The housing market channel of the monetary transmission mechanism in Hong Kong

Hong Kong Monetary Authority

Abstract

This paper examines the roles that the property market plays in the transmission of interest rate movements to output growth and inflation in Hong Kong. Theoretically, interest rate-induced property price fluctuations affect private consumption and fixed asset investments through the wealth and balance sheet effects. They are also directly fed through to the rental component of the composite CPI to affect the headline inflation rate, and are indirectly passed to prices of goods and services through their impact on aggregate demand.

Simulation results from a vector autoregression (VAR) model show that the wealth and balance sheet effects of interest rate shocks on real GDP through the property price channel are on average relatively small compared with the direct cost of capital effects through other channels. However, the impact of the property price channel is very significant in affecting property prices and inflation rates.

In the absence of discretionary monetary policy for macroeconomic stabilization under the currency board system, prudential measures that counteract the impact of the property price channel may play a useful role in maintaining macroeconomic and financial stability, particularly in disastrous scenarios of large property price swings. The adoption of a forward-looking strategy in the implementation of the internal ratings-based approach under the Basel II framework – specifically, adjusting capital requirements according to property price misalignments – may help moderate banks' lending to the real estate market when the market is overheated, and provide some boosting effect when the market is unduly weak, thereby stabilizing housing prices to mitigate the impact of the property price channel.

I. Introduction

It is generally agreed that monetary policy shocks have a substantial effect on real economic activities, but there are disagreements on the transmission mechanism through which the impact occurs. The conventional money view contends that monetary policy affects the real economy mainly by altering the cost of capital, which in turn affects spending on fixed asset investment and consumer durables, while the new credit view argues that monetary easing stimulates economic activities by strengthening the balance sheet position of borrowers, thereby improving their overall terms of credit and increasing the supply of intermediated credit to bank-dependent borrowers (Bernanke and Gertler (1995)). Although the money and credit views differ in their interpretation of the transmission mechanism, they share a common recognition of the importance of asset prices, particularly property prices, in the propagation of monetary shocks to the real economy, given that housing wealth accounts for the majority of the net worth of households.

This paper focuses on the role that the property market in Hong Kong plays in the transmission of interest rate shocks to output growth and inflation. This topic is important for two reasons. First, as the real estate market plays a predominant role in the Hong Kong economy, it is useful to quantify the wealth and balance sheet effects associated with interest rate-induced property price fluctuations. Interest rate-induced property price swings can be very destabilizing for the local economy, as the experience during the Asian financial crisis

demonstrated. Second, synchronized housing price booms in industrial countries over the past few years have increased the dependence of their economies on the property market. Global monetary tightening has recently started to take its toll on the global real estate market, with housing markets in selected industrial economies showing visible signs of slowdown, posing systemic risks to economic stability. This paper provides a timely study to examine the contractionary effect associated with monetary tightening through the property price channel, which could be of general interest to other economies.

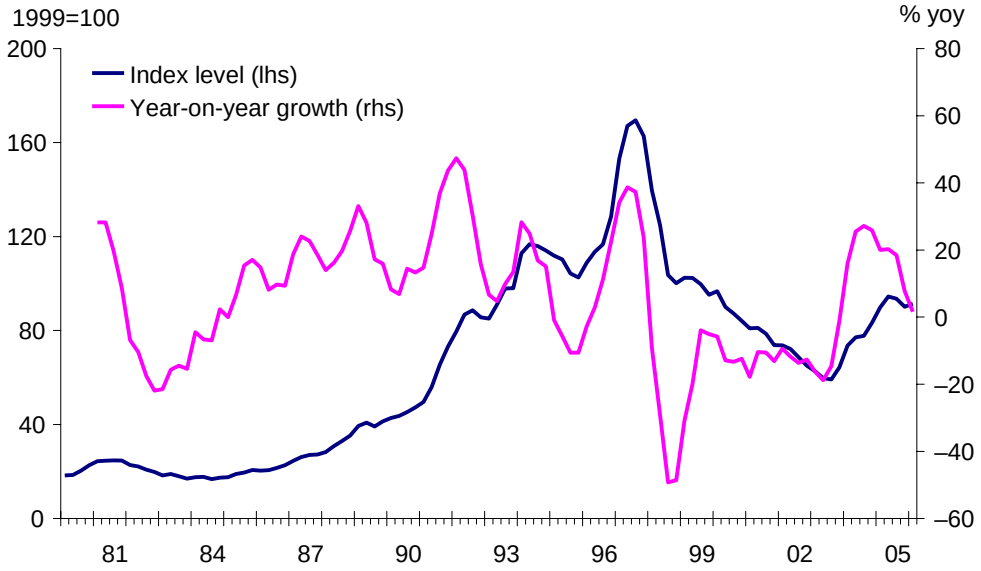
The rest of the paper proceeds as follows. Section II presents some stylized facts on property price swings in Hong Kong and examines the impact of interest rate changes on property prices. Section III outlines the various channels through which developments in the real estate market affect output and inflation. Section IV presents simulation results on the impact of interest rate changes on output growth and inflation through the property price channel using a small vector autoregression (VAR) model. Section V looks at possible measures that an economy with a currency board system can take to counteract the impact of the property price channel to maintain macroeconomic and financial stability. Section VI draws conclusions.

II. Relationship between property prices and interest rates

As documented in Gerlach and Peng (2004), property price movements in Hong Kong have been extraordinarily large and frequent, with numerous instances of price increases of over 20% and at least two occasions of sharp declines of a similar magnitude (Chart 1).

Chart 1

Movements in residential property price

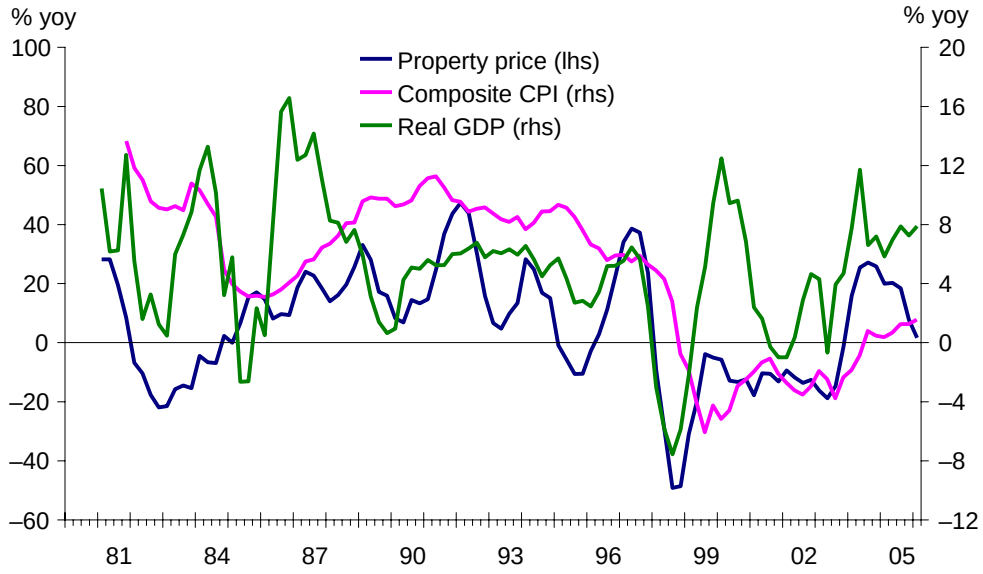


Sources: Rating and Valuation Department and HKMA estimates.

Accompanying the sharp swings in housing prices were gyrations in inflation and economic activities in Hong Kong (Chart 2). The persistent decline in property prices after the Asian financial crisis was associated with a prolonged period of deflation and a notable increase in the unemployment rate, while the subsequent recovery since the middle of 2003 has been accompanied by synchronized rebounds in property price, inflation and GDP growth.

Chart 2

Property price, inflation and output growth



Sources: C&SD, Rating and Valuation Department and HKMA estimates.

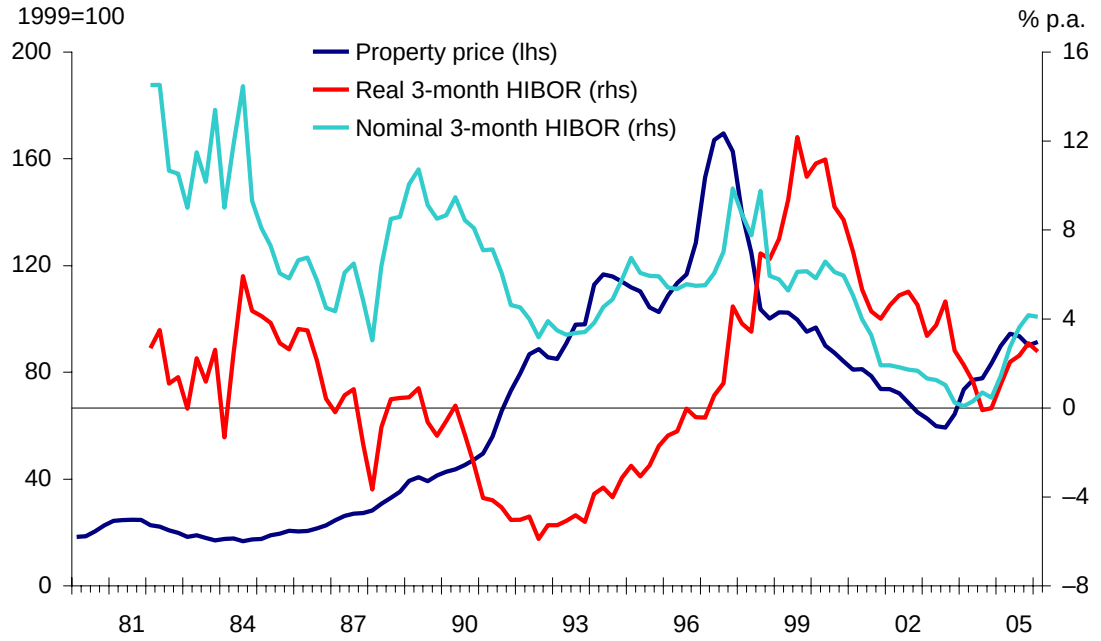
To what extent can the gyrations in property prices be explained by economic fundamentals, particularly changes in interest rates? Previous research at the HKMA suggests that property prices do indeed respond to economic fundamentals but may also be subject to bubble-like processes. Peng (2002) presented a speculative bubble model in which real property prices are determined by macroeconomic conditions and supply and demand factors including the unemployment rate, real interest rate, real rental index, the number of households and private housing stocks, in addition to a bubble-building and a bubble-bursting term. Leung and Liu (2005) adopted a stock-flow approach to model the residential housing market. They showed that long-run property prices are related to the housing stock, real household income, real user cost (interest rate) and population density. Both the speculative bubble model and the stock-flow model suggest that movements in housing prices are negatively related to interest rates. Specifically, the speculative bubble model (stock-flow model) shows that for every one percentage point increase in the interest rate, property price will decrease by 0.32 (0.48) percentage points, ceteris paribus.[1]

Under the Linked Exchange Rate system, Hong Kong dollar interest rates are exogenously determined by US interest rates as well as any risk premium required by investors to hold Hong Kong dollar assets. Consequently, interest rate movements are not tailored to smoothing domestic economic fluctuations, and they may at times even exacerbate property price swings. In particular, as shown in Chart 3, the negative real interest rates in the early part of the 1990s fuelled property price advancement, while the sharp hikes in interest rates on the back of sharp increases in the Hong Kong dollar risk premium during the Asian financial turmoil set off the collapse of real estate prices from their peak in late 1997. Overall, gyrations in property prices in Hong Kong are closely associated with movements in interest rates.

[1] Note that these are the immediate (within one quarter) effects. Second-round changes would occur through the lagged property price term and error-correction term in the models.

Chart 3

Property price and interest rates



Note: Real interest rate is computed by subtracting the headline composite CPI inflation rate from the three-month HIBOR.

Sources: Rating and Valuation Department and HKMA estimates.

III. Housing market channel of monetary transmission mechanism

Interest rate-induced property price fluctuations can affect the real economy via various channels. Changes in property prices affect private consumption and fixed asset investment through the wealth and balance sheet effects, and are passed through to the consumer price index via the rental component. These effects should be distinguished from the direct impact of interest rate changes on output growth and inflation, as discussed below.

1. Interest rate, property price and consumption

Theoretically, interest rate changes affect private consumption directly through an income effect and a substitution effect. A rise in interest rates increases the interest income of households to boost private consumption (the income effect), but also increases the incentive to delay current consumption in favor of savings (the substitution effect), rendering the overall impact ambiguous. On the other hand, interest rate changes directly affect the financing cost of consumer durables, which suggests a negative relationship between consumption of durable goods and interest rates. Empirical results from the HKMA small macro-econometric model show that private consumption expenditure, which includes consumption on both durable and non-durable goods, is negatively related to the interest rate both in the long-run cointegrating relationship as well as in the short-run dynamics (Kong and Leung (2004)).

Interest rate changes also affect private consumption through their effects on property prices. Property price fluctuations are commonly thought to affect private consumption through the so-called wealth effect. According to the life-cycle and permanent income hypotheses,

households' consumption expenditure is dependent not only on current income level but also on their lifetime financial resources. As housing wealth usually accounts for a large part of these resources, changes in property prices can affect consumption expenditure. Cutler (2005) estimated a consumption function and found a stable relationship among consumption, labor income and housing wealth in Hong Kong. In addition, there is a "balance sheet channel" through which interest rate-induced property price fluctuations affect consumption. Because of information asymmetry and frictions in the credit market, cash flows and balance sheet conditions of households are important determinants of their capacity to borrow to finance consumption. As property price movements directly affect the market value of households' assets and indirectly influence cash flows of households by affecting mortgage payments, they can have an impact on private consumption expenditure through the balance sheet channel.

It should be noted that the magnitude of the balance sheet effect depends on the initial financial conditions of households (Peng et al (2001)). The balance sheet effect is unlikely to be large if financial conditions of households are initially sound, as households can withstand fairly substantial decreases in property prices without affecting their cash flows or access to credit. However, if the declines in property prices put households into a negative equity position, they are likely to respond by cutting their current consumption and increasing their savings to help repair their balance sheets. Conversely, initially credit-constrained households may increase their consumption significantly if an increase in property prices permits them to obtain credit using property as collateral. Using household survey data in the UK, Disney, Henley and Jevons (2002) showed that the elasticity of consumption with respect to house price shocks is greatest when property prices are rising for households that have zero or negative equity values in their housing stocks.

2. Interest rate, property price and fixed asset investment

Changes in interest rates affect fixed asset investment (including both housing and production equipments) by altering the financing cost of purchases and changing asset values. In particular, in respect of the property market, interest rate cuts reduce the cost of mortgage financing to boost demand for properties, thereby increasing property prices. Higher property prices relative to construction costs make building new houses more attractive and profitable, stimulating building and construction investment.

Furthermore, as in the case of private consumption, there is a "balance sheet channel" through which interest rate-induced property price fluctuations affect investment. As real estate properties are commonly used as collateral for bank credit, a rise in property prices increases the borrowing capacity of companies to finance investment. Experience in Hong Kong during the Asian financial crisis highlighted the importance of the balance sheet channel for bank-dependent corporate borrowers. The HKMA conducted two surveys on the financing situation of small and medium-sized enterprises (SMEs) in late 1999 and March 2000. The survey results suggested that there was a gap between the demand for bank credit by SMEs and the supply of funds by banks because of unfavorable characteristics of the SME loan market, including inadequate financial disclosure, low transparency of operations and a relatively high delinquency ratio. As a result, banks relied heavily on collateral in their lending decisions in the SME loan market. The sharp fall in property prices during the Asian financial crisis eroded the value of real estate collateral considerably, making it difficult for SMEs to obtain adequate bank financing.

3. Interest rate, property price and inflation rate

Interest rate-induced changes in property prices are directly fed through to the rental component of the composite CPI to affect the headline inflation rate, and are indirectly passed to the prices of goods and services through their impact on aggregate demand.[2] The rental component accounts for about 29% of the composite CPI basket in Hong Kong, exerting substantial influence on the headline inflation rate. Experience during the periods of deflation from late 1998 to 2004 confirmed the importance of the rental component in contributing to overall inflation rate. The composite CPI declined by a cumulative 13.3% during the November 1998 – June 2004 period, in which 7.5 percentage points were contributed by the rental component.

IV. Simulated impact of the housing market channel

This section attempts to quantify the impact of an increase in the three-month HIBOR on output growth and inflation through the property price channel. A small vector autoregression (VAR) model consisting of the headline composite CPI inflation rate, quarter-on-quarter growth in real GDP and property prices, and changes in the three-month HIBOR is constructed for this purpose (see Appendix 1 for the details of the VAR model). Similar to the methodology in Ludvigson, Steindel and Lettau (2002) and Giuliodori (2004), a two step approach is adopted. In the first step, the responses of output growth, inflation and property price to a 100 basis point increase in the three-month HIBOR are generated using the VAR model. In the second step, the impact of the same shock is simulated under a counterfactual regime, in which the effects of property price fluctuations on output growth and inflation are shut off by setting the estimated coefficients on the lags of property price in the inflation and output equations to zero. The difference between the responses in the two steps can be taken as the impact of the interest rate shock through the property price channel.

The effects of a 100 basis point hike in the three-month HIBOR on headline inflation rate, GDP and property price with the property price channel turned on and off are shown in Charts 4a–4c below. They show that a 100 basis point increase in the three-month HIBOR led to across-the-board declines in real GDP, property prices and headline inflation rate. The declines are more pronounced in the presence of the property price channel for all variables. The decrease in property prices is more significant in the presence of the property price channel because of the feedback effect of real GDP growth and inflation rate on property prices.

Chart 4a shows that the impact of interest rate shocks through the property price channel on real GDP growth is relatively small, as the responses are similar whether the channel is turned on or off. In other words, the wealth and balance sheet effects on aggregate demand associated with interest rate-induced property price swings are comparatively small versus the direct cost of the capital effect of interest rate shocks on aggregate demand. Chart 4b shows that the importance of the property price channel to the decline in property prices is more noticeable, as the responses are quite different when turning on and off the channel. Chart 4c suggests that the contribution of the property prices channel to the decrease in the headline inflation rate is very significant and is comparable to the effect through other channels, as the responses differ markedly when turning on and off the channel.

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[2] A property price increase will raise the market rental rate, which will eventually increase the rent paid by tenants when they renegotiate or renew their rental contracts. Rental contracts in Hong Kong normally have a duration of two years. Rents are usually fixed during the first year, and may be re-negotiated in the second year.

Overall, the results suggest that the property price channel plays an important role in the transmission of interest rate shocks to property prices and the general inflation rate, but a relatively minor role in the case of output growth. Although the results suggest that the property market does not normally amplify business cycle fluctuations in the face of interest rate shocks, it is possible – and even likely – that in episodes of unusually large property price movements within a short period of time (eg the boom in 1996–1997 and the subsequent bust in 1998–1999), the property price channel can have a great impact on consumption and economic activity. While the low frequency of occurrence of such events and their non-linear nature make it difficult to capture the effects by traditional econometric methods, anecdotal evidence suggests they have been significant in Hong Kong. In particular, the experience of almost six years of deflation after the bursting of the property bubble in late 1997 demonstrated that volatile property prices could still pose significant challenges to macroeconomic and financial stability as the increase in the number of mortgage loans in negative equity was almost certainly a reason behind reduced consumption expenditures at the time. At that time, mortgage delinquency ratios increased sharply, suggesting increased stress on the banking system. Experiences in other countries, as documented in Borio and Lowe (2002), also show that large asset price swings figure prominently in many accounts of financial instability.

In view of the risk to financial and monetary stability posed by sharp swings in property prices, the next section discusses an approach to deal with risks based on prudential measures consistent with the new Basel II approach.

V. Prudential measures to counteract the property price channel

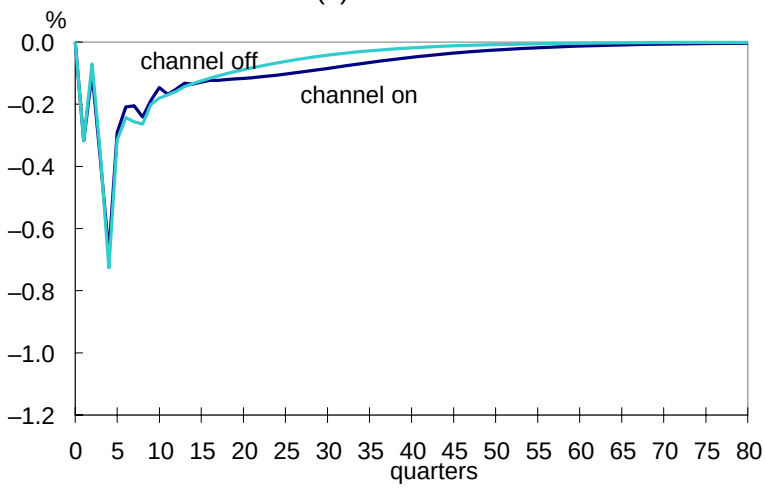
Cecchetti (2006) argues that in analyzing the macroeconomic impact of asset price booms and crashes, it is the disasters that are of true concern. To maintain exchange rate stability under the Linked Exchange Rate System, Hong Kong gives up autonomy to adjust interest rates to respond to disastrous scenarios of economic contractions and asset price swings. In the absence of the interest rate tool, prudential measures that counteract the effect of the property price channel may play a useful role in maintaining macroeconomic and financial stability. This section considers a tool, built on the internal ratings-based approach of Basel II, that varies prudential capital requirements according to the degree of misalignment in property prices to generate some countercyclical effects to dampen boom-bust cycles of property prices.

The tool is a risk management instrument that would be activated when there are signs of significant mispricing of property prices. It is not intended to micro-manage property price fluctuations. The premise of the approach is that the risks of banks' mortgage portfolios are higher when property prices are particularly high relative to their fundamental values and lower when property prices are particularly low. A forward-looking approach to risk assessment therefore implies a need to increase capital requirements in the former case and decrease them in the latter. The variation in capital requirements would affect banks' ability or willingness to lend, thereby contributing to a moderation in the volatility of demand for housing and the consequent volatility of property prices. Monetary and financial stability would be strengthened.

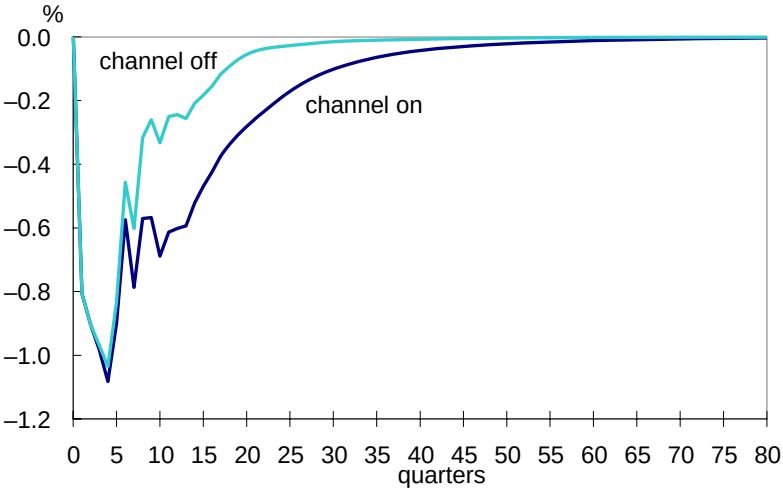
Chart 4

Responses of variables to 100 bp increase in the three-month HIBOR

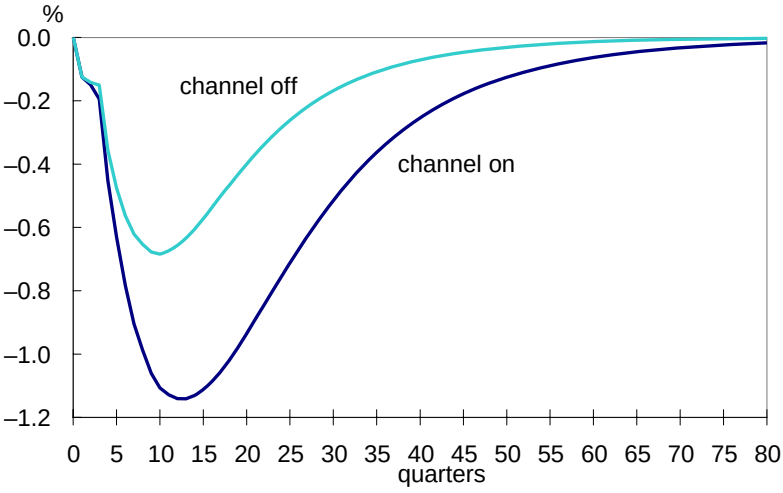
(a) Real GDP



(b) Property price



(c) Composite CPI inflation



Source: HKMA estimates.

Under Pillar I of Basel II, banks are required to maintain a capital adequacy ratio (ratio of banks' capital to their risk-weighted assets) of not lower than 8%. For banks adopting the internal ratings-based approach, the calculation of risk-weighted assets for credit exposures is based on three basic risk components: (i) probability of default, (ii) loss-given-default, and (iii) exposure-at-default.[3] These risk components are derived based on banks' internal credit models and they form the major inputs into different risk-weighted assets functions to calculate the capital adequacy ratio.[4] Under the internal ratings-based approach, banks will be required to regularly assess the risks of their portfolios and adjust their capital or portfolios accordingly to satisfy the regulatory requirements.

As real estate is commonly used as physical collateral for securing bank lending, property price fluctuations should be taken into account in the estimation of the risk components of banks' risk-weighted assets. It is widely accepted that the prevailing market price of an asset may deviate from its fundamental value in the short run, but tends to move towards its fundamental value in the long run. The assessed risk for bank lending with property pledged as collateral should reflect such tendencies. If this is the case, the internal ratings-based approach and the treatment of physical collateral under the Basel II framework could give rise to the possibility of introducing some degree of countercyclicality into the capital requirement.[5] In the area of mortgage lending, this would involve the estimation of the fundamental value of properties and banks would assign a higher amount of capital for their property loans, other things being equal, when property prices are above the fundamental value, and vice versa.[6] This would be in agreement with the Basel II framework, as the probability of default is usually higher (lower) when the value of the property used as collateral is above (below) its fundamental value.

Conceptually, it is easy to understand why the risk of a loan is positively correlated with the deviation of the prevailing property price from its fundamental value. Credit risks of collateralized credit exposures in general, and mortgage loans in particular, are closely tied with the values of physical collateral. Credit risk models adopted in banks usually incorporate the current loan-to-value ratio, which measures the leverage ratio of the collateralized loan, as one of the risk drivers. Various studies show that probability of default and loss-given-default are positively correlated with the current loan-to-value ratio.[7] Specifically, the price of a property pledged as collateral has a higher tendency to fall when it is above its fundamental value, increasing the likelihood of the loan having a higher loan-to-value ratio. Similarly, the loss-given-default is also likely to be higher. This suggests that the overall risk of a loan, and thus the capital required, should be positively related to the gap between the prevailing property price and its fundamental value.

To the extent that different levels of misalignment in property prices may represent different levels of risk, the internal ratings-based approach would call for adjustments to the capital

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[3] Probability of default measures the likelihood that a borrower will default over a one-year time horizon, while loss-given-default captures the portion of credit exposures that will be lost if default occurs (after taking the economic value of physical collateral into account). Exposure-at-default measures the credit exposures at the time of default.

[4] For corporate exposures, besides the probability of default, loss-given default and exposure-at-default, effective maturity is an additional risk component.

[5] Strictly speaking, to the extent that the capital requirement of Basel II is procyclical, and tends to amplify economic cycles, the countercyclicality introduced by the internal ratings-based approach as suggested in this paper would more accurately be described as dampening the procyclicality of the capital requirement.

[6] Fundamental property value is defined as the level of property price which is sustainable in the sense of being consistent with economic fundamentals.

[7] See, for example, Campbell and Dietrich (1983), Goldberg and Capone (1998), Jokivuolle and Peura (2003) and Hui et al (2006).

requirement or portfolio structure of banks when such misalignments take place or vary. With this relationship between risks and the property value gap, the adoption of a forward-looking strategy in the implementation of the internal ratings-based approach could introduce some countercyclical effects to smooth the property price cycles, thus enhancing monetary and financial stability.

In practice, the effectiveness of such a tool largely depends on the sensitivities at various stages of the countercyclical mechanism, i.e. how the risk of mortgage loans may respond to the gap between prevailing property prices and their fundamental values (thus affecting the capital requirements), how the changes in capital requirements may impact on credit expansion and how credit growth may affect property prices. In this regard, the case of Hong Kong is being examined, and the empirical evidence will be reported in a separate study when it is completed.

VI. Conclusions

This paper examines the roles that the property market plays in the transmission of interest rate movements to output growth and inflation in Hong Kong. Theoretically, interest rate-induced property price changes affect private consumption and fixed asset investments through the wealth and balance sheet effects. They are also directly fed through to the rental component of the composite CPI to affect the headline inflation rate, and are indirectly passed to prices of goods and services through their impact on aggregate demand.

Simulation results from a vector autoregression (VAR) show that the wealth and balance sheet effects of interest rate shocks on real GDP through the property price channel on average are relatively small compared with the direct cost of capital effects through other channels. However, the property price channel plays a very important role in the transmission of interest rate shocks to the property price and headline inflation rate.

In the absence of discretionary monetary policy for macroeconomic stabilization under the currency board system, prudential measures that counteract the impact of the property price channel may play a useful role in maintaining macroeconomic and financial stability, particularly in disastrous scenarios of large property price swings. Countercyclical capital requirements in the internal ratings-based approach under the Basel II framework may help moderate banks' lending to the real estate market when the market is overheated, and provide some boosting effect when the market is unduly weak, thereby stabilizing housing prices to mitigate the impact of the property price channel.

Appendix 1

Vector Autoregression

A vector autoregression (VAR) consisting of the headline composite CPI inflation rate, the quarter-on-quarter growth in real GDP and property prices, and changes in the three-month HIBOR is estimated. The sample is composed of quarterly data from 1983:Q2 to 2006:Q1. A lag length of four is chosen for estimations based on the Akaike information criterion. The estimated VAR is as follows.

$$\begin{bmatrix} \pi \\ \Delta ppt \\ \Delta gdp \\ \Delta hibor \end{bmatrix} = \begin{bmatrix} 1.17 & 0.01 & 0.11 & -0.13 \\ (10.53) & (0.46) & (2.30) & (-1.79) \\ 1.21 & 0.60 & 0.14 & -0.81 \\ (1.97) & (5.46) & (0.56) & (-2.09) \\ 0.14 & 0.04 & 0.24 & -0.32 \\ (0.53) & (0.81) & (2.30) & (-1.96) \\ -0.04 & 0.03 & 0.14 & -0.22 \\ (-0.22) & (0.78) & (1.66) & (-1.78) \end{bmatrix} \begin{bmatrix} \pi_{t-1} \\ \Delta ppt_{t-1} \\ \Delta gdp_{t-1} \\ \Delta hibor_{t-1} \end{bmatrix} +$$

$$\begin{bmatrix} -0.09 & 0.03 & 0.05 & 0.04 \\ (-0.52) & (1.26) & (1.04) & (0.52) \\ -2.28 & 0.01 & 0.05 & -0.22 \\ (-2.43) & (0.09) & (0.18) & (-0.55) \\ -0.16 & -0.03 & 0.13 & 0.03 \\ (-0.41) & (-0.60) & (1.19) & (0.15) \\ -0.04 & 0.02 & -0.06 & -0.07 \\ (-0.21) & (0.45) & (-0.71) & (-0.56) \end{bmatrix} \begin{bmatrix} \pi_{t-2} \\ \Delta ppt_{t-2} \\ \Delta gdp_{t-2} \\ \Delta hibor_{t-2} \end{bmatrix} + \begin{bmatrix} 0.06 & 0.01 & -0.03 & 0.03 \\ (0.34) & (0.33) & (-0.63) & (0.39) \\ 3.09 & 0.09 & 0.17 & -0.50 \\ (3.22) & (0.73) & (0.65) & (-1.32) \\ 0.03 & -0.08 & 0.12 & -0.30 \\ (0.07) & (-1.52) & (1.05) & (-1.90) \\ -0.35 & -0.00 & -0.06 & 0.04 \\ (-1.11) & (-1.11) & (-0.73) & (0.30) \end{bmatrix} \begin{bmatrix} \pi_{t-3} \\ \Delta ppt_{t-3} \\ \Delta gdp_{t-3} \\ \Delta hibor_{t-3} \end{bmatrix} +$$

$$\begin{bmatrix} -0.19 & 0.01 & -0.01 & -0.15 \\ (-1.83) & (0.31) & (-0.30) & (-2.47) \\ -1.80 & -0.26 & -0.35 & -0.01 \\ (-3.08) & (-2.31) & (-1.38) & (-0.03) \\ 0.04 & 0.05 & 0.15 & -0.59 \\ (0.18) & (1.08) & (1.40) & (-4.09) \\ 0.03 & 0.02 & -0.00 & 0.03 \\ (0.14) & (0.53) & (-0.05) & (0.26) \end{bmatrix} \begin{bmatrix} \pi_{t-4} \\ \Delta ppt_{t-4} \\ \Delta gdp_{t-4} \\ \Delta hibor_{t-4} \end{bmatrix}$$

where π is the headline composite CPI inflation rate, gdp represents real GDP, ppt refers to property prices, and hibor denotes the three-month HIBOR.

A Cholesky decomposition is imposed based on the following ordering: three-month HIBOR, real GDP, property prices and headline composite CPI inflation rate. The impulse response functions and variance decomposition are shown in Chart A1 and Chart A2 respectively.

Chart A1

Impulse response functions

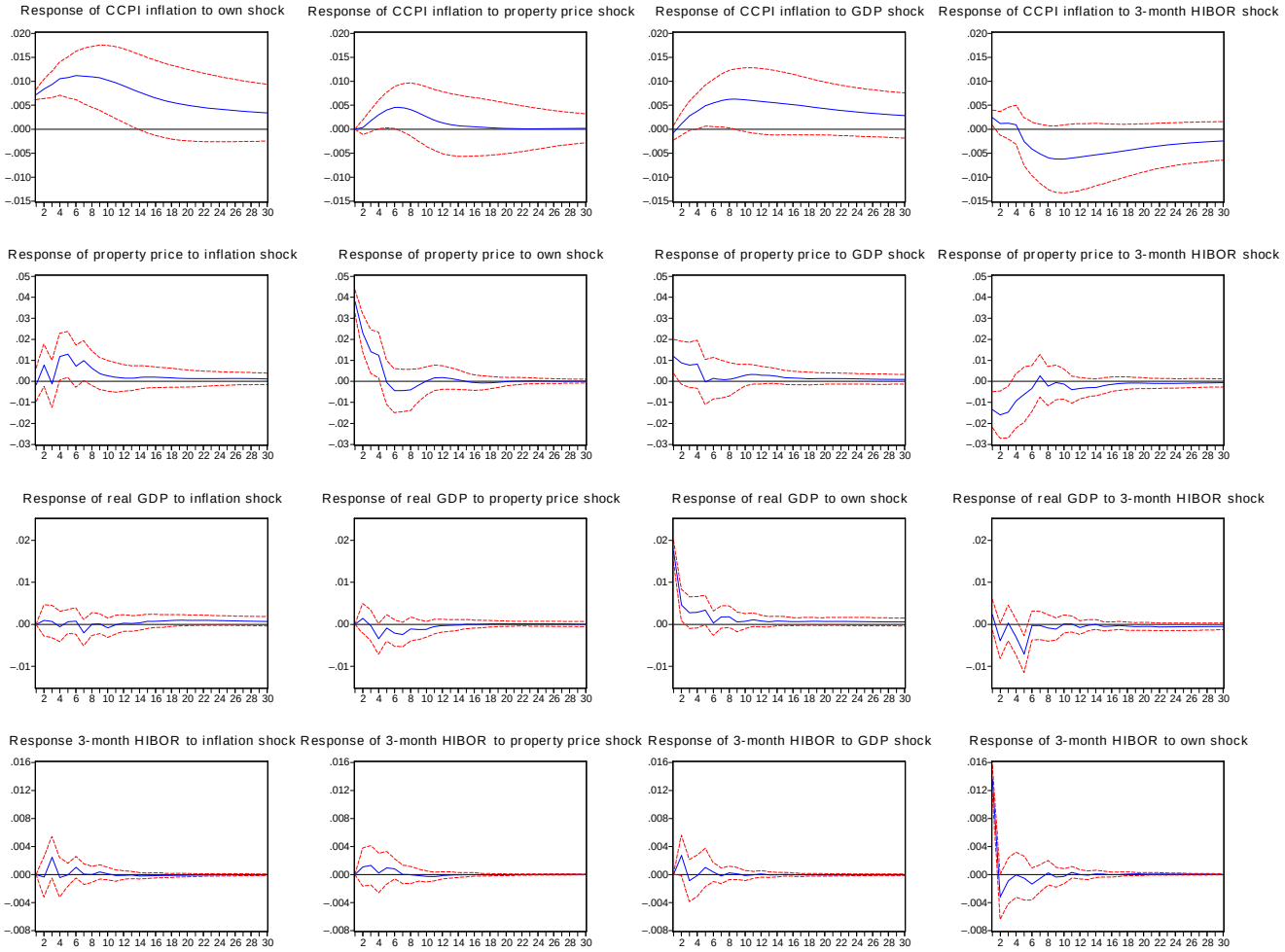
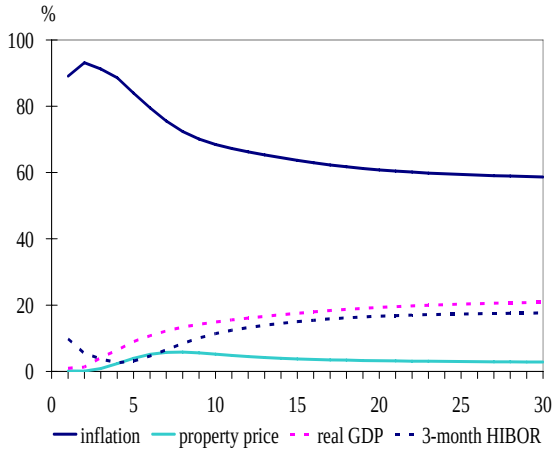


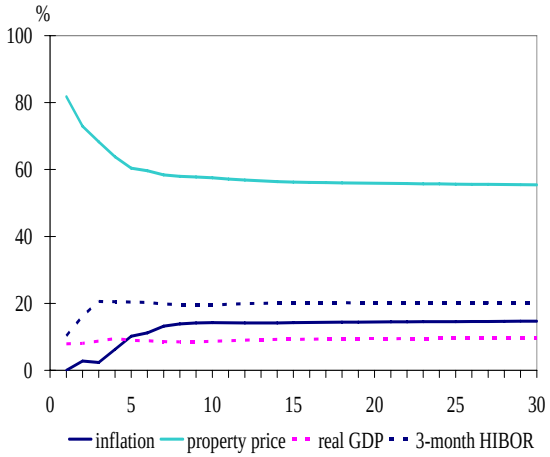
Chart A2

Variance decomposition

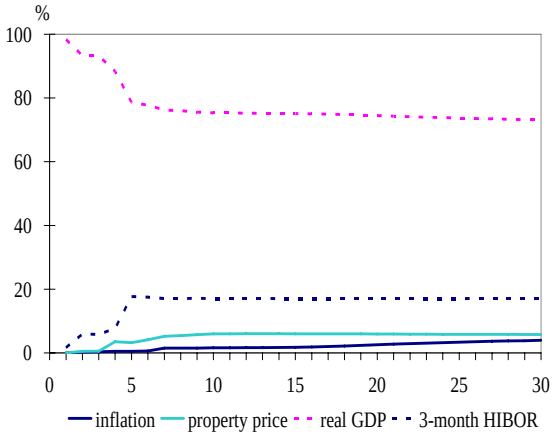
Variance decomposition of composite CPI inflation



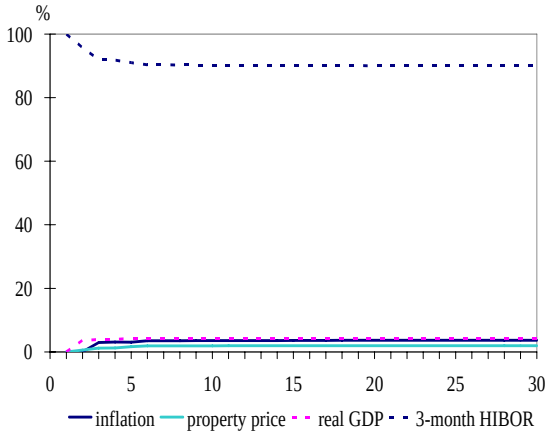
Variance decomposition of property price growth (qoq)



Variance decomposition of real GDP growth (qoq)



Variance decomposition of change in 3-month HIBOR



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