Hong Kong Institute for Monetary Research
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EFFECTS OF CAPITAL FLOW ON THE EQUITY AND

HOUSING MARKETS IN HONG KONG

(with Yin-Wong Cheung and Kenneth Chow)

Matthew S. Yiu

Hong Kong Institute for Monetary Research

Hong Kong Monetary Authority

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Outline

◆ Motivation of the study

◆ Surveillance of capital flows in and out of Hong Kong

◆ Official measure vs illicit measure

◆ Capital flow impacts on equity and real estate markets

◆ Concluding remarks

Motivation

◆ Work in this area since the study on capital flows of Hong Kong by ASEAN + 3 Macroeconomic Research Office (AMRO) in 2013 as one of the case studies in the Asian region.

◆ Hong Kong experienced huge capital inflows in the years of 2009 to 2010 as the monetary base raised from around HK$350 bn to over HK$1000 bn.

◆ Hong Kong asset prices surged substantially, particularly housing price, in response, a number of macro-prudential measures were implemented.

◆ Need close monitoring and surveillance of capital flows in and out of the Hong Kong economy.

◆ Quantify the impacts of different measures of capital flow on asset markets.

Capital flows: BoP 2008 to 2013, % of GDP

	2008	2009	2010	2011	2012	2013
Current Account Balance	15.0%	9.9%	7.0%	5.6%	1.6%	1.9%
Capital transfers	-0.1%	-0.2%	-0.2%	-0.1%	-0.1%	-0.1%
Financial non-reserve assets (net change)	-1.7%	28.4%	-1.4%	-1.3%	6.0%	0.9%
OI assets	23.5%	38.8%	-30.4%	-40.4%	-6.5%	-24.1%
OI liabilities	-17.0%	8.5%	59.7%	38.5%	18.4%	45.7%
PI assets	-11.1%	-23.7%	-35.3%	-8.1%	-15.3%	-22.2%
PI liabilities	-5.4%	5.0%	10.4%	7.5%	13.7%	6.5%
DI assets	-26.0%	-27.1%	-43.0%	-38.6%	-33.6%	-33.4%
DI liabilities	30.6%	25.4%	36.2%	38.7%	28.5%	28.0%
FD assets	31.3%	22.7%	15.7%	18.6%	15.1%	16.4%
FD liabilities	-27.6%	-21.2%	-14.7%	-17.5%	-14.4%	-16.0%
Reserve assets (net change)	-13.1%	-36.9%	-3.3%	-4.5%	-9.3%	-2.7%
Net errors and omissions	-0.1%	-1.2%	-2.0%	0.3%	1.7%	0.0%

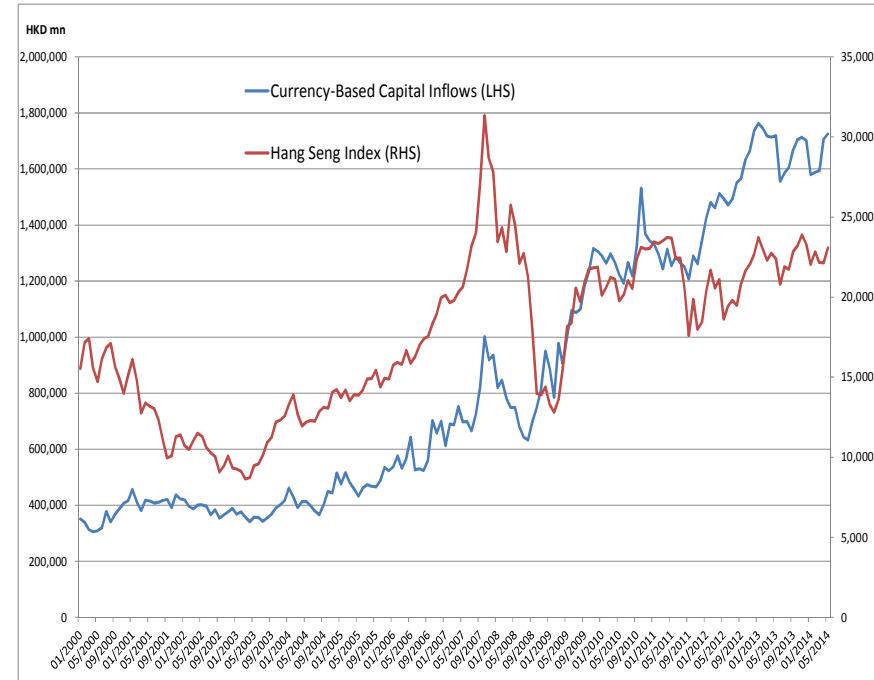◆ Capital inflows were particularly strong in 2009 and 2012, according to Balance of Payment Statistics
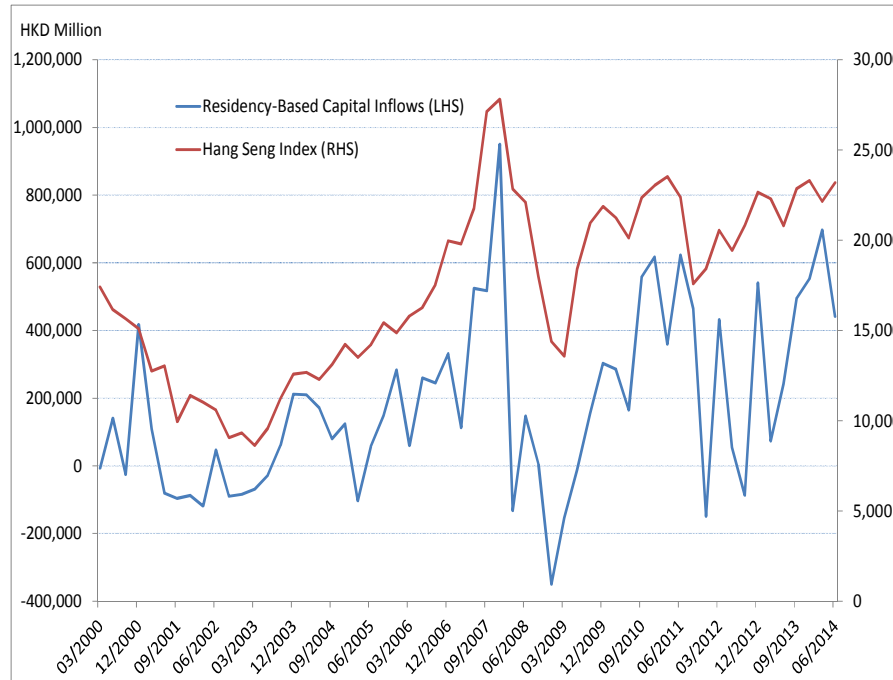
Capital inflows: Monetary Base
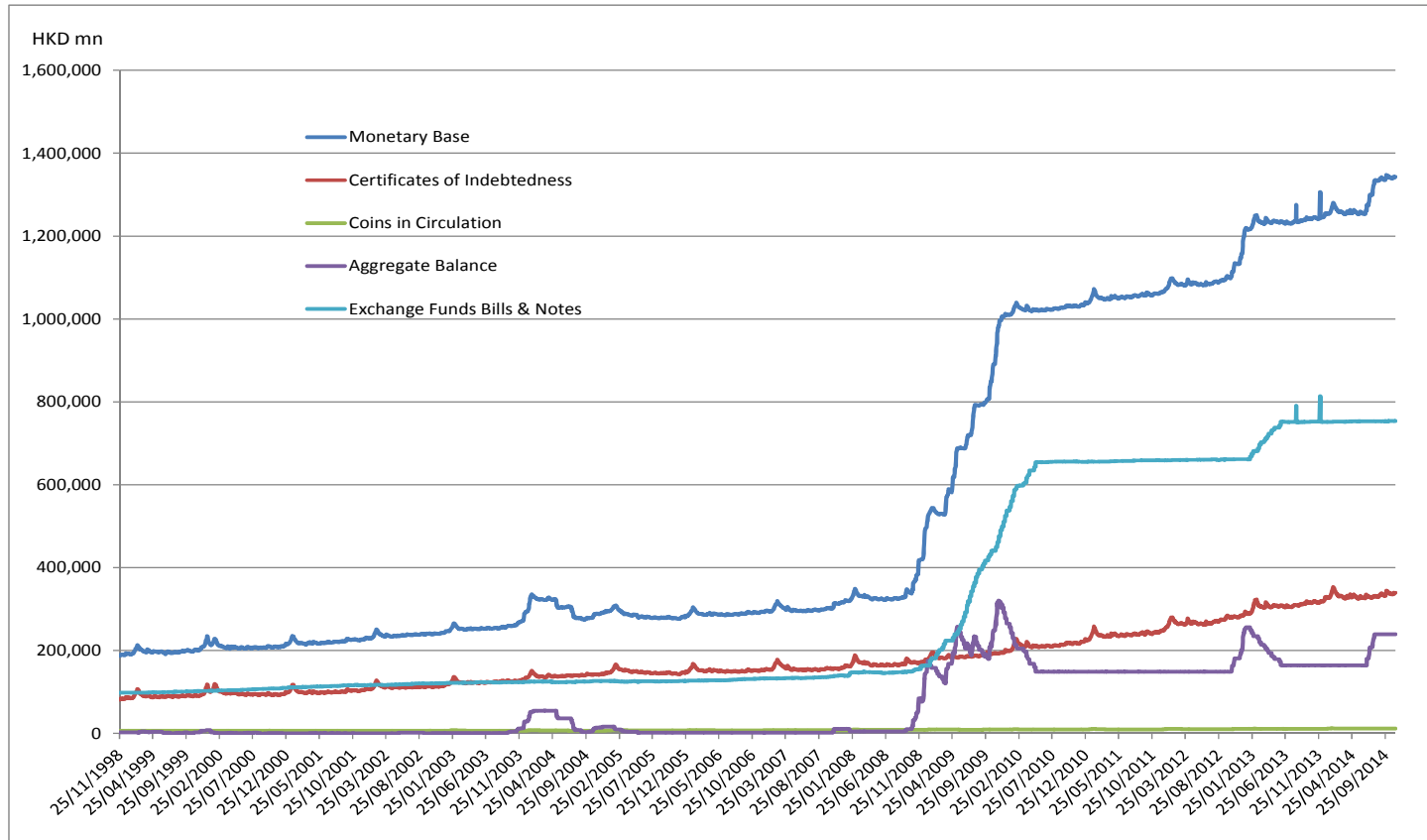
◆ Because of the Linked Exchange Rate System (LERS), the monetary base reflects capital inflows clearly.
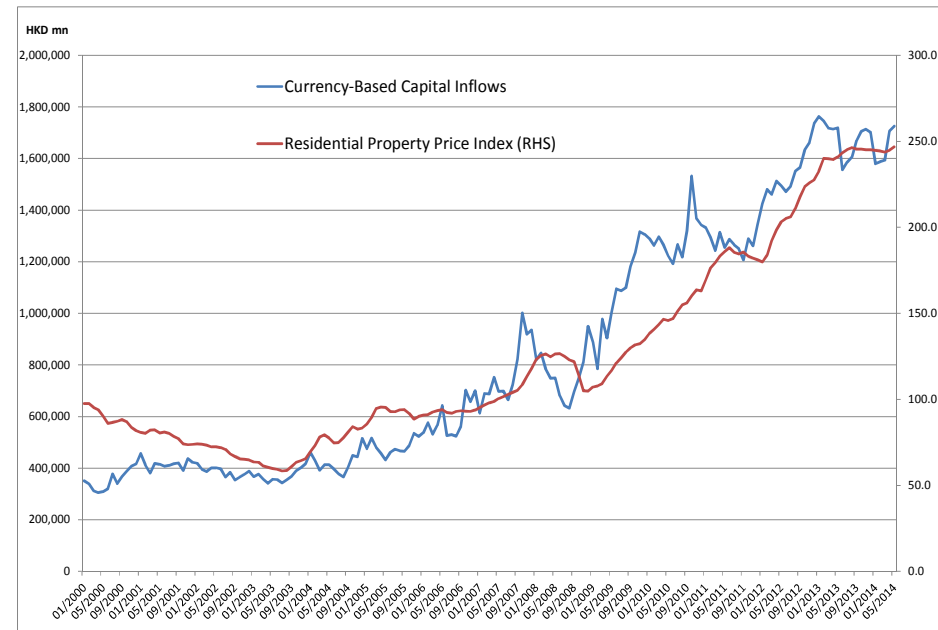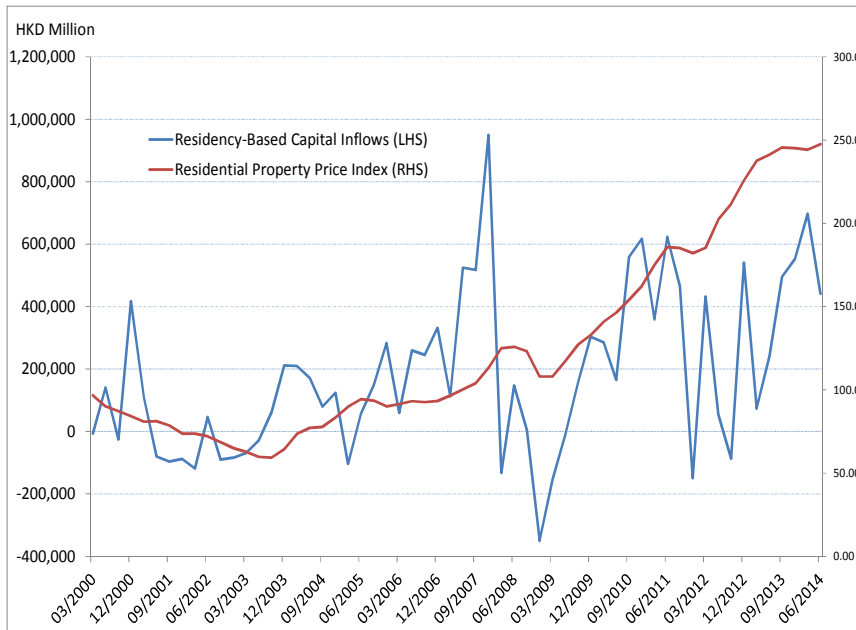
Capital Inflows and Equity Market

◆ Residency-based (BoP) capital inflows (quarterly data) have a weaker correlation with HSI than currency-based capital inflows (converted into quarterly data)

Capital Inflows and Real Estate Market

◆ Currency-based (monetary base + banks' net foreign exchange position) measure tracks the PPI better.

Official and Illicit
Capital Flow Measures

◆ Official records: Balance of Payments statistics (so-called residency-based measure) versus monetary base plus banks' foreign exchange position (so-called currency-based measure):

$$currency\ based\ measure = monetary\ base + FX\ poisition$$

◆ Because of no capital control, Hong Kong provides a convenient conduit for capitals to pass through where it is difficult to track capitals that flow through a third county. Commonly used measures are World Bank Residual (WBR) method and trade mis-invoicing method and we use:

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

  – 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). Most of these components are BoP statistics.

Impacts on Asset Markets (I)

◆ Regression equation I:

$$Y_t = \alpha + \sum_{j=1}^{p} \beta_j Y_{j,t-j} + \sum_{j=1}^{q} \beta_j X_{j,t-j} + \gamma W_t + \lambda D_t + \tau D_t X_t + \varepsilon_t,$$

◆ W_t is VIX the proxy of global risk appetite, D_t is QE dummy and $D_t X_t$ is the interaction term of QE and capital inflow measure

◆ Regression equation II:

$$Y_t = \alpha + \sum_{j=1}^{p} \beta_j Y_{j,t-j} + \sum_{j=1}^{p} \beta_j X_{j,t-j} + \phi Z_t + \delta M_t + \lambda D_t + \tau D_t X_t + \varepsilon_t,$$

◆ The difference between Eq. One and Eq. Two is the economic control variables: HK real GDP growth and bank loan growth for Z_t and China real GDP growth for M_t.

HSI	Quarter-on-quarter percentage change in the Hang Seng Index (Dependent variable of Table 1 – 3)
PPI	Quarter-on-quarter percentage change in the Residential Property Price Index: 1999=100 (Dependent variable of Table 4 – 6)
Currency-based capital inflows	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 inflows	World Bank Residual measure (% of GDP), first differenced
VIX	The CBOE Volatility Index, taken log 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)
QE	Dummy variable for the QE episode, with value = 1 for 2009Q1-2009Q4, 2010Q4-2011Q2, 2012Q3-2013Q1 and value = 0 for other quarters
Sample period	2002Q1 to 2015Q4

- We have tested the endogeneity of every RHS variables and only find CB measure is endogenous. So, we use lag(s) of the CB measure and the contemporaneous term of the rest.
- We have also tried other control variables, such as current account balance, China's exports through Hong Kong, MSCI global and regional stock indexes and others, but for brevity do not report them as they turned out to be insignificant in the preliminary stage.

Regression Results for Equity Market (I)

Table 1: Hang Seng Index (HSI) and the CB Measure 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	
$\overline{R}^2$	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%

Regression Results for Equity Market (II)

Table 2: Hang Seng Index (HSI) and the WBR Measure 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	
$\overline{R}^2$	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%

Regression Results for Equity Market (III)

Table 3: Hang Seng Index (HSI), the WBR measure and CB Measure 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**
$\overline{R}^2$	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%

Regression Results for Real Estate Market (I)

Table 4: Property Price Index (PPI) and the CB Measure 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**
$\overline{R}^2$	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%

Regression Results for Real Estate Market (II)

Table 5: Property Price Index (PPI) and the WBR Measure 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%

Regression Results for Real Estate Market (III)

Table 6:   Property Price Index (PPI), the WBR Measure and CB Measure 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%

Concluding Remarks (I)

- As a small open economy and susceptible to excessive international capital flows, 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 flow on the Hong Kong economy; specifically focus on the two asset markets, namely the equity market and the real estate sector.

- Draw a few observations from the exercise. First, which measure of capital flows should be considered? In this exercise, for official records, we use the CB measure, and for illicit capital flows, the commonly used WBR measure is employed.

- The measures of official and illicit flows have comparable magnitudes, and have low degrees of correlation. The different operational measures of capital flows, official and illicit, have different implications for the equity market and the real estate sector.

Concluding Remarks (II)

- The study highlights the complexity of managing capital flows in an open economy. To achieve the desired policy effect, capital management policies, particularly macro-prudential policies, must be capital flow and economic-sector specific.

- Among these economic control variables, the significant impact of China's growth on the Hong Kong equity market is worth noting. 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 the capital flows to and from China.

- Lastly, the effects of the illicit WBR measure are very complicated. Further investigation is desirable such as using other illicit measures: mis-invoicing method and hot money method.

Thank You