Countries: 2003-2012," Washington DC: Global Financial Integrity.

Kim, S. and D. Yang (2008), "The Impact of Capital Inflows on Emerging East Asian Economies: Is Too Much Money Chasing Too Little Good?" Working Paper Series on Regional Economic Integration No.15, Asian Development Bank.

Kwan, Y., C. Leung and J. Dong (2015), "Comparing Comsumption-based Asset Pricing Models: The Case of an Asian City," *Journal of Housing Economics*, 28: 18-41.

Lam, R. (2014), "Assessing Hong Kong's Capital Flow," Hong Kong Economic Monthly (July 2014), Hang Seng Bank.

Laopodis, N. (2011), "Equity Prices and Macroeconomic Fundamentals: International Evidence," *Journal of International Financial Markets, Institutions and Money*, 21: 247-276.

Leung, C., T. Leung and B. Tsang (2014), "Tax-driven Bunching of Housing Market Transactions: The Case of Hong Kong," *International Real Estate Review*, 18: 473-501.

Leung, C. and E. Tang (2015), "Speculating China Economic Growth through Hong Kong? Evidence from the Stock Market IPO and Real Estate Markets," *International Real Estate Review*, 18: 45-87.

Levine, R. and M. Carkovic (1999), "Do Foreign Investment and Portfolio Inflows Accelerate Economic Growth?" Manuscript (December).

Obstfeld, M. (2007), "International Finance and Growth in Developing Countries: What Have We Learned?" Working Paper No.34, Commission on Growth and Development, World Bank, Washington, D. C.

Ostry, J. D., A. Ghosh, K. Habermeier, L. Laeven, M. Chamon, M. Qureshi, and A. Kokenyne (2011), "Managing Capital Inflows: What Tools to Use?" IMF Staff Discussion Note, SND/11/06.

Ostry, J. D., A. Ghosh, K. Habermeier, M. Chamon, M. Qureshi and D. Reinhardt (2010), "Capital Inflows: The Role of Controls," IMF Staff Position Note 10/04.

Reisen, H. and M. Soto (2001), "Which Types of Capital Inflows Foster Developing-Country Growth?" International Finance, 4: 1-14.

The Research Department (2012), "How Do We Monitor Hong Kong Dollar Fund Flows?" HKMA Quarterly Bulletin – December 2012, Hong Kong Monetary Authority: 1- 8.

Tang, M.K. and K. Lau (2014), "Where have the HKD Inflows Gone?" Emerging Markets : EM Macro Daily, Goldman Sachs Global Macro Research.

The Strategy, Policy, and Review Department, IMF (2011), "Recent Experiences in Managing Capital Inflows – Cross-Cutting Themes and Possible Policy Framework," IMF Policy Paper, http://www.imf.org/external/np/pp/eng/2011/021411a.pdf

Tillmann, P. (2013), "Capital Inflows and Asset Prices: Evidence from Emerging Asia," J*ournal of Banking and Finance*, 37: 717-29.

Yiu, M. S., J. Yu and L. Jin (2013), "Detecting Bubbles in Hong Kong Residential Property Market," *Journal of Asian Economics*, 28: 115-24.

Yiu, M. S. and S. Sahminan (2015), "Global Liquidity, Capital Inflows and House Prices in ASEAN Economies," *International Real Estate Research*, forthcoming.

Yu, Y. (2009), The Management of Cross-Border Capital Flows and Macroeconomic Stability in China, Third World Network.

Table 1a. Balance of Payments 2008 – 2014, Percent of GDP

	2008	2009	2010	2011	2012	2013	2014
Current Account Balance	15.0%	9.9%	7.0%	5.6%	1.6%	1.5%	1.9%
Capital transfers	-0.1%	-0.2%	-0.2%	-0.1%	-0.1%	-0.1%	-0.03%
Financial non-reserve assets (net change)	-1.7%	28.4%	-1.4%	-1.3%	6.0%	-1.3%	1.9%
OI assets	23.5%	38.8%	-30.4%	-40.4%	-6.5%	-29.9%	-38.7%
OI liabilities	-17.0%	8.5%	59.7%	38.5%	18.4%	46.5%	42.6%
PI assets	-11.1%	-23.7%	-35.3%	-8.1%	-15.3%	-24.1%	-1.7%
PI liabilities	-5.4%	5.0%	10.4%	7.5%	13.7%	6.0%	8.6%
DI assets	-26.0%	-27.1%	-43.0%	-38.6%	-33.6%	-30.2%	-53.4%
DI liabilities	30.6%	25.4%	36.2%	38.7%	28.5%	27.9%	39.9%
FD assets	31.3%	22.7%	15.7%	18.6%	15.1%	19.9%	19.9%
FD liabilities	-27.6%	-21.2%	-14.7%	-17.5%	-14.4%	-17.3%	-15.3%
Reserve assets (net change)	-13.1%	-36.9%	-3.3%	-4.5%	-9.3%	-2.7%	-6.2%
Net errors and omissions	-0.1%	-1.2%	-2.0%	0.3%	1.7%	2.5%	2.4%

Notes: A positive number indicates inflows (that is, a decrease in assets or an increase in liabilities). “OI,” “PI,” “DI,” and “FD,” denote “other investment,” “portfolio investment,” “direct investment,” and “financial derivatives,” respectively.

Table 1b. Balance of Payments 2013Q1 to 2014Q4, Percent of GDP

	2013Q1	2013Q2	2013Q3	2013Q4	2014Q1	2014Q2	2014Q3	2014Q4
Current Account Balance	-0.3%	-1.0%	1.5%	1.3%	-0.2%	-0.4%	1.8%	0.7%
Capital transfers	-0.01%	-0.01%	-0.1%	-0.004%	-0.003%	-0.01%	-0.002%	-0.02%
Financial non-reserve assets (net change)	0.1%	1.0%	-1.9%	-0.4%	2.8%	0.02%	-0.04%	-0.8%
OI assets	6.0%	-2.6%	-15.0%	-18.3%	-15.1%	-16.6%	-1.0%	-6.0%
OI liabilities	1.4%	7.7%	16.1%	21.2%	21.2%	14.3%	-0.3%	7.4%
PI assets	-5.8%	-1.7%	-7.8%	-8.6%	-0.5%	-4.0%	3.2%	-0.4%
PI liabilities	2.0%	-0.1%	2.0%	2.0%	0.04%	1.6%	7.6%	-0.6%
DI assets	-11.5%	-8.1%	-7.4%	-3.2%	-16.5%	-4.7%	-19.6%	-12.6%
DI liabilities	7.2%	5.3%	9.4%	6.0%	12.8%	8.4%	9.4%	9.3%
FD assets	5.7%	4.3%	4.7%	5.2%	4.0%	5.8%	3.2%	6.9%
FD liabilities	-4.9%	-3.8%	-3.9%	-4.7%	-3.2%	-4.7%	-2.7%	-4.8%
Reserve assets (net change)	-0.8%	-1.2%	1.3%	-2.1%	-1.4%	-0.5%	-3.0%	-1.2%
Net errors and omissions	1.0%	1.2%	-0.9%	1.2%	-1.1%	1.0%	1.3%	1.3%

Notes: A positive number indicates inflows (that is, a decrease in assets or an increase in liabilities). “OI,” “PI,” “DI,” and “FD,” denote “other investment,” “portfolio investment,” “direct investment,” and “financial derivatives,” respectively.

Table 2. Correlations among Various Measures of Capital Flows and their Components

	R-b	DI	PI	FD	OI	C-b	MB	FX P	WBR U	WBR A	TMI U	TMI A
R-b	1.00	0.34	0.57	0.23	0.93	0.14	-0.13	0.25	-0.86	-0.38	0.21	0.23
DI	0.34	1.00	0.11	-0.23	0.13	0.10	0.05	0.09	-0.20	-0.26	-0.15	-0.15
PI	0.57	0.11	1.00	0.02	0.32	0.29	0.02	0.31	-0.33	-0.23	0.17	0.18
FD	0.23	-0.23	0.02	1.00	0.20	-0.26	-0.45	-0.01	-0.23	-0.27	0.20	0.16
OI	0.93	0.13	0.32	0.20	1.00	0.09	-0.12	0.17	-0.89	-0.29	0.22	0.25
C-b	0.14	0.10	0.29	-0.26	0.09	1.00	0.50	0.84	-0.15	-0.06	0.27	0.26
Mb	-0.13	0.05	0.02	-0.45	-0.12	0.50	1.00	-0.05	0.30	0.52	0.08	0.10
FX P	0.25	0.09	0.31	-0.01	0.17	0.84	-0.05	1.00	-0.36	-0.39	0.26	0.23
WBR U	-0.86	-0.20	-0.33	-0.23	-0.89	-0.15	0.30	-0.36	1.00	0.65	-0.19	-0.16
WBR A	-0.38	-0.26	-0.23	-0.27	-0.29	-0.06	0.52	-0.39	0.65	1.00	-0.04	0.00
TMI U	0.21	-0.15	0.17	0.20	0.22	0.27	0.08	0.26	-0.19	-0.04	1.00	0.90
TMI A	0.23	-0.15	0.18	0.16	0.25	0.26	0.10	0.23	-0.16	0.00	0.90	1.00

Notes:
1) “R-b,” “OI,” “PI,” “DI,” “FD,” denote residency-based measure, other investment, portfolio investment, direct investment, and financial derivatives, respectively.
2) “C-b,” “Mb,” “FX P” denote currency-based measure, monetary base, and the net spot foreign exchange position of the banks, and
3) “WBR” and “TMI” refer to the World Bank residual measure and the trade-mis-invoicing measure; the unadjusted and adjusted series are indicated by the label “U” and “A.”

Table 3a. Hang Seng Index (HSI) and Residency-Based Measures of Capital Flows

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.03	2.07	0.75	6.36*	0.79
AR(1)	0.14	0.24**	0.18*	0.17**	0.17*
Residency-based capital flow	0.15				
Direct investment flow		-0.07			
Portfolio flow			0.50**		
Financial derivative flow				1.29	
Other investment flow					0.13
$\overline{R}^2$	0.05	0.02	0.05	0.06	0.03

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 3b. Hang Seng Index (HSI) and the Residency-Based Measures of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	0.84	0.95	0.53	0.41	0.76	0.43	-13.82**	-0.005
AR(1)	0.36	0.42*	-0.07	0.16*	0.19*	0.19*	0.05	0.26**
Portfolio flow	0.47*	0.45*	0.51**	0.39*	0.49**	0.50**	0.41	0.41*
MSCI Global (t-1)	-0.24							
MSCI Asia Pacific Inc JP (t-1)		-0.30						
MSCI Asia Pacific Exc JP (t-1)			0.27					
HK Real GDP				0.50**				
Current Account Balance					0.39			
Hong Kong Bank Loans						0.10		
China Real GDP							6.27**	
China's Net Exports via Hong Kong								-3.90**
$\overline{R}^2$	0.05	0.05	0.05	0.11	0.04	0.04	0.20	0.20

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 4a. Hang Seng Index (HSI) and the Currency-Based Measures of Capital Flows

	Model 1	Model 2	Model 3
Constant	0.06	1.13	1.13
AR(1)	0.22*	0.23*	0.24**
Currency-based capital flow (1st Diff)	0.94***		
Monetary Base (1st Diff)		0.39	
Banks' Net Spot FX Position (1st Diff)			1.10***
$\overline{R}^2$	0.21	0.03	0.22

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 4b. Hang Seng Index (HSI) and Currency-Based Measures of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	1.12	1.13	0.56	0.91	1.12	0.78	-13.64*	0.28
AR(1)	0.23	0.25	-0.34	0.22**	0.23**	0.25**	0.10	0.31***
Banks' Net Spot FX Position (1st Diff)	1.11***	1.10***	1.27***	0.97***	1.15***	1.10***	1.07***	1.04***
MSCI Global (t-1)	0.01							
MSCI Asia Pacific Inc JP (t-1)		-0.01						
MSCI Asia Pacific Exc JP (t-1)			0.61					
HK Real GDP				0.26				
Current Account Balance					-0.44			
Hong Kong Bank Loans						0.11		
China Real GDP							6.29*	
China's Net Exports via Hong Kong								-3.75**
$\overline{R}^2$	0.20	0.20	0.26	0.22	0.20	0.20	0.37	0.35

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 5a. Hang Seng Index (HSI), WBR Measures and TMI Measures

	Model 1	Model 2	Model 3	Model 4
Constant	3.04**	1.77	1.34	1.36
AR(1)	0.29**	0.24**	0.19**	0.16*
WBR Unadj. (t-1)	0.19***			
WBR Adj. (t-1)		0.04		
TMI Unadj. (1st Diff)			0.63**	
TMI Adj. (1st Diff)				0.96**
$\overline{R}^2$	0.07	0.01	0.12	0.10

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 5b. Hang Seng Index (HSI), WBR Measures and TMI Measures with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	2.41*	2.42*	2.45*	2.22	2.32*	2.43	2.87**	-11.99**	1.62
AR(1)	0.24**	0.37**	0.47**	-0.10	0.24**	0.24***	0.21*	0.11	0.31***
WBR Unadj. (t-1)	0.15*	0.15*	0.14*	0.15*	0.16**	0.15*	0.13*	0.16**	0.13*
TMI Unadj. (1st Diff)	0.55**	0.53**	0.54**	0.55**	0.30	0.54*	0.70**	0.46**	0.39*
MSCI Global (t-1)		-0.18							
MSCI Asia Pacific Inc JP (t-1)			-0.30						
MSCI Asia Pacific Exc JP (t-1)				0.35					
HK Real GDP					0.33				
Current Account Balance						0.14			
Hong Kong Bank Loans							-0.20		
China Real GDP								6.20***	
China's Net Exports via Hong Kong									-3.39**
$\overline{R}^2$	0.14	0.12	0.14	0.13	0.13	0.12	0.13	0.28	0.24

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 6a. Property Price Index (PPI) and Residency-Based Measures of Capital Flows

	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	0.97	1.12	1.52	3.16	1.25
AR(1)	0.71***	0.77***	0.78***	0.74***	0.71***
AR(2)	-0.44***	-0.44***	-0.42***	-0.39***	-0.41***
Residency-based capital flow	0.09**				
Direct investment flow		0.12			
Portfolio flow			0.16		
Financial derivative flow				0.36	
Other investment flow					0.10*
$\overline{R}^2$	0.45	0.38	0.40	0.39	0.43

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 6b. Property Price Index (PPI) and Residency-Based Measures of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Constant	1.12	1.11	1.14	0.80	0.97	1.01	0.13	0.94	0.96	1.01	1.09
AR(1)	0.66***	0.64***	0.60***	0.69***	0.69***	0.73***	0.71***	0.71***	0.71***	0.71***	0.71***
AR(2)	-0.40***	-0.38***	-0.32***	-0.41***	-0.40***	-0.43***	-0.42***	-0.44***	-0.44***	-0.44***	-0.44***
Residency-based capital flow	0.07**	0.07**	0.05	0.09**	0.09**	0.10***	0.09**	0.09**	0.09**	0.09**	0.09***
MSCI Global (t-1)	0.07										
MSCI Asia Pacific Inc JP (t-1)		0.10*									
MSCI Asia Pacific Exc JP (t-1)			0.12**								
HK Real GDP (t-2)				0.15**							
Current Account Balance					-0.27						
Hong Kong Bank Loans						-0.05					
China Real GDP							0.35				
China's Net Exports via Hong Kong								-0.07			
SSD (=1 since 2010Q4)									0.04		
BSD (=1 since 2012Q4)										-0.34	
DSD (=1 since 2013Q1)											-0.99
$\overline{R}^2$	0.45	0.47	0.48	0.47	0.44	0.44	0.44	0.44	0.44	0.44	0.44

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 7a. Property Price Index (PPI) and Currency-Based Measures of Capital Flows

	Model 1	Model 2	Model 3
Constant	1.03	1.45	1.46
AR(1)	0.76***	0.75***	0.78***
AR(2)	-0.32***	-0.39***	-0.34***
Currency-based capital flow (t-1) (1st Diff)	0.34***		
Monetary Base (t-1) (1st Diff)		0.28**	
Banks' Net Spot FX Position (t-1) (1st Diff)			0.33***
$\overline{R}^2$	0.49	0.40	0.46

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 7b. Property Price Index (PPI) and Currency-Based Measures of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Constant	1.11	1.10	1.08	1.08	1.04	0.56	-0.76	0.88	0.93	1.01	1.10
AR(1)	0.71***	0.69***	0.64***	0.76***	0.75***	0.72***	0.74***	0.74***	0.76***	0.76***	0.76***
AR(2)	-0.30***	-0.29***	-0.26**	-0.32***	-0.31***	-0.33***	-0.28**	-0.28**	-0.32***	-0.32***	-0.32***
Currency-based capital flow (t-1) (1st Diff)	0.30***	0.28***	0.25**	0.32***	0.33***	0.43***	0.34***	0.36***	0.33***	0.33***	0.34***
MSCI Global (t-1)	0.06										
MSCI Asia Pacific Inc JP (t-1)		0.08									
MSCI Asia Pacific Exc JP (t-1)			0.10*								
HK Real GDP				-0.03							
Current Account Balance					-0.10						
Hong Kong Bank Loans						0.14					
China Real GDP							0.73				
China's Net Exports via Hong Kong								-0.36			
SSD (=1 since 2010Q4)									0.36		
BSD (=1 since 2012Q4)										0.11	
DSD (=1 since 2013Q1)											-0.40
$\overline{R}^2$	0.49	0.50	0.52	0.48	0.48	0.51	0.49	0.49	0.48	0.48	0.48

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 8a. Property Price Index (PPI), WBR Measures and TMI Measures

	Model 1	Model 2	Model 3	Model 4
Constant	0.76	1.19	1.94**	1.87**
AR(1)	0.78***	0.78***	0.68***	0.65***
AR(2)	-0.39***	-0.37***	-0.35***	-0.36***
WBR Unadj. (t-1)	-0.09**			
WBR Unadj. (t-1) * Dummy	0.41***			
WBR Adj. (t-1)		-0.12		
WBR Adj. (t-1) * Dummy		0.44*		
TMI Unadj. (1st Diff)			-0.14	
TMI Unadj. (1st Diff) * Dummy			0.47*	
TMI Adj. (1st Diff)				-0.12
TMI Adj. (1st Diff) * Dummy				0.96***
$\overline{R}^2$	0.46	0.40	0.41	0.46

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Table 8b. Property Price Index (PPI), WBR Measures and TMI Measures with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
Constant	0.86	0.83	0.64	0.93	0.88	0.93	1.34	0.97	0.90	1.02	0.98
AR(1)	0.61***	0.61***	0.62***	0.63***	0.60***	0.65***	0.65***	0.66***	0.65***	0.64***	0.64***
AR(2)	-0.33***	-0.31***	-0.26**	-0.30**	-0.31**	-0.35***	-0.36**	-0.38***	-0.36**	-0.35**	-0.36**
WBR Unadj. (t-1)	-0.09**	-0.08**	-0.07*	-0.10**	-0.10**	-0.09**	-0.10**	-0.09**	-0.09**	-0.09**	-0.09**
WBR Unadj. (t-1) * Dummy	0.34**	0.34**	0.41***	0.30***	0.27**	0.30**	0.29**	0.30**	0.29**	0.29**	0.28*
TMI Adj. (1st Diff)	-0.05	-0.06		0.11	-0.05	-0.07	-0.08	-0.07	-0.08	-0.09	-0.09
TMI Adj. (1st Diff) * Dummy	0.69*	0.64*		0.79**	0.88**	0.88**	0.91**	0.89**	0.89**	0.94**	0.91**
MSCI Global (t-1)	0.08										
MSCI Asia Pacific Inc JP (t-1)		0.09*									
MSCI Asia Pacific Exc JP (t-1)			0.14***								
HK Real GDP				-0.19							
Current Account Balance					-0.34						
Hong Kong Bank Loans						-0.02					
China Real GDP							-0.18				
China's Net Exports via Hong Kong								0.25			
SSD (=1 since 2010Q4)									0.03		
BSD (=1 since 2012Q4)										-0.58	
DSD (=1 since 2013Q1)											-0.32
$\overline{R}^2$	0.52	0.53	0.54	0.54	0.51	0.50	0.50	0.51	0.50	0.51	0.50

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.
*** Significant at 1%; ** significant at 5%; * significant at 10%

Figure 1a. Hong Kong Monetary Base and its Components (1st Diff, Percentage of GDP)

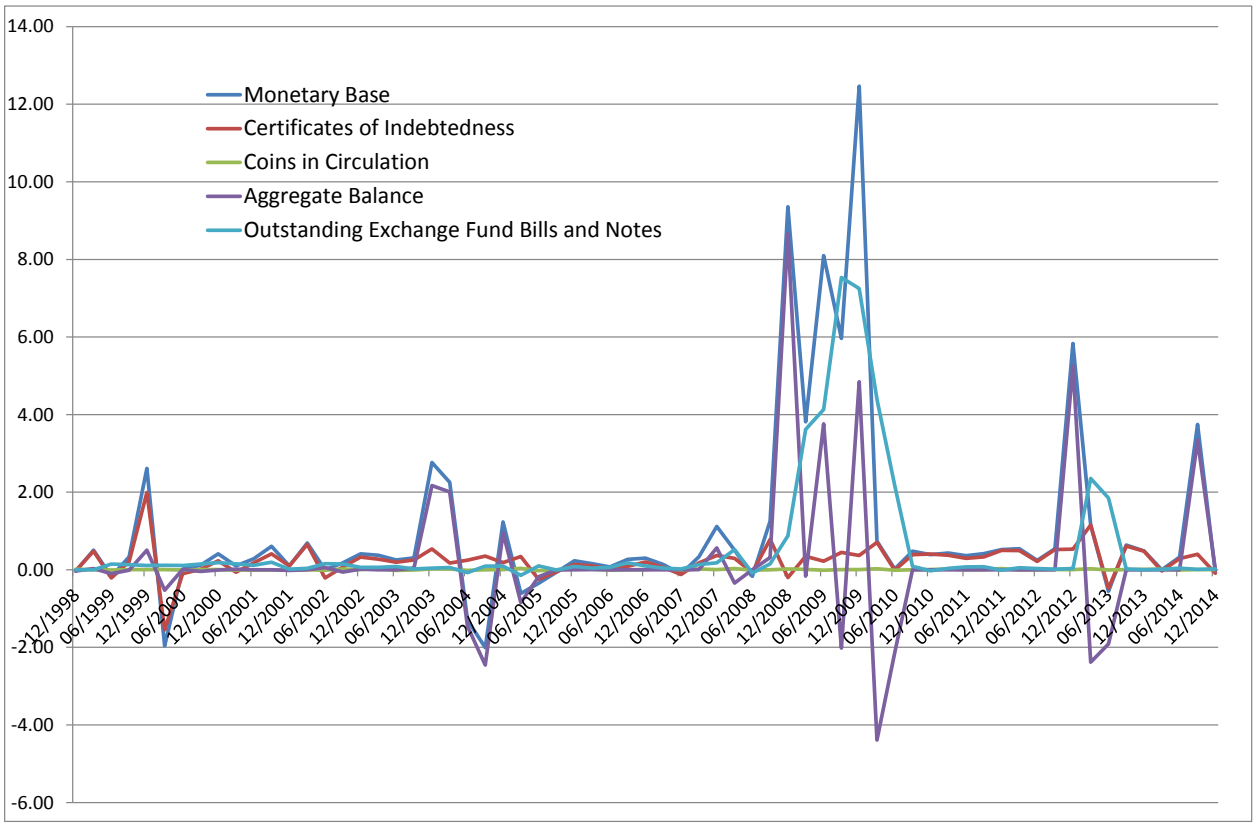


Figure 1b. Monetary Base and Currency-Based Capital Flow Measures (1st Diff, Percentage of GDP)

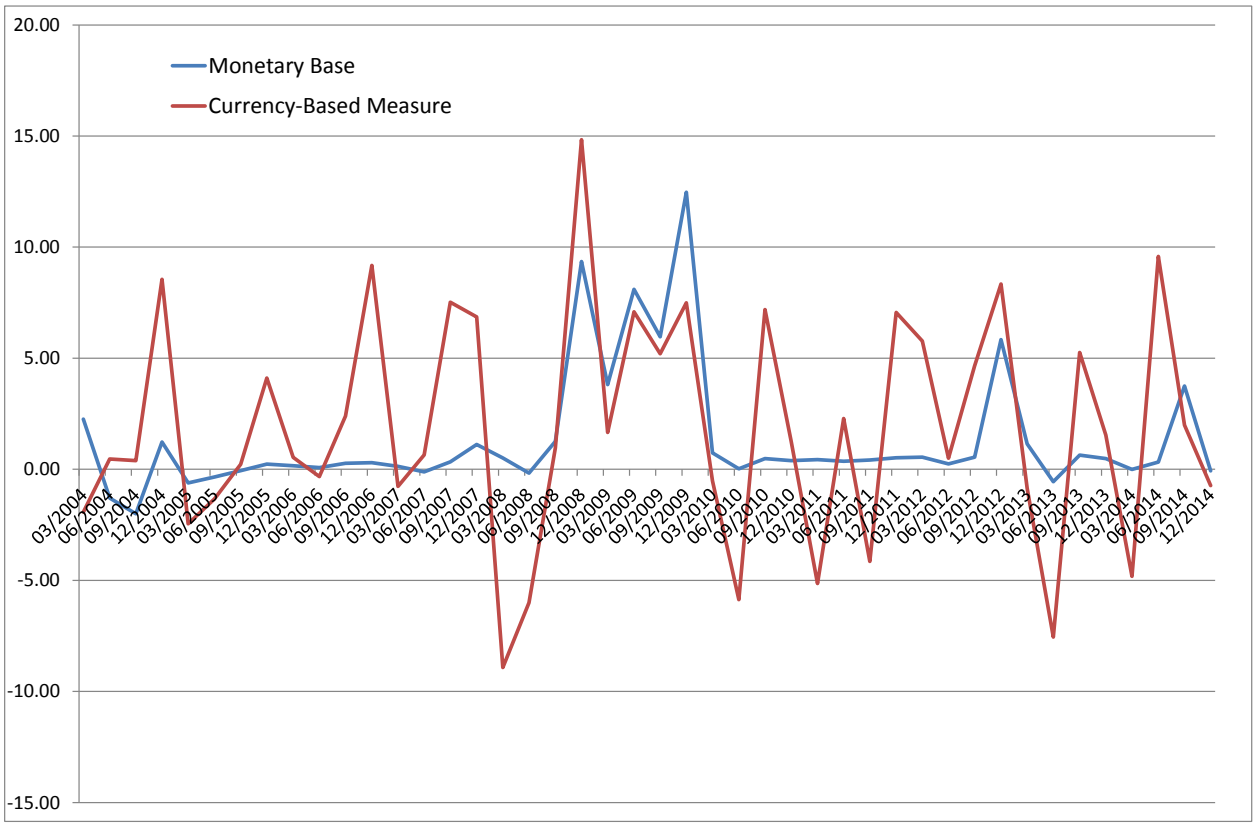


Figure 2. Residency-Based and Currency-Based Capital Flows

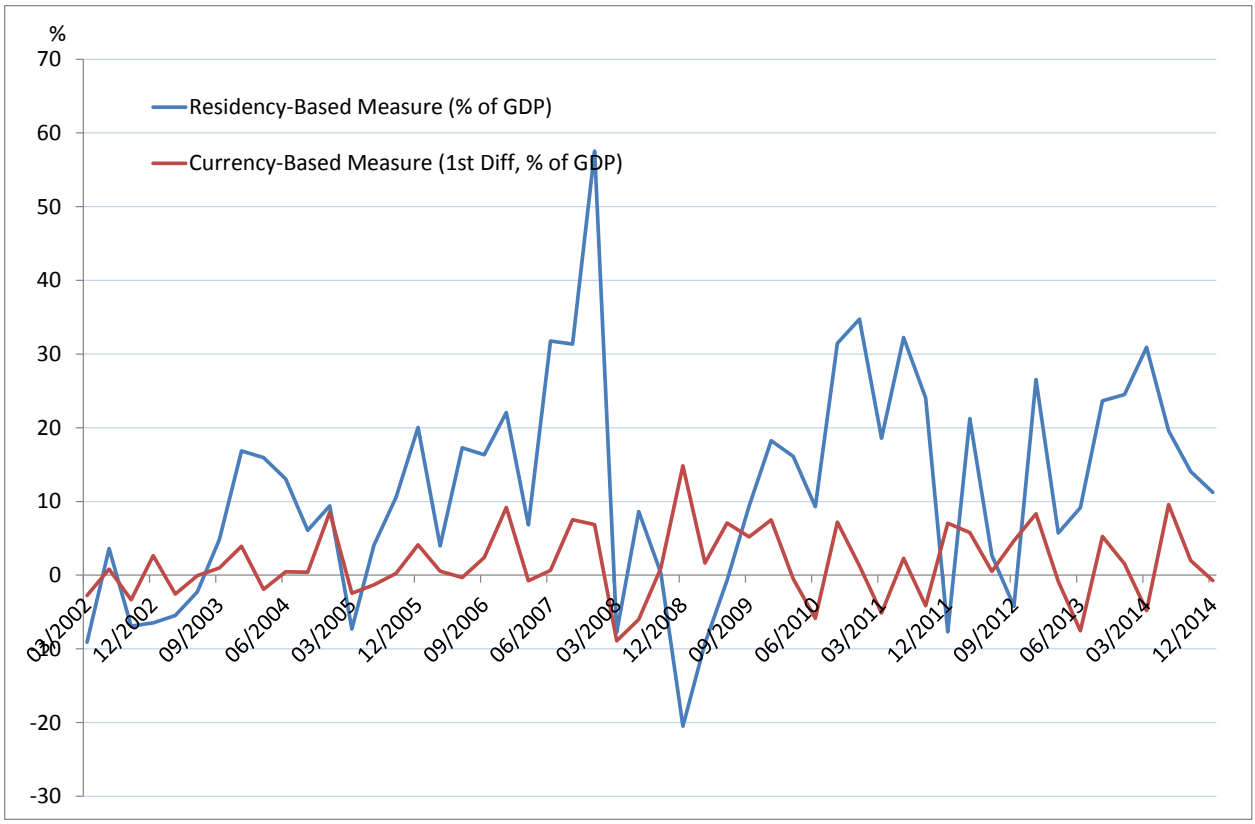


Figure 3a. WBR Measures of Capital Flows

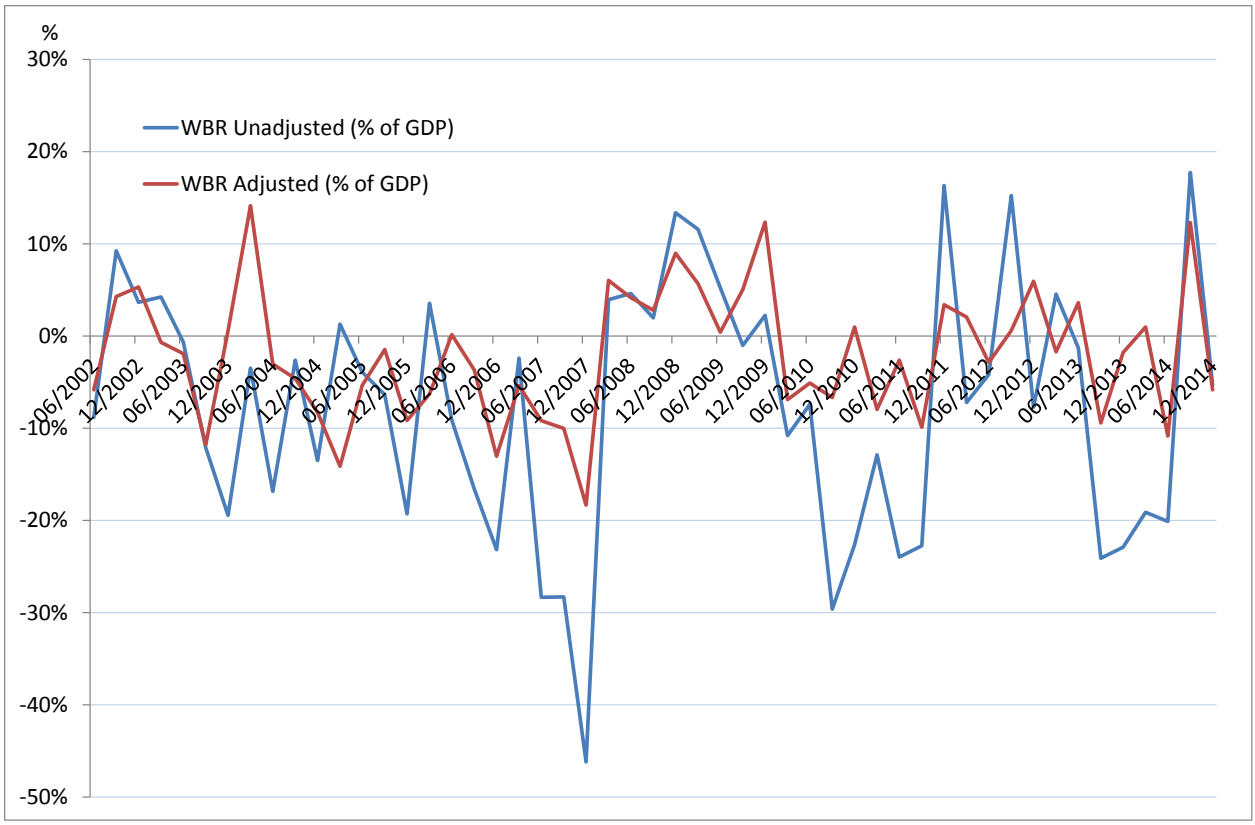


Figure 3b. TMI Measures of Capital Flows

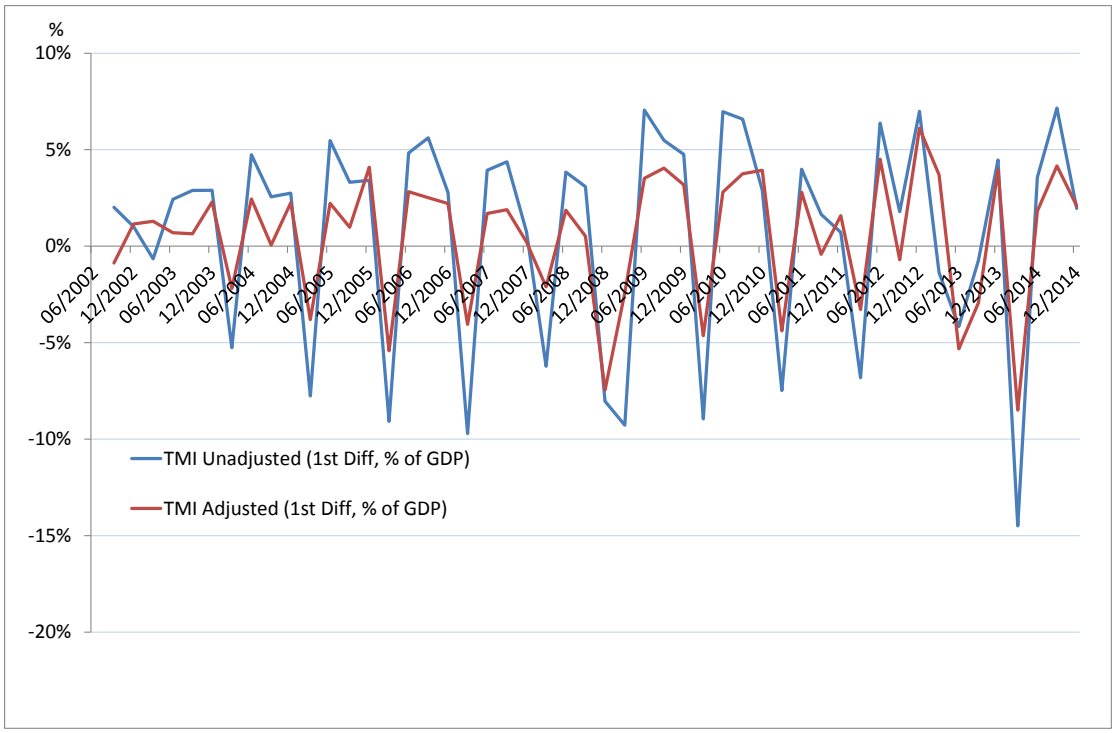


Figure 4. Residency-Based Capital Flows and the Hang Seng Index Return

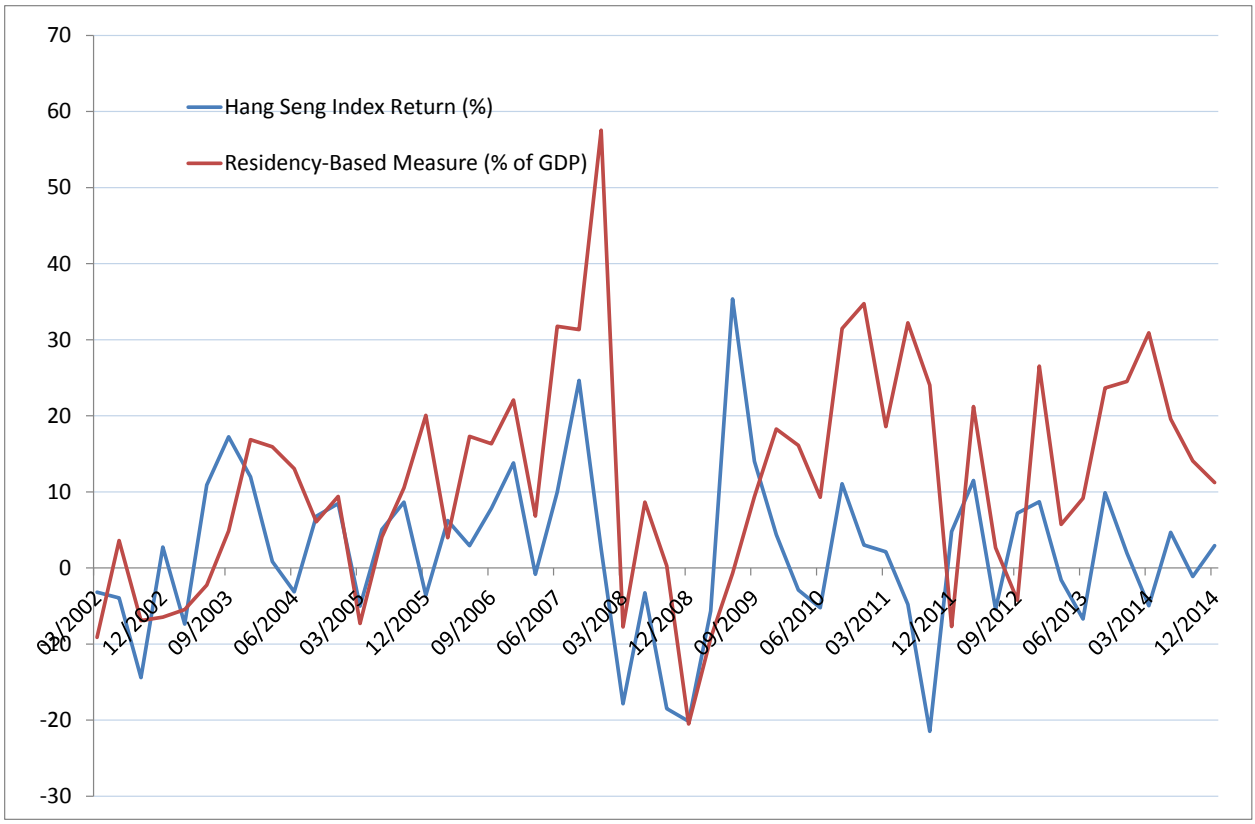


Figure 5. Currency-Based Capital Flows and the Hang Seng Index Return

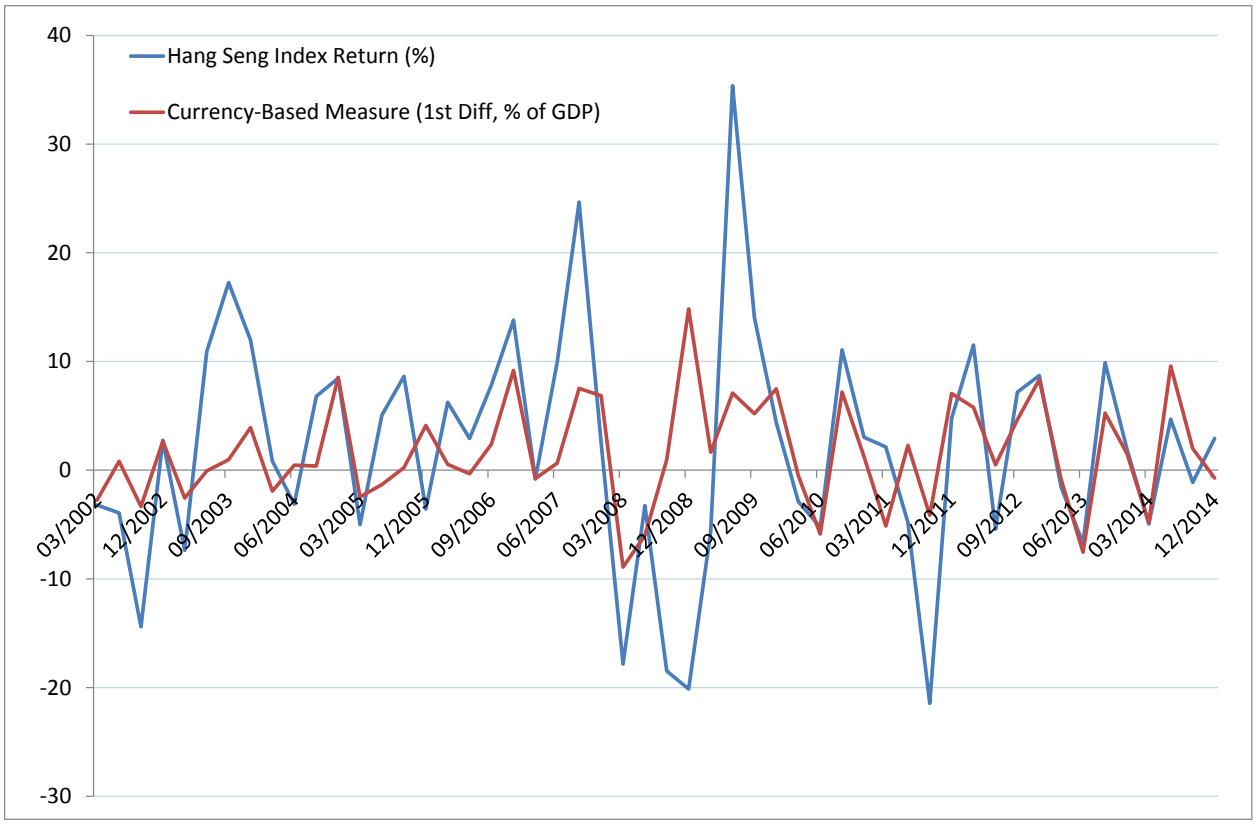


Figure 6. Residency-Based Capital Flows and the Real Estate Price Index Return

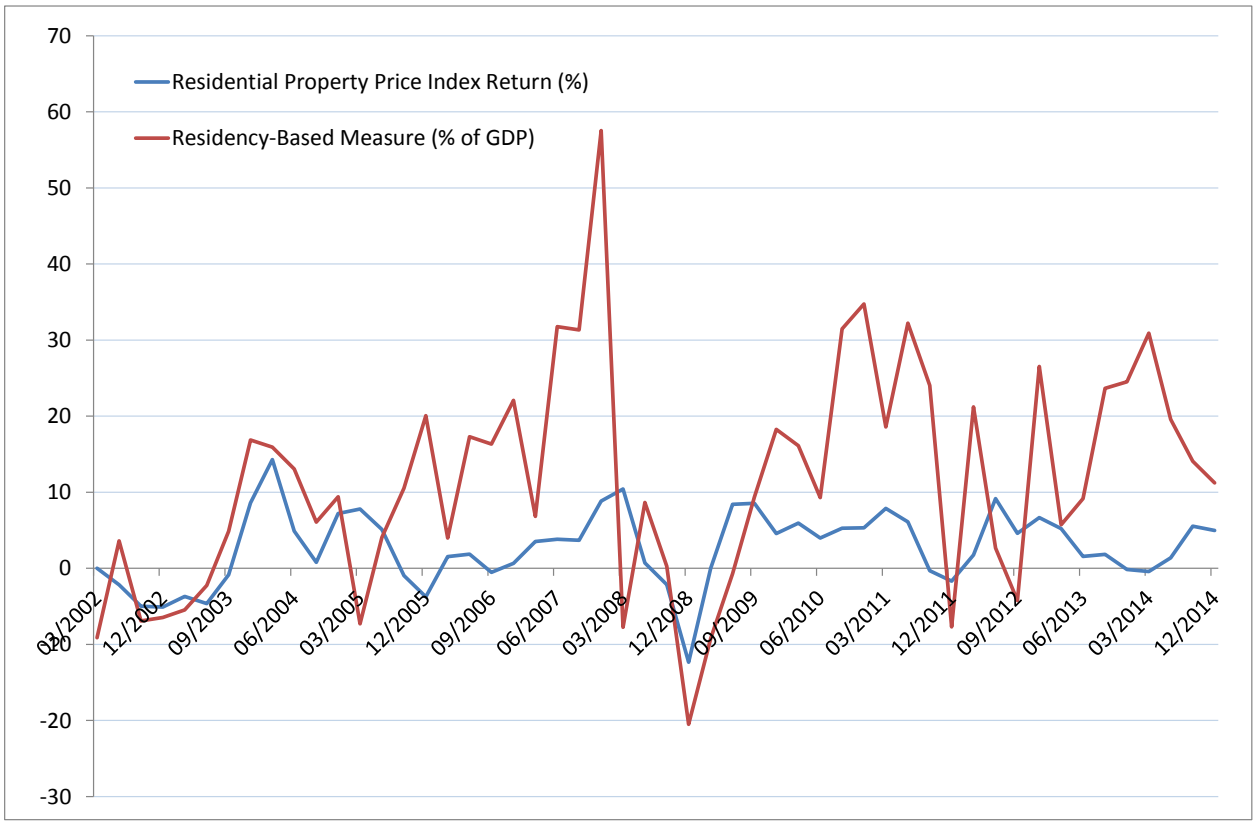


Figure 7. Currency-Based Capital Flows and the Real Estate Price Index Return

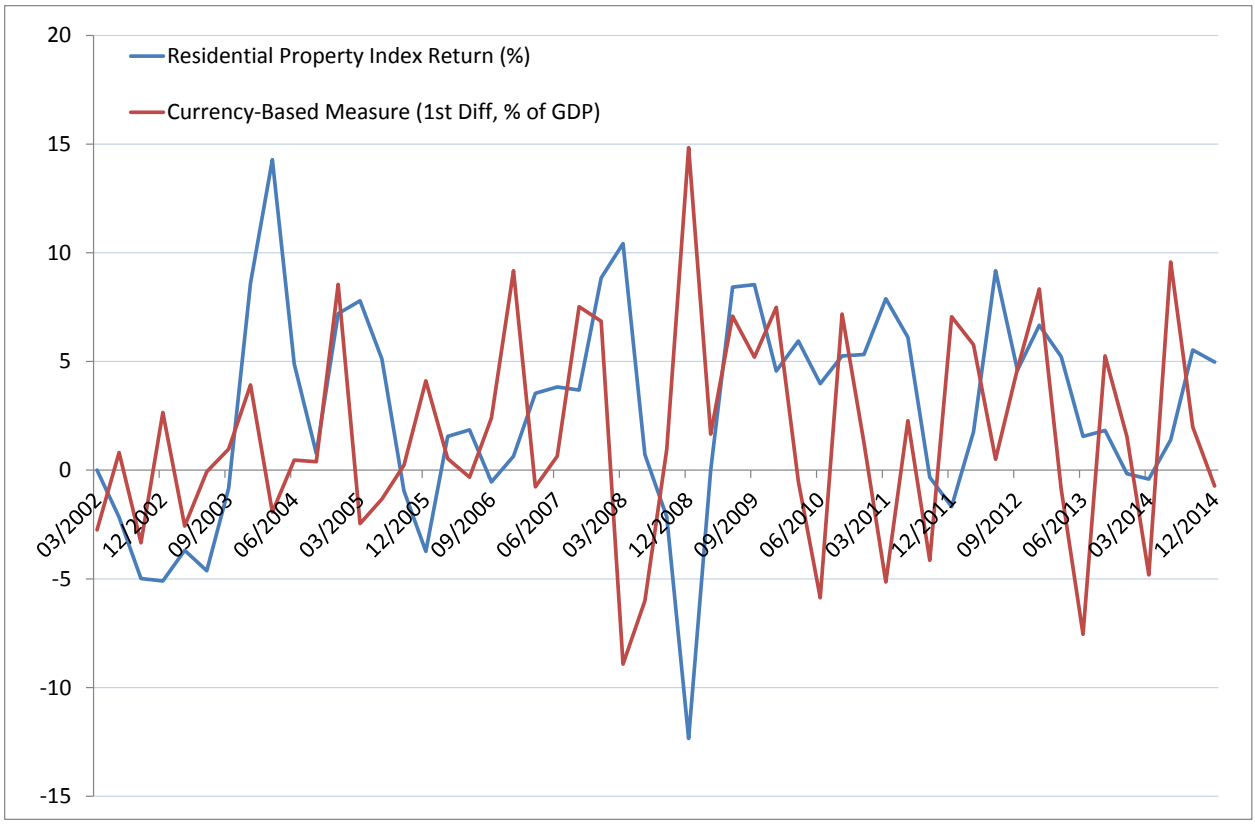
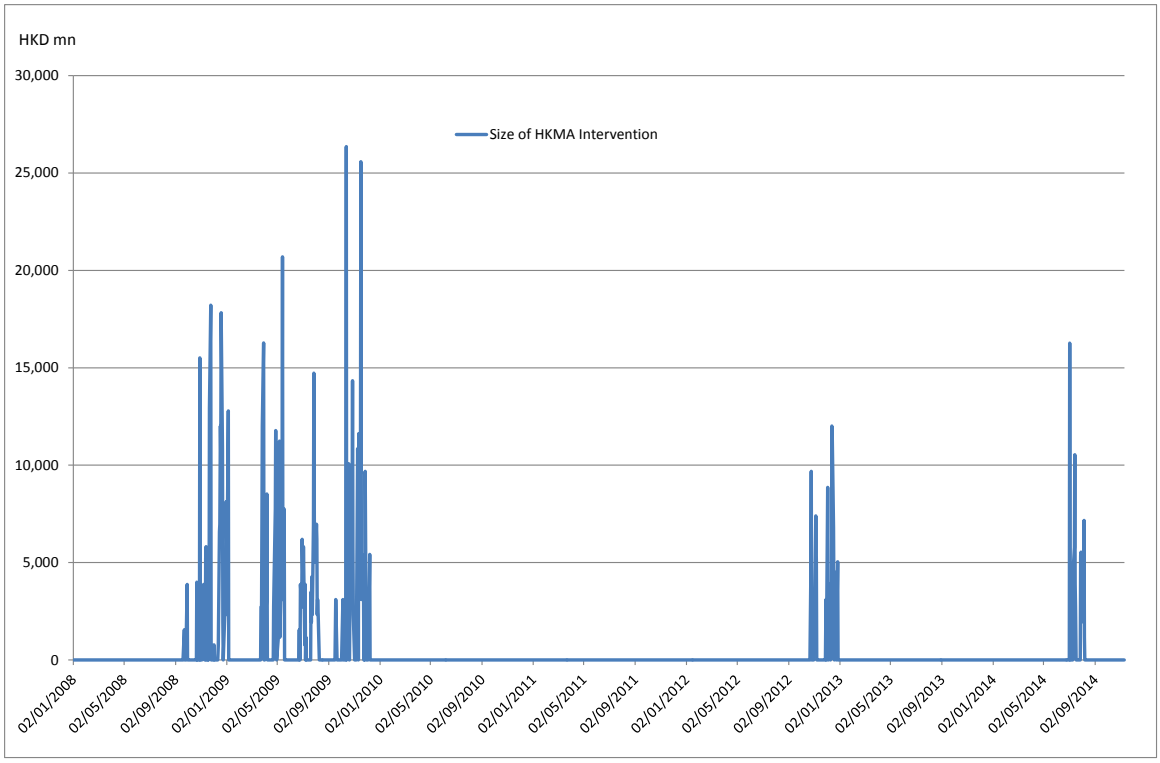


Figure 8. Interventions by the Hong Kong Monetary Authority



Appendix A. Definition of Variables

HSI	Quarter-on-quarter percentage change in the Hang Seng Index (Dependent variable of Table 3a – 5b)
PPI	Quarter-on-quarter percentage change in the Residential Property Price Index: 1999=100 (Dependent variable of Table 6a – 8b)
Residency-based capital inflows	Sum of the liabilities of direct investment, portfolio investment, financial derivatives and other investment in the balance of payments (% of GDP)
Direct investment inflow	Liability of direct investment in the balance of payments (% of GDP)
Portfolio inflow	Liability of portfolio investment in the balance of payments (% of GDP)
Financial derivative inflow	Liability of financial derivative investment in the balance of payments (% of GDP)
Other investment inflow	Liability of other investment in the balance of payments (% of GDP)
Currency-based capital inflows	The sum of Hong Kong monetary base and net spot foreign currency positions of banks in Hong Kong (% of GDP)
Monetary Base	Monetary base of Hong Kong (% of GDP)
Banks' Net Spot FX Position	Net spot foreign currency positions of banks in Hong Kong (% of GDP)
WBR Unadj.	World Bank Residual measure, unadjusted for the short-term deposits and currency in the banking system (% of GDP)
WBR Adj.	World Bank Residual measure, adjusted by subtracting the short-term deposits and currency in the banking system from the external debts (% of GDP)
TMI Unadj.	Trade mis-invoicing measure, unadjusted for re-exports from China to other countries (% of GDP)
TMI Adj.	Trade mis-invoicing measure, adjusted by subtracting re-exports from China to other countries from Hong Kong's export (% of GDP)
MSCI Global	The MSCI Index is a free-float weighted equity index. It was developed with a base value of 100 as of December 31 1987. It includes both emerging and developed world markets. (Quarter-on-quarter percentage change)
MSCI Asia Pacific Exc JP	The MSCI Asia Pacific excluding Japan Index is a free-float weighted equity index. It was developed with a base value of 100 as of December 31 1987. (Quarter-on-quarter percentage change)
MSCI Asia Pacific Inc JP	The MSCI Asia Pacific Index is a free-float weighted equity index. It was developed with a base value of 100 as of December 31 1987. (Quarter-on-quarter percentage change)
HK Real GDP	Hong Kong's real GDP growth rate (Quarter-on-quarter percentage change)
China Real GDP	China's real GDP growth rate (Quarter-on-quarter percentage change)
Current Account Balance	Hong Kong's current account balance (% of GDP)
Hong Kong Bank Loans	Hong Kong dollar and foreign currency loans made by banks in Hong Kong (% of GDP)
China's Net Exports via Hong Kong	It is calculated as Hong Kong's re-exports from China to the rest of the world minus Hong Kong's re-exports to China from rest of the world minus Hong Kong's re-exports from China to China (% of GDP)
SSD	Dummy variable for Special Stamp Duty, with value = 1 since 2010Q4, and = 0 before 2010Q4
BSD	Dummy variable for Buyer's Stamp Duty, with value = 1 since 2012Q4, and = 0 before 2012Q4
DSD	Dummy variable for Double Stamp Duty, with value = 1 since 2013Q1, and = 0 before 2013Q1
Dummy	Dummy variable for QE1 and QE3, with value = 1 for 2008Q4-2009Q4, 2012Q4, 2013Q1; and = 0 for other quarters.

Appendix B. Selected Property Market Macro-Prudential Measures in Hong Kong

The following information is compiled from the Hong Kong Monetary Authority, the Inland Revenue Department of the Government of the Hong Kong Special Administrative Region and Yiu, Yu and Jin (2012).

Prudential measures imposed on property mortgages in October 2009
- A maximum Loan-to-Value (LTV) ratio of 60% to properties with a value at HK$20 million or above.

Stamp duty on the sale of immovable property in Hong Kong in April 2010
- For properties with a value below HK$2 million: HK$100;
- For properties with a value from HK$2 million and below HK$2.35 million, paying HK$100 + 10% of excess over HK$2 million;
- For properties with a value from HK$2.35 million and below HK$3 million, paying 1.5%;
- For properties with a value from HK$3 million and below HK$3.29 million, paying HK$45,000 + 10% of excess over HK$3 million;
- For properties with a value from HK$3.29 million and below HK$4 million, paying 2.25%;
- For properties with a value from HK$4 million and below HK$4.43 million, paying HK$90,000 + 10% of excess over HK$4 million;
- For properties with a value from HK$4.43 million and below HK$6 million, paying 3%;
- For properties with a value from HK$6 million and below HK$6.72 million, paying HK$180,000 + 10% of excess over HK$6 million;
- For properties with a value from HK$6.72 million and below HK$20 million, paying 3.75%;
- For properties with a value from HK$20 million and below HK$21.74 million, paying HK$750,000 + 10% of excess over HK$20 million;
- Increasing the stamp duty rate on transactions of properties valued more than HK$20 million from 3.75% to 4.25%.

Prudential measures imposed on property mortgages in August 2010
- Applying a maximum LTV ratio of 60% to properties with a value at HK$12 million or above;
- For properties valued below HK$12 million, the 70% LTV will continue to apply, but the maximum loan amount is capped at HK$7.2 million;
- Lowering the maximum LTV ratio for properties which are not intended to be occupied by the owners to 60%.
- Standardising the limit on debt servicing ratios (DSRs) of borrowers to 50% and the stressed DSR to 60%.

Prudential measures imposed on property mortgages in November 2010
- Lowering the maximum LTV ratio for properties with a value at HK$12 million or above from 60% to 50%;
- Lowering the maximum LTV ratio for properties with a value at or above HK$8 million and below HK$12 million from 70% to 60%, but the maximum loan amount is capped at HK$6 million;
- Maintaining the maximum LTV ratio for residential properties with a value below HK$8 million at 70%, but the maximum loan amount is capped at HK$4.8 million;
- Lowering the maximum LTV ratio for all non-owner-occupied residential properties, properties held by a company and industrial and commercial properties to 50%, regardless of property values.

Special Stamp Duty (SSD) imposed on sale of residential property in Hong Kong in November 2010
- Imposing the SSD for residential property acquired on or after 20 November 2010 and resold with 24 months. The following SSD rates would apply in addition to the ad valorem rates of stamp duty already imposed before: 15% within 6 months, 10% between 6 months to 12 months and 5% between 12 months to 24 months.

Prudential measures imposed on property mortgages in June 2011
- For owner-occupied residential properties with a value at HK$10 million or above, the maximum Loan-to-Value (LTV) ratio shall be 50%;

- For owner-occupied residential properties with a value at HK$7 million or above but below HK$10 million, the maximum LTV ratio shall be 60%, subject to a maximum loan amount of HK$5 million;
- For owner-occupied residential properties with a value below HK$7 million, the maximum LTV ratio shall be 70%, subject to a maximum loan amount of HK$4.2 million.
- Reducing the applicable maximum LTV ratio by 10 percentage points for all property mortgages to borrowers whose income is derived mainly from outside Hong Kong. However, borrowers who can demonstrate having a close connection with Hong Kong (e.g. those who are on secondment by a local employer to work outside Hong Kong with documentary proof provided by the employer or those who have their immediate family members residing in Hong Kong) will not be subject to the LTV reduction; and
- Lowering the maximum LTV ratio for residential and non-residential property mortgage loans based on borrowers' net worth (i.e. net worth-based mortgage loans) from 50% to 40% irrespective of the value of the properties. In view of the difficulties in verifying borrowers' net worth regularly, it is considered prudent to lower the maximum LTV ratio.

Prudential measures imposed on property mortgages in September 2012[28]

- For mortgage loans mortgage loans assessed based on the debt servicing ability of mortgage applicant, the maximum debt servicing ratio (DSR) shall be lowered from 50% to 40%. Accordingly, the maximum stressed DSR shall also be lowered from the current 60% to 50%.
- For mortgage loan assessed based on the net worth of mortgage applicant, the maximum loan-to-value ratio (LTV) shall be lowered from 40% to 30%.
- For mortgage applicants whose principal income is derived from outside Hong Kong, the applicable maximum LTV shall be lowered by 20 percentage points, instead of 10 percentage point.
- The maximum loan tenor of all new property mortgage loans is limited to 30 years.

Special Stamp Duty (SSD) and Buyers' Stamp Duty (BSD) on acquisition of residential properties or resale of residential properties in October 2012

- SSD of 20 percent if the residential property has been held for six months or less.
- SSD of 15 percent if the residential property has been held for more than six months but for 12 months or less.
- SSD of 10 percent if the residential property has been held for more than 12 months but for 36 months.
- BSD of 15 percent for all residential properties, on top of the existing ad valorem stamp duty and SSD, if applicable, except for Hong Kong permanent resident.

Ad Valoren Stamp Duty on acquisition of residential properties and non-residential properties in February 2013

- Doubling across the board the rates of existing ad valorem stamp duty applicable to both residential and non-residential properties.
- Stamp duty of 1.5% if transactions valued HK$2 million.
- Exemption applied to HK permanent residents who are not beneficial owners of any other residential property in Hong Kong at the time of acquisition of a residential property.
- Standardisation of the stamp duty regime for both residential and non-residential property transactions.

Prudential measures imposed on property mortgages in February 2013

- In stress-testing mortgage applicants' repayment ability, banks are now required to assume a mortgage rate increase of 3%, applying to all mortgage loans for residential, commercial and industrial properties.
- The maximum LTV ratios of mortgage loans for all commercial and industrial properties is lowered by 10%.
- The maximum LTV ratio of mortgage loans for standalone car park spaces is set at 40% and the maximum loan tenor at 15 years.

[28] The measures in relation to DSR and LTV mentioned in the first three bullets are applicable only to property mortgage loan applicants who have already borrowed or guaranteed outstanding property mortgage loans for one or more properties at the time of a mortgage loan application. The measure listed in the last bullet is however applicable to all property mortgage loan applicants. For the third bullet, this requirement can be exempted if the applicants can demonstrate that they have a close connection with HK.