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Effects of Capital Flow on the Equity and Housing Markets in Hong Kong

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Abstract

The revival of strong capital flows to emerging economies following the Global Financial Crisis in 2008-09 has rekindled the debate on effects of excessive capital inflows. We study the 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. It is found that the official and illicit capital flow measures display a low level of comovement and exhibit differential effects on Hong Kong's equity and residential housing markets. The results highlight the complexity of managing capital flows, and the relevance of sector-specific capital management policies.

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1. Introduction

The 2008-9 global financial crisis (GFC) led to severe economic stresses around the world. In response, a few advanced countries including the US introduced accommodative monetary policies, dubbed quantitative easing (QE), to stimulate domestic demand and revitalise their impaired financial markets. However, the QE programs raised concerns about overabundance of global liquidity. It is estimated that, from early 2009 to early 2013, the central banks in the US, UK and Japan generated liquidity of US\$3.95 trillion.¹ The excess liquidity triggered 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.²

The surge in global liquidity, and the related excess capital flows after the GFC, rekindled the debate on the adverse capital flow effect on emerging markets.³ Capital inflows usually help deepen and broaden financial markets and provide additional funds for the economy. However, policymakers in emerging Asian economies are extremely concerned about the economic threats caused by unchecked and excessive capital flows that undermine the structural integrity and medium to long-term economic prospects of their economies. These threats are not only triggered by QE, but also by a reversal and withdrawal of such policy. The potential danger of the tapering policy is clearly illustrated by volatile responses of emerging markets to rumours and discussions in mid-2013 about the possibility of the US Fed to scale down its QE policy.

Studies on capital flows cover a range of issues including their determinants, benefits and costs. Some studies investigate what and how policies should be adopted to manage effects of capital flow. It is generally agreed that the effect on economic performance depends on both the nature of the capital flow and the economic and institutional environment of the recipient economy. Furthermore, capital flows can have non-negligible effects on monetary and financial stability and the real economy. Empirical studies, however, yield inconclusive evidence on the net benefits of capital flows; see, for example, Obstfeld (1998), Levine and Carkovic (1999), Edwards (2001), Reisen and Soto (2001), Berument and Dincer (2004), and Obstfeld (2007).

Capital controls of different forms have been imposed by different countries to curb capital flows and, hence, their adverse effects. In general, researchers affirm that capital controls associated with market interventions cause capital misallocation and inefficient use of resources, which has severe costs in terms of long-term growth and welfare. Despite this, capital controls are still commonly used in some developing countries. The IMF in the early 2010s modified its policy stance on capital controls. Several IMF studies expound that, under certain conditions, capital control measures and macro-prudential policies provide protection against macroeconomic and financial instabilities (Ostry et al., 2010, 2011; The Strategy, Policy and Review Department, IMF, 2011).⁴ However, Gochoco-Bautista and Rhee (2013) argue the new IMF framework is hard to implement. In summary, the emerging general

¹ The US, for example, generated US\$2.2 trillion liquidity between March 2009 and April 2013 (Yiu and Sahminan, 2015).

² Aziz and Yarcia (2014) and Cho and Rhee (2013), for example, study the US QE effect on Asian economies.

³ For brevity, capital flows and cross-border capital flows are used interchangeably.

⁴ Fernald and Babson (1999) and Yu (2009), for example, claim capital controls insulated China from adverse global financial volatility effects during crisis periods.

consensus recognises the positive roles of macro-prudential policies and capital controls in managing macroeconomic and financial instability.

Hong Kong provides a good setting for assessing capital flows and their effects on the recipient economy. Its minimal capital controls and large financial sector, one of the largest in the world, mean that it is heavily exposed to international capital flows. In addition, it has adopted the Linked Exchange Rate (LER) system, a modern currency board system that has pegged the Hong Kong dollar to the US dollar for more than thirty years. Limited exchange rate flexibility and free capital mobility mean the effect of capital flow can quickly show up in its monetary system and affect its real economy. Hong Kong must maintain a high level of economic flexibility and adopt appropriate macro policies and suitable macro-prudential measures to mitigate effects of volatile capital movement.⁵

When capital flows into an economy, it will typically increase demand for local currency assets, including bonds, stocks and real estate and push up their prices. In the case of Hong Kong, equity and real estate property are among the most popular asset classes to foreign investors. The Hong Kong stock market is one of the largest in Asia and the world. It also ranks high in global IPO and fundraising activities. The Hong Kong housing market is often deemed speculative and, from time to time, gets into the news for its high real estate prices. The price variations of these two asset classes are commonly attributed to capital inflows. Thus, it is worth investigating capital flow effects on these two markets in Hong Kong.

Under the LER system, Hong Kong avails itself of a timely measure of recorded capital flows, the so-called currency-based (CB) measure, which is based on changes in the monetary base and the net spot foreign currency position of the banking system. The measure emphasises transactions based on currency conversion. The CB measure has been used frequently in empirical studies on effects of capital flow on Hong Kong's real economy and its asset markets.⁶ He *et al.* (2009) and the HKMA Research Department (2012), for example, have expounded the applicability of the CB measure in the case of Hong Kong. Furthermore, during and after the US QE era, the inflows to the Asian region were mainly through the domestic banking systems and, thus, mostly captured by the monetary aggregates and balance sheets of central banks (Chung *et al.*, 2014 and Aziz and Shin, 2015).

He *et al.* (2009) and the HKMA Research Department (2012) note that a measure of capital flows based on Balance of Payments (BoP) statistics has limitations on studying capital flow effects on Hong Kong. For instance, as an international financial centre, offshore loans booked through Hong Kong involve only inflows and outflows of foreign currencies. These transactions are recorded under the BoP statistics but have no implications for the Hong Kong dollar exchange rate. Alternatively, when switching between Hong Kong and foreign currencies involving only residents (or only foreigners) due to, say, portfolio re-balancing, the activity is captured by the currency-based measure but not the BoP statistics. Thus, we consider the CB measure rather than a measure based on BoP statistics.

One limitation of the official CB measure is that, for various reasons, some cross-border transactions are not recorded officially.⁷ While the official balance of errors and

⁵ Darbar and Wu (2015) study the macro-prudential policy of five economies, including Hong Kong.

⁶ The CB measure is also quite commonly used by practitioners (Lam, 2014; Tang and Lau, 2014).

⁷ In this 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.

omissions captures discrepancies in officially recorded fund movements, other measures are perceived to offer better gauges of cross-border illicit flows. A commonly used measure of illicit capital movement is the World Bank Residual (WBR) measure based on BoP data. Conceivably, 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 using the CB measure and the WBR measure. In the next section, we describe, in the context of Hong Kong, the measures of official and illicit capital flows. The effects of capital flow on the two asset markets in the sample period from the first quarter of 2002 to the last quarter of 2015 are examined in Section 3. Section 4 offers some concluding remarks.

2. Measuring Capital Flows

Hong Kong is vigilant about effects of capital flow on its economy. In the mid-1990s, Hong Kong bank regulators were aware of the surge of capital flows into emerging markets and the associated adverse impacts on the banking system (Carse, 1995). During and after the Asian Financial Crisis, the volatile capital movements and their pressures on recipient economies reminded authorities of the importance and the challenge of the surveillance of capital flows (Yam, 2000). Since the early 2000s, the Hong Kong Monetary Authority has regularly reported capital flows in and out of the Hong Kong economy in its reports, particularly in the Half-Yearly Monetary and Financial Stability Report.

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 the Hong Kong dollar as the target currency; acquiring real estate assets in Hong Kong; and parking money in Hong Kong for future investment in, say, China.⁸

To gauge capital flows in and out of the Hong Kong dollar, we use the CB measure, which is the sum of the monetary base and the net spot foreign currency (FC) position of the banking system. When foreign investors want to hold Hong Kong dollar assets, they will convert their foreign currency deposits into Hong Kong dollar deposits. If there is a net inflow, the net spot FC position of the Hong Kong banking system increases. When Hong Kong banks do not want to increase their net spot FC position, they can sell the foreign currency to the Hong Kong Monetary Authority under the LER arrangement. The action will increase the total Hong Kong dollar liquidity in the Hong Kong banking system and the monetary base. Thus, we can use the CB measure to gauge Hong Kong's capital movement.

The CB measure data used in the subsequent analyses are constructed as follows. The monetary base and net spot FC position stock series are normalised by GDP, and first-differenced. The resulting CB data are stationary. Henceforth, for convenience, we call the resulting CB data series the CB measure.

⁸ 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).

In this study, we use the WBR measure to gauge illicit capital flows in and out of Hong Kong.⁹ The WBR measure has been widely used in studying illicit capital flows. Using information derived from BoP statistics, the 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 WBR measure is given by:

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

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). To align with the CB measure, the WBR in (1) is defined with a minus sign on the right-hand-side of the expression such that a positive value means an inflow. If all transactions are reported appropriately, the double-entry accounting principle should make the sources of funds equal the uses of funds.

Similar to the CB measure, the WBR normalised by GDP and first differenced is used in the following regression exercise. The adjusted WBR series is stationary. For brevity, we hereafter call the adjusted WBR series the WBR measure.

Figure 1 shows the CB and WBR measures. Despite Hong Kong imposing limited restrictions on capital mobility and being one of the most open economies, the WBR measure shows that the magnitude and variability of illicit flows are higher than those of the official CB measure. Further, these two measures do not move in tandem; the estimate of correlation coefficient between CB and WBR measures is -0.33. The sample correlation coefficient suggests that the official and illicit capital flows display different patterns, and capture different facets and types of information of cross-border fund movements.

(Figure 1 about here)

3. Economic Implications

For a small open economy with a fixed exchange rate, massive capital outflow can easily trigger a confidence crisis and economic turmoil, while excessive capital inflow can lead to mis-allocation and an overheated economy. 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 surge in global liquidity and the global low-interest-rate environment, there are, among developing economies, growing concerns about the adverse effects of excessive capital flows. A typical complaint is that abundant capital influx leads to artificially underestimated credit risk and, subsequently, to asset price bubbles. Under the LER System, the domestic asset markets of Hong Kong are susceptible to pressure of excessive capital flow. Nevertheless, with its laissez-faire economic policy stance, Hong Kong is, in general, reluctant to impose capital controls to regulate capital flows.

⁹ Some capital movements not captured by official data in developing countries, and methods to estimate them, are discussed in detail by Kar and Cartwright-Smith (2009) and Kar and Spanjer (2014).

In the next two subsections, we study the effects of capital flows on the equity and real estate markets in Hong Kong.

3.1 Equity Market

The return on the Hang Seng Index (HSI), the CB measure and the WBR series are graphed, respectively, in Figures 2 and 3. Overall, the change in the CB measure tracks the return on the Hang Seng Index better than the WBR measure.

(Figure 2 about here)

(Figure 3 about here)

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

$$Y_t = \alpha + \sum_{j=1}^p \beta_j Y_{t-j} + \sum_{j=0}^q \delta_j X_{t-j} + \gamma W_t + \theta G_t + \lambda D_t + \sum_{j=0}^q \tau_j D_t X_{t-j} + \varepsilon_t, \quad (2)$$

where Y_t is the return on the Hang Seng Index, the lagged dependent variable is included to account for persistence and p is up to 2; X_t is the capital flow measure and q is up to 2; W_t is the VIX reflecting the global financial cycle and is also known as the fear index (Rey, 2013); G_t is the Global Financial Crisis (GFC) dummy; D_t is the US QE dummy; the interaction term $D_t X_t$ is included to allow for different capital flow effects in the QE episode; and ε_t is the regression error term.¹⁰

All the variables used on the right hand side of the equation are tested for endogeneity. For both the equity and housing market cases, the contemporaneous CB measure is the only one that failed the test. Thus, the lagged CB variables are used in the regression exercise and the other variables are in their contemporaneous form.

The results of estimating the effect of capital flows captured by the CB measure are presented in Table 1. The column labelled “Model 1” indicates that the first two lags of the HSI return only explain a relatively small portion of the variation in the return series. Furthermore, the presence of lagged dependent variables renders the estimated residuals display insignificance in serial correlation.¹¹ In Model 2, the overall capital flow effect of the first two lags of the CB measure is statistically significant and improves the explanatory power as indicated by the adjusted R^2 estimates from 0.05 to 0.27. The finding is in accordance with the common wisdom that capital flow impacts the local equity market.¹²

(Table 1 about here)

The results reported under the column labelled Model 3 show that the fear index VIX yields a statistically significant effect at the 1% level. Its inclusion improves the adjusted R^2 estimate by 17% over the 27% of Model 2. It has been shown in many empirical studies that

¹⁰ Definitions of variables used in this sub-section and the rest of the paper are given in the Appendix.

¹¹ The estimated residuals of all model specifications presented in this study pass the serial correlation test.

¹² Note that the CB measure and the return on HSI have a contemporaneous correlation of 0.42, which encores the perceived impact of inflows on equity returns.

the VIX has substantial negative influences on the equity markets of emerging economies; the higher the VIX index (which triggers a risk-off sentiment), the lower equity prices in emerging markets. Nonetheless, the CB measure retains its significance in the presence of the strong VIX effect.

The results, when including the GFC and QE dummy variables, are reported under the heading of Model 4. As expected, the GFC dummy variable exerts a downward pressure on the local stock market, though the QE dummy variable is not significant by itself. However, the interaction term of the QE dummy variable and the second lagged CB is positive and statistically significant; a finding that is in accordance with the conjecture of capital inflows during the QE episode, capital inflows were partly responsible for variations in the Hong Kong equity market. After allowing for these GFC and QE effects, the HSI return is still significantly affected by capital flows captured by the CB measure. Lastly, the inclusion of the GFC dummy variable, and the QE dummy variable and its interaction terms, improves the adjusted R^2 estimate that represents the overall explanatory power of the regression model to 0.50.

In sum, the CB measure, which captures capital flows via currency conversion, has a significant effect on the local equity market, and its effect has been further strengthened by the US QE policy.

Arguably, other economic factors can contribute to variations in equity returns.¹³ To assess the robustness of the capital flow effect in Table 1, we estimate the following augmented specification:

$$Y_t = \alpha + \sum_{j=1}^p \beta_j Y_{t-j} + \sum_{j=0}^q \delta_j X_{t-j} + \gamma W_t + \theta G_t + \lambda D_t + \sum_{j=0}^q \tau_j D_t X_{t-j} + \phi Z_t + \delta M_t + \varepsilon_t, \quad (3)$$

where Z_t includes Hong Kong's real GDP growth and bank loan growth, and M_t comprises China's real GDP growth.^{14,15} The Chinese economic growth is selected to reflect Hong Kong's growing dependence on the Chinese economy and the fact that shares of China-based companies contribute to about half of the value of HSI.

The results of estimating (3) are presented under the columns labelled Models 5 to 7, Table 1. Individually, Hong Kong's real GDP growth and China's real GDP growth yield a positive and significant impact on the HSI return, and improve the adjusted R^2 estimate. The bank loan variable has no significant effect. The finding attests to the relevance of both the local and Chinese economic forces on the Hong Kong equity market. The inclusion of these economic control factors does not qualitatively affect the significance of other explanatory

¹³ Different empirical studies have examined effects of different economic factors on asset prices. For example, see Galeotti and Schiantarelli (1994), Laopodis (2011), and Campbell et al. (2014) for equity prices, and see Leung (2004), Apergis (2003) and Sari et al. (2007) for real estate prices. Some commonly examined macro-determining factors include real growth, interest rate, and trade balance.

¹⁴ Some studies (e.g. Leung et al., 2006), rather than specific economic variables, employ principal components extracted from financial and real variables as economic factors.

¹⁵ Additional economic variables, including the change in the Hong Kong current account balance and China's net exports via Hong Kong (a proxy of China's hot money flows via the trade mis-invoicing channel), were considered in the preliminary stage. These variables turned out to be insignificant and, thus, were not presented for brevity.

variables in the model. Specifically, the CB and its interaction terms display similar significant patterns. In other words, the inclusion of these economic control variables does not materially affect the capital flow effect on HSI returns.

The column labelled Model 8P presents the parsimonious specification that includes significant economic control variables, VIX, the GFC dummy, the CB measure and the QE-CB interaction term. The estimation results affirm the finding that the CB measure, especially during the QE period, has exerted considerable effects on the Hong Kong equity market.¹⁶

To investigate the effects of illicit capital flow on Hong Kong's equity market, we replace the CB measure with the WBR measure in specifications (2) and (3). Note that the contemporaneous WBR measure passes the endogeneity test and, thus, is employed in the regression exercise. Table 2 presents the results pertaining to the WBR measure.

(Table 2 is about here)

The WBR measure is statistically significant at the 5% level, and has a negative effect on the local equity market (Model 2, Table 2). The negative effect is not in line with the usual notion that inflows tend to boost asset prices in the recipient economy. We do not have a good explanation except the observation that illicit flows can be motivated by non-economic reasons. Given the obscureness of their motivations, it is beyond this study to further investigate the negative WBR effect.¹⁷

The inclusion of WBR improves the adjusted R^2 estimate from 0.05 to 0.16; the marginal explanatory power is, however, relatively speaking, smaller than the one recorded for the two CB lagged variables under Model 2, Table 1. The differences in the estimated WBR and CB effects reflects their dis-similar comovement pattern as indicated by their correlation coefficient of -0.33, and the possibility that the two measures are capturing capital flows with different underlying motivations.

The results in Tables 1 and 2 show that replacing the CB measure with the WBR measure does not qualitatively change the estimated effects of other explanatory variables, except the QE and WBR interaction variable, which is insignificant. Specifically, the VIX, GFC, Hong Kong GDP, and China GDP variables retain their similar statistically significant effects on the Hong Kong equity market (Models 3 to 7, and Model 8P, Table 2).

Table 3 presents the estimation results when both the CB and WBR measures are included in the regression. Again, the effects of the VIX, GFC, Hong Kong GDP, and China GDP variables in Table 3 are qualitatively comparable to those in Tables 1 and 2. The effects of the two capital flow measures display some discernible quantitative changes. The coefficient estimates of the CB and WBR variables are usually smaller than the corresponding ones in Tables 1 and 2, and, depending on the specific specification, vary in the level of significance. The signs of these coefficient estimates are, nevertheless, the same as the corresponding one in the previous tables. The parsimonious specification reported under the column Model 5P indicates that the second lagged CB variable, and its interaction term, retain their statistical significance while the WBR measure is only significant at the 13%

¹⁶ All the parsimonious models in this and subsequent tables have the lowest values of AIC and SIC, except this parsimonious model in Table 1. In Model 8P, while the AIC is the lowest among all the eight models, the SIC is higher than that of Model 5.

¹⁷ The investigation is further complicated by the lack of breakdowns of these illicit flows.

level. Nevertheless, comparing with Model 8P in Table 1, the inclusion of the WBR enhances the adjusted R^2 estimate to 0.59 from 0.57. Therefore, despite the WBR being not highly significant, it may still affect the Hong Kong equity market.

(Table 3 about here)

3.2 Residential Property Market

The Hong Kong real estate market is one of the most expensive and least affordable 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 4 and 5, graph respectively, the CB and WBR capital flow measures against returns on the residential property price index (PPI) compiled by the Hong Kong Rating and Valuation Department. The CB measure displays volatility comparable to that of residential property price index returns. The WBR measure, on the other hand, is more volatile than the return on the residential property index.

(Figure 4 about here)

(Figure 5 about here)

The investigation of empirical effects of capital flows on the Hong Kong residential property market is based on specifications (2) and (3).¹⁸ Specifically, the dependent variable is the return on the Hong Kong residential PPI. The CB and WBR measures will be used sequentially as the capital flow variable.¹⁹

The results of estimating the effect of the CB measure on the return on PPI are presented in Table 4. Compared with the stock index HSI, the PPI return variable displays a higher level of persistence but the same lag structure; the first two lags of the return series are statistically significant. After controlling for its own history, the PPI return is still significantly affected by capital flows captured by the first lag of the CB measure (Model 2). Capital inflows put positive pressure on the property market. The positive CB capital flow effect survives the inclusion of other explanatory variables (Models 3 to 7 and Model 8P).

(Table 4 about here)

Among the other explanatory variables, only the VIX and bank loan growth significantly affect PPI returns. The VIX, which is regarded as a global risk factor, has the expected negative effect on real estate prices. The PPI return is positively affected by bank loan growth that reflects monetary conditions. The result is in accordance with the notion that real estate prices are fuelled by easy monetary conditions. The parsimonious specification presented under the column Model 8P shows that 55% of the variation in PPI returns can be explained by the selected variables.

¹⁸ Some studies of Hong Kong house prices including Chang et al. (2013) and Leung and Tang (2015a, b) adopt the VAR framework. This study adopts the regression setting and focuses on the effect of capital flows on asset markets partly because our preliminary analyses revealed no statistically significant impact of lagged PPI returns on capital flow measures.

¹⁹ Similar to the case of HSI regression, at the stage of preliminary analyses we examined various potential determining factors, including variables that represent macro-prudential policies for managing the Hong Kong real estate market. These variables turned out to be insignificant and, thus, were not presented for brevity.

Effects of the WBR measure of illicit capital flows on the residential PPI are presented in Table 5. Similar to the case of HSI (Table 2), the WBR measure garners a negative and significant coefficient estimate, which implies a downward pressure on property prices. By comparing the magnitudes of coefficient estimates and adjusted R^2 estimates reported for Model 2s in Tables 4 and 5, we infer that, relative to the WBR measure, the CB measure has a stronger effect on PPI returns.

(Table 5 about here)

The VIX variable also displays the expected negative effect in the presence of the WBR measure. With the exception of the interaction term of QE and WBR, the PPI return is not affected by other control variables (Models 4 to 7 and Model 8P). The coefficient estimate of the interaction term is significantly positive and is larger than the negative WBR coefficient estimate. The result suggests that, during the QE period, the illicit capital inflow tends to push up property price. The interpretation mirrors concerns raised in the media of the hot money effect on the Hong Kong real estate market. Conceivably, the difference between the effects of the WBR and its interaction terms may be attributed to the different motivations behind illicit flows across QE and non-QE periods that represent different market and policy environments.

Table 6 presents the combined effects of the CB and WBR measures on PPI returns. The estimation results are largely in line with those in Tables 4 and 5: the explanatory variables that are significant in either table are also significant in Table 6. Both the CB and WBR measures are significant. Relatively speaking, the positive effect of the CB measure is larger than the negative effect of the WBR measure. The VIX variable, the proxy of the global risk, is significantly negative. Regarding the GFC dummy, the QE variable and its interaction terms with the CB and WBR measures, only the interaction term with the illicit capital flow is significant with a positive coefficient, that is, the effect of the WBR measure becomes positive during the QE episode. The parsimonious model (Model 5P) includes the banks' loan growth variable in addition to the two capital flow measures, the VIX variable and the QE interaction term. It is noted that the parsimonious model commands an adjusted R^2 estimate larger than the parsimonious models in Tables 4 and 5; indicating that both capital flow measures contain useful information to explain the variability of the return in Hong Kong residential PPI.

(Table 6 about here)

4. 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 that Hong Kong has a good gauge of cross-border fund movements and prudently manages the effects of these flows. In this exercise, we study the effects of capital flow on the Hong Kong economy; specifically, we focus on the two asset markets, namely 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 liberalising their capital accounts.

We can draw a few observations from the exercise. First, an overarching issue is 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 infer capital movements not officially recorded. In our exercise, we used the CB measure, which is based on official records of transactions involving currency conversion and is deemed appropriate for the Hong Kong monetary system. For illicit capital flows, we employed the commonly used WBR measure.

Second, although Hong Kong is one of the most open economies, the measures of official and illicit flows display different patterns and have a low degree of correlation. The different operational measures of capital flows, official and illicit, have different implications for the equity market and the real estate sector. While official and illicit capital measures affect the equity market, the magnitudes of their impacts are not the same. While the official flows positively affect the two markets, the illicit capital flows have negative influence on the equity and property price returns.²⁰ That is, different types of capital flows can have different effects on a market and across markets.

Third, the study highlights the complexity of managing capital flows in an open economy. Authorities must recognise that different types of capital flows can have different impacts on different sectors of their economies. To achieve the desired policy effect, capital management policies, including macro-prudential policies, must be capital-flow-and-economic-sector specific. The policy formulation process is further complicated by a) the classification of capital flows can be more complicated than the dichotomy approach adopted in this exercise, and b) the differences in market, institutional and legal environments can alter the implications of capital flow on the economy. It is of interest to investigate the sources of differential effects exhibited by different capital flows. However, such an exercise is beyond the scope of this study.

Fourth, our empirical findings indicate that the effects of the US QE policy vary across regression specifications. The QE episode can have different implications for the effects of the two types of capital flows on the Hong Kong equity and real estate markets. During the QE episode, the official capital flows have a stronger positive effect while the illicit capital flow turns to a strong positive influence from a negative one in the non-QE period. Another interesting result is the significant impact of the GFC on the local stock market, whereas it has no impact on the local property market.

Lastly, our regression results show the Hong Kong economy is affected by both internal and external economic factors; and the capital flow is not the only or main determining factor. Among these economic control variables, the significant impact of China's growth on the Hong Kong equity market is worth noting. Our results confirm the Chinese influences commonly discussed in the media. Thus, in view of the growing economic ties between Hong Kong and Mainland China, and China's expansion into international financial markets, Hong Kong should be conscientious about China's influences.

²⁰ We do not have convincing explanations for the negative WBR effect, which warrants further investigation.

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Appendix: Definition of Variables

HSI	Quarter-on-quarter percentage change in the Hang Seng Index (Dependent variable of Tables 1 to 3)
PPI	Quarter-on-quarter percentage change in the Residential Property Price Index: 1999=100 (Dependent variable of Tables 4 to 6)
Currency-based capital inflow	The sum of Hong Kong monetary base and net spot foreign currency positions of banks in Hong Kong (% of GDP), first differenced
Monetary Base	Monetary base of Hong Kong (% of GDP)
Banks' Net Spot FC Position	Net spot foreign currency positions of banks in Hong Kong (% of GDP)
WBR inflow	World Bank Residual measure (% of GDP), first differenced
VIX	The CBOE Volatility Index, in log scale and first differenced
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)
Bank Loan Growth	Hong Kong dollar and foreign currency loans made by banks in Hong Kong (quarter-on-quarter percentage change)
GFC	Dummy variable for the Global Financial Crisis episode, with value = 1 from 2007Q4 to 2008Q4
QE	Dummy variable for the QE episode, with value = 1 for 2009Q1-2009Q4, 2010Q4-2011Q2, 2012Q3-2013Q1 and value = 0 for other quarters

Table 1: Hang Seng Index Return and the CB Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8P
Constant	2.00	1.55	1.88	3.32**	1.44	-3.10	3.27***	-4.43
AR(1)	0.24***	0.50***	0.39***	0.38**	0.27**	0.26*	0.36***	0.14
AR(2)	-0.23***	-0.49***	-0.35***	-0.26***	-0.26***	-0.26**	-0.30***	-0.26***
Currency-based measure (t-1)		-0.70**	-0.69***	-0.81***	-0.48*	-0.72***	-0.82***	-0.36
Currency-based measure (t-2)		1.04**	0.72**	0.36	0.53**	0.36	0.46*	0.49*
VIX			-20.14***	-17.43**	-20.31**	-16.72**	-16.36**	-20.98***
GFC				-9.44***	-7.58***	-8.78***	-9.34***	-6.40**
QE				-6.00				
QE* Currency-based measure (t-1)				0.54				
QE* Currency-based measure (t-2)				1.15**	0.59*	0.63	0.66	0.48*
HK Real GDP Growth Rate					0.53***			0.52**
China Real GDP Growth Rate						2.62**		2.58**
Bank Loan Growth							-0.12	
\bar{R}^2	0.05	0.27	0.44	0.50	0.56	0.52	0.49	0.57
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed	passed	passed	passed

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 2: Hang Seng Index Return and the WBR Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8P
Constant	2.00	1.97	1.85	2.64**	1.78	-6.19	2.49**	-6.86*
AR(1)	0.24**	0.18	0.13	0.11	0.06	-0.01	0.12	-0.05
AR(2)	-0.23**	-0.14	-0.10	-0.09	-0.05	-0.09	-0.10	-0.04
WBR measure		-0.23***	-0.16**	-0.14**	-0.12*	-0.16**	-0.14**	-0.13**
VIX			-21.28***	-18.71**	-22.94***	-17.41**	18.91***	-21.76***
GFC				-8.64***	-7.64*	-8.06***	-8.53***	-7.09*
QE				0.21				
QE* WBR measure				-0.06				
HK Real GDP Growth Rate					0.59***			0.60***
China Real GDP Growth Rate						3.86**		3.76**
Bank Loan Growth							0.06	
\bar{R}^2	0.05	0.16	0.35	0.37	0.48	0.45	0.38	0.53
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed	passed	passed	passed

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 3: Hang Seng Index Return, the WBR Measure and the CB Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5P
Constant	2.00	1.31	1.72	3.16**	-5.06*
AR(1)	0.24**	0.40***	0.35***	0.32**	0.12
AR(2)	-0.23**	-0.42***	-0.31**	-0.20	-0.19*
WBR measure		-0.14*	-0.08	-0.06	-0.10
Currency-based measure (t-1)		-0.48	-0.56**	-0.69**	-0.31
Currency-based measure (t-2)		0.95**	0.69	0.28	0.43*
VIX			-18.88**	-17.03*	-18.66**
GFC				-9.18***	-6.85***
QE				-6.03	
QE* WBR measure				-0.12	
QE* Currency-based measure (t-1)				0.50	
QE* Currency-based measure (t-2)				1.25**	0.57*
HK Real GDP Growth Rate					0.53***
China Real GDP Growth Rate					2.77**
\bar{R}^2	0.05	0.30	0.44	0.49	0.59
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed

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 4: Property Price Index Return and the CB Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8P
Constant	1.72**	0.98	0.87	0.87	0.92	-0.78	0.40	0.40
AR(1)	0.77***	0.77***	0.75***	0.73***	0.75***	0.73***	0.71***	0.71***
AR(2)	-0.41***	-0.34***	-0.29***	-0.27**	-0.29**	-0.25**	-0.29***	-0.29***
Currency-based measure (t-1)		0.30***	0.30***	0.32***	0.29***	0.28***	0.39***	0.39***
VIX			-5.04*	-4.96*	-4.90*	-4.85*	-5.31*	-5.31*
GFC				-0.46				
QE				0.64				
QE* Currency-based measure (t-1)				-0.12				
HK Real GDP Growth Rate					0.03			
China Real GDP Growth Rate						0.69		
Bank Loan Growth							0.15**	0.15**
\bar{R}^2	0.39	0.47	0.52	0.49	0.51	0.52	0.55	0.55
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed	passed	passed	passed

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 5: Property Price Index Return and the WBR Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8P
Constant	1.72**	1.87***	1.64	1.44**	1.60**	0.15	1.56	1.54**
AR(1)	0.77***	0.75***	0.74***	0.80***	0.81***	0.79***	0.75***	0.81***
AR(2)	-0.41***	-0.40***	-0.33***	-0.36***	-0.34***	-0.33***	-0.31***	-0.36***
WBR measure		-0.04*	-0.06**	-0.09**	-0.09***	-0.09***	-0.08**	-0.09**
VIX			-6.03*	-7.09**	-7.13**	-7.10**	-6.49**	-7.44**
GFC				0.17				
QE				0.64				
QE* WBR measure				0.23***	0.23***	0.22***	0.18**	0.23***
HK Real GDP Growth Rate					-0.10			
China Real GDP Growth Rate						0.58		
Bank Loan Growth							-0.19	
\bar{R}^2	0.39	0.39	0.45	0.49	0.52	0.51	0.48	0.51
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed	passed	passed	passed

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%

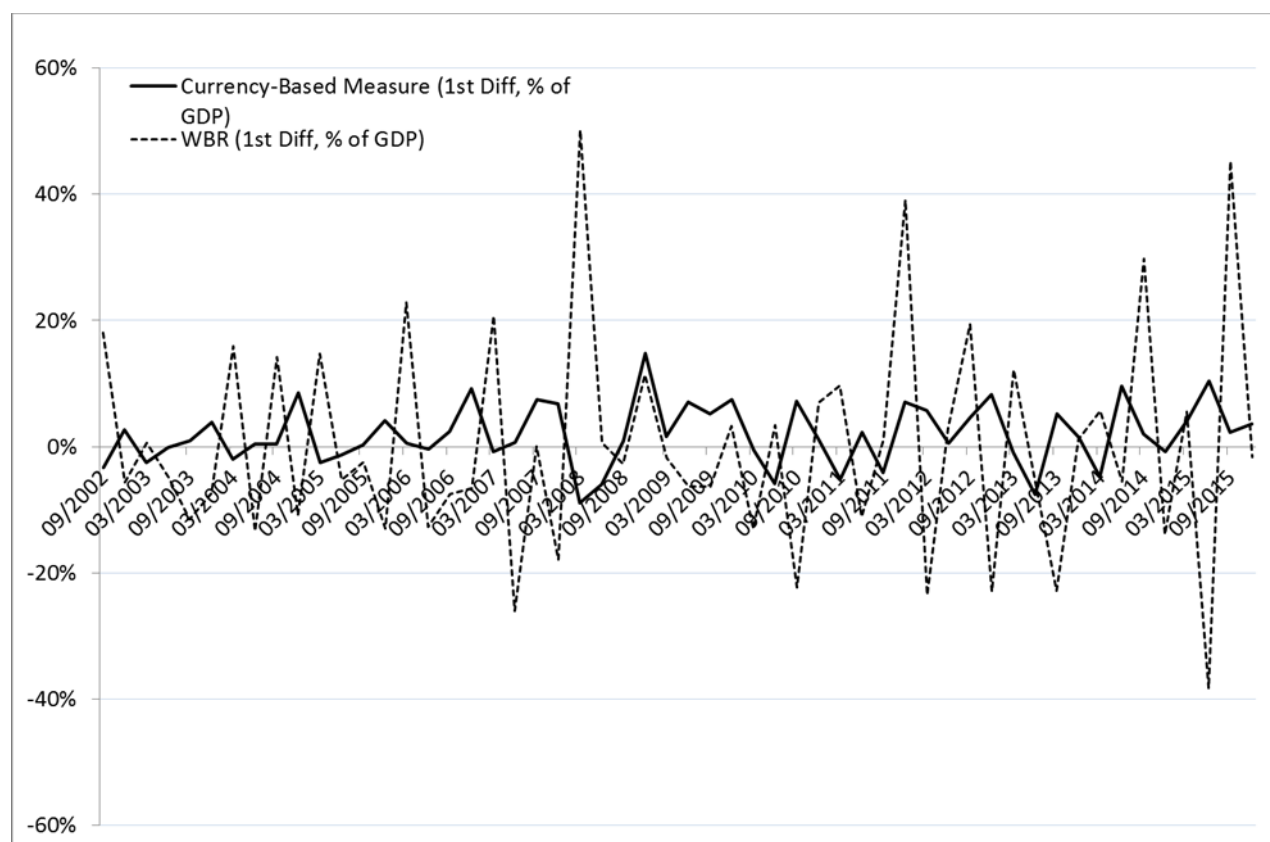
Table 6: Property Price Index Return, the WBR Measure and the CB Measure of Capital Flows with Control Variables

	Model 1	Model 2	Model 3	Model 4	Model 5P
Constant	1.72**	1.18*	1.74	0.96	0.51
AR(1)	0.77***	0.75***	0.58***	0.86***	0.78***
AR(2)	-0.41***	-0.34***	-0.29***	-0.35***	-0.32***
WBR measure		-0.014	-0.04	-0.07**	-0.06**
Currency-based measure (t-1)		0.28***	0.25***	0.21**	0.33***
VIX			-5.47*	-7.05**	-7.17***
GFC				0.18	
QE				-0.90	
QE* WBR measure				0.25***	0.21***
QE* Currency-based measure (t-1)				0.17	
HK Real GDP Growth Rate					
China Real GDP Growth Rate					
Bank Loan Growth					0.12**
\overline{R}^2	0.39	0.45	0.51	0.54	0.58
Residual Test: Q-Stat. upto lag 12	passed	passed	passed	passed	passed

Note: All estimations are adjusted for heteroskedasticity and autocorrelation using the Newey-West HAC Standard Errors and Covariance.

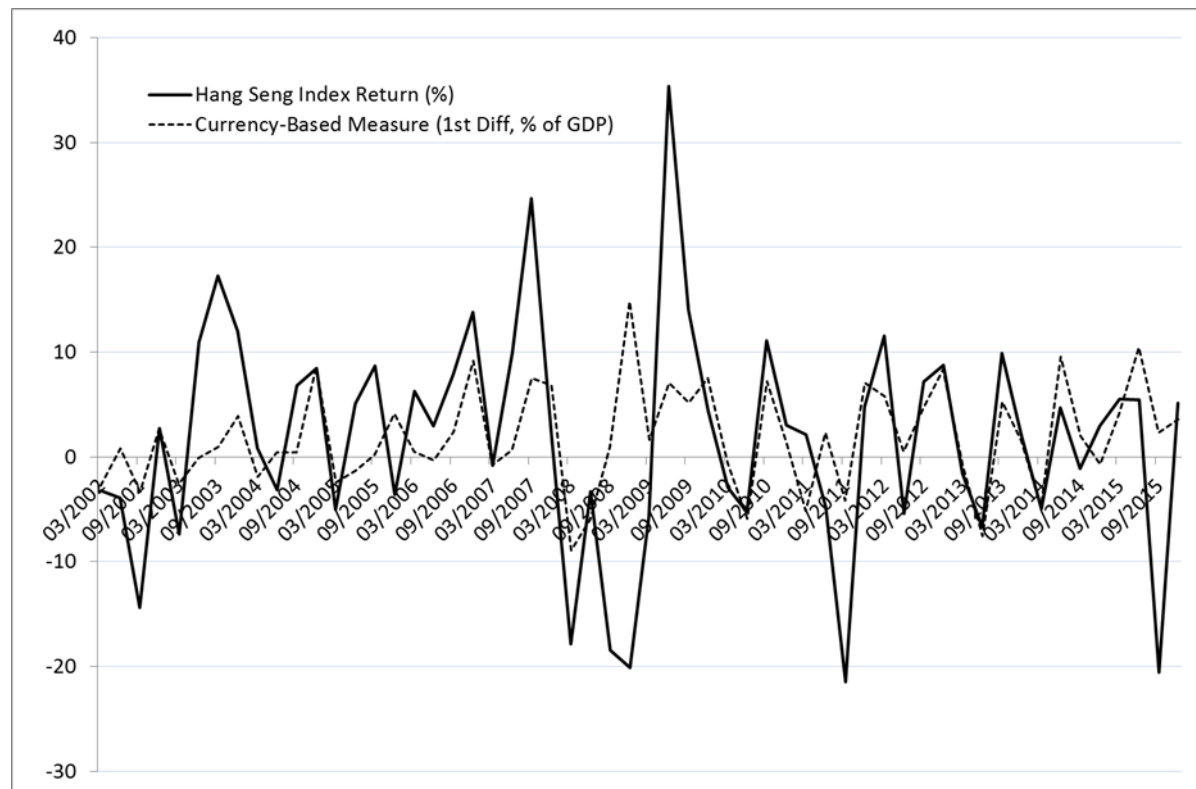
*** Significant at 1%; ** significant at 5%; * significant at 10%

Figure 1: The Currency-Based Measure and the WBR measure of Capital Flows



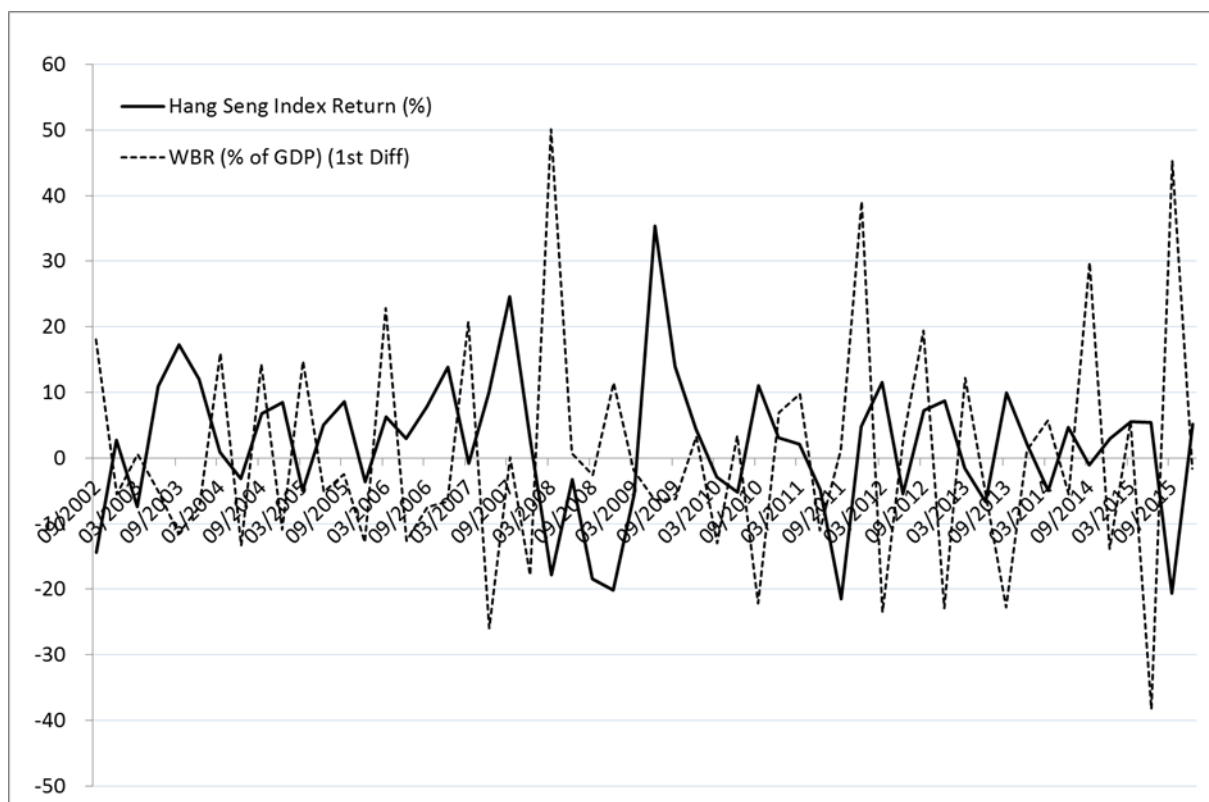
Sources: CEIC and authors' calculations

Figure 2: The Currency-Based Measure and the Hang Seng Index Return



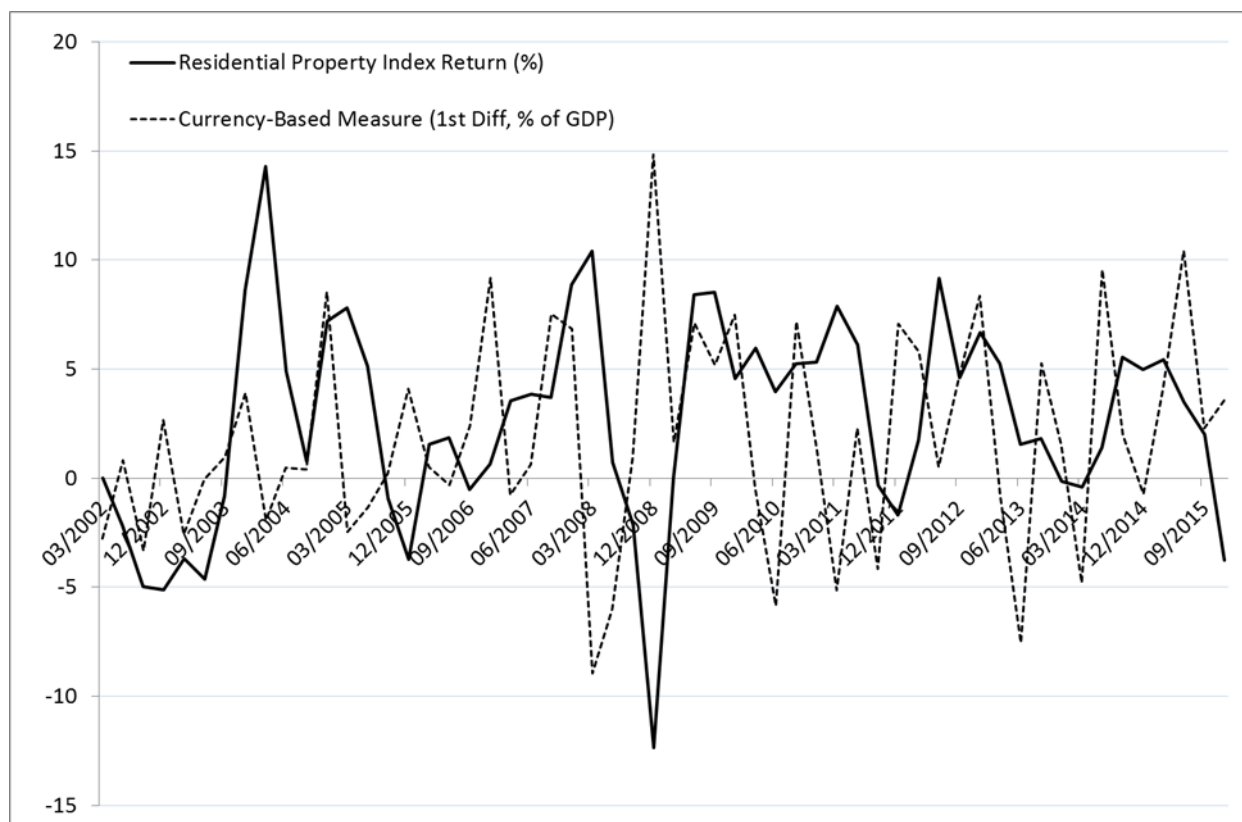
Sources: CEIC and authors' calculations

Figure 3: The WBR Measure and the Hang Seng Index Return



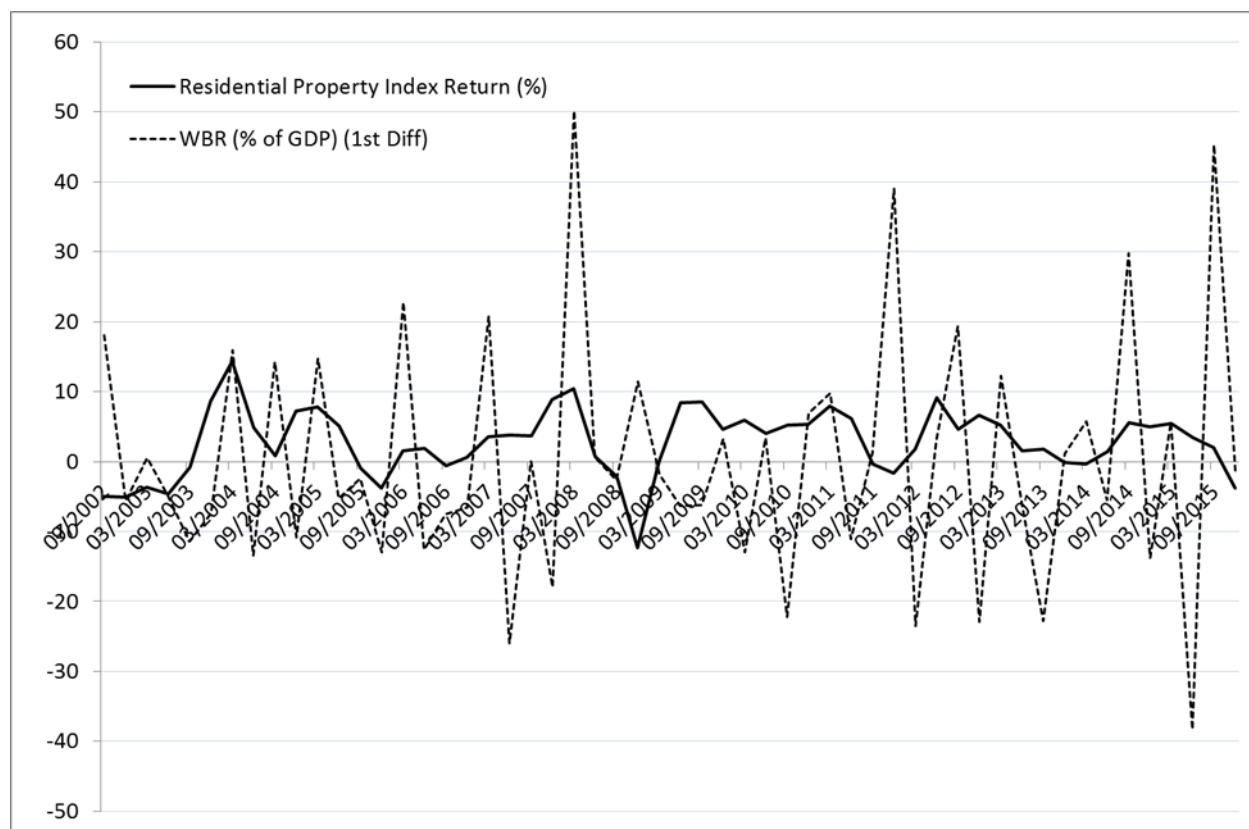
Sources: CEIC and authors' calculations

Figure 4: The Currency-Based Measure and the Real Estate Price Index Return



Sources: CEIC and authors' calculations

Figure 5: The WBR Measure and the Real Estate Price Index Return



Sources: CEIC and authors' calculations