HONG KONG MONETARY AUTHORITY

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POTENTIAL IMPACT OF JOINT UNWINDING OF UNCONVENTIONAL MONETARY POLICIES ON DOLLAR LOANS OF FOREIGN BANKS IN HONG KONG

Key points:

- *As the US monetary policy normalisation continues and the European Central Bank and the Bank of Japan may possibly scale down their unconventional monetary policies (UMPs), the supply of US dollar loans of foreign banks in Hong Kong could be affected significantly amid tighter liquidity conditions.*

- *Specifically, our empirical study finds that banks' cross-border funding linkages with countries adopting UMPs are one significant channel through which the supply of dollar loans could be affected.*

- *Nevertheless, scenario analysis shows that the impact of joint unwinding of UMPs on the supply of dollar loans of foreign banks in Hong Kong would be mild largely due to notable post-crisis improvement in their capitalisation and liquidity. Such improvement partly reflects the prudential measures put in place over the past years including Basel III and the Stable Funding Requirement for banks in Hong Kong.*

- *Looking ahead, the stronger balance sheet of foreign banks in Hong Kong should help reduce the risk of a sharp disruption in the supply of dollar loans in the Hong Kong banking sector when major advanced economies eventually unwind their UMPs.*

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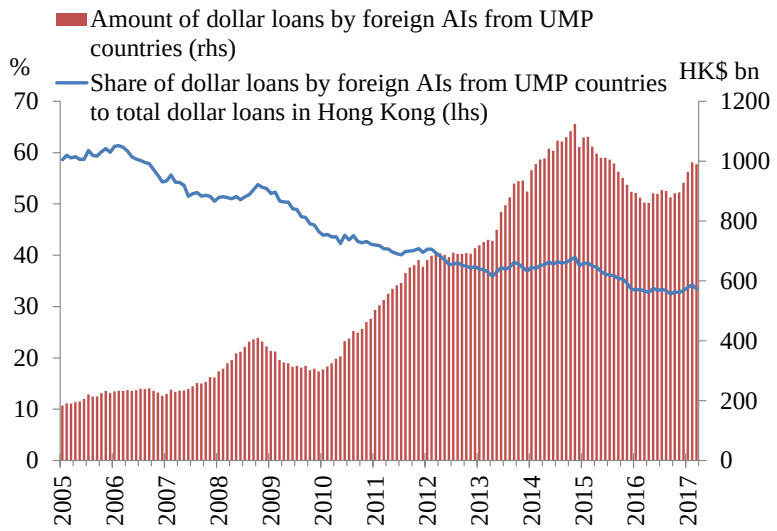
I. INTRODUCTION

Foreign banks are important vehicles for transmitting foreign monetary policies to host countries (Cetorelli and Goldberg, 2012). Being an international financial centre, Hong Kong is not immune from such inward spillovers. As the US monetary policy normalisation continues and the European Central Bank (ECB) and the Bank of Japan (BOJ) may possibly scale down their UMPs, the supply of US dollar loans in the Hong Kong banking sector could be affected significantly amid tighter liquidity conditions. Against this background, this study attempts to assess how would joint unwinding of UMPs in the four major advanced economies (i.e. the US, euro-area, Japan and the UK, and henceforth referred to as UMP countries) would affect the supply of dollar loans for their banks in Hong Kong (henceforth referred to as UMP banks in Hong Kong).

We put our focus on UMP banks in Hong Kong primarily because they are significant providers of dollar loans in the market (Chart 1). Despite the declining share, UMP banks in Hong Kong accounted for about one-third of dollar loans in the banking system. Apart from this, many UMP banks in Hong Kong, particularly banks from euro-area and Japan have been more active in the dollar loan market since the global financial crisis, and have relied more dollar funding from UMP countries, suggesting that their dollar lending would be more affected by unwinding of UMPs. [1]

[1] See "Box 5: Changes in business models of banks in Hong Kong after the crisis and their implications", Half-yearly Monetary and Financial Stability Report, March 2017

Chart 1: US dollar loans by UMP banks in Hong Kong



Source: HKMA.

Based on a confidential panel dataset reported by foreign banks to the Hong Kong Monetary Authority, our empirical analysis finds that joint unwinding of UMPs would reduce the supply of dollar loans by UMP banks in Hong Kong. Specifically, banks' cross-border funding linkages with the UMP countries are one significant channel through which the supply of dollar loans could be affected. Nevertheless, the loan impact is found to be mild attributing mainly to improvements in capital and liquidity positions of banks after the crisis. Such improvement partly reflects the prudential measures put in place after the global financial crisis including Basel III and the Stable Funding Requirement for banks in Hong Kong. One key implication is that policy effects of Basel III requirements and prudential measures could help mitigate the loan impact arising from unwinding of UMPs.

This paper is organised as follows. The next section describes the empirical models and the data used in assessing the potential impact of unwinding of UMPs on dollar loans. Section III presents the estimation results and scenario analysis. The final section concludes.

II. THE EMPIRICAL MODELS AND DATA

a. Empirical model

We start the analysis by constructing a quarterly monetary policy index (MPI) that reflects monetary policies of the four major UMP countries. We then estimate econometric models to explain quarterly changes of dollar loans of foreign banks in Hong Kong in the logarithm form (ΔL) by quarterly changes of the MPI (ΔMPI) and other factors.

We construct the MPI as follows. Firstly, we obtain a shadow policy rate for each of the four UMP countries from Krippner (2015, 2016) as a measure of their respective monetary policy stances.[2] Details of the shadow rate estimates are discussed in the next sub-section. Secondly, for each foreign bank in Hong Kong, we compute a weighted average of the four shadow rates for each time point, with the weights reflecting funding dependence of the bank with respective UMP countries. More specifically, we proxy the funding dependence of the bank on a UMP country by its net US dollar cross-border liabilities from the banking sector of that country as a share of its total liabilities in the previous quarter.[3] Essentially, we assume that the bank would respond differently to monetary policies in the four UMP countries such that the more dollar funding it directly obtains from a UMP country, the more responsive is that bank to the monetary policy in that UMP country.[4]

Apart from direct dollar funding flows from the four UMP countries, foreign banks in Hong Kong may also source dollar funding from their parent banks. Since a typical way for parent banks to obtain dollar funding is from the US wholesale funding market[5], they may be responsive to monetary policy in the US through this indirect channel. To capture the potential spillover effect through this indirect channel in constructing the MPI, we increase the weight for the US shadow

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[2] For details, see http://www.rbnz.govt.nz/research-and-publications/research-programme/additional-research/measures-of-the-stance-of-united-states-monetary-policy/comparison-of-international-monetary-policy-measures.

[3] A zero weight is assigned if net US dollar cross-border liabilities from that country are negative, i.e. the foreign bank is a net funding provider to the banking sector of that country.

[4] As the direct dollar banking flows are used in the model, these essentially assume that banks in the respective UMP countries would first obtain US dollar funding either from wholesale markets or through foreign exchange swap markets before lending to foreign banks in Hong Kong.

[5] Alternatively, parent banks could also obtain dollar funding through FX swap markets and such dollar funding is also captured in foreign bank's US dollar net funding from parents.

rate if the foreign bank in Hong Kong receives net dollar funding from its home country's banking sector.[6] We define the resulting bank-specific time series as the MPI. By construction, a positive value of *ΔMPI* indicates a tighter monetary policy condition of the four major UMP countries. We then use *ΔMPI* to examine dollar loans of foreign banks in Hong Kong by the following simple regression model:

$$\Delta L_{b,t} = \alpha_0 + \sum_{i=0}^{3} \beta_{1,i} \Delta MPI_{b,t-i} + \alpha_1 X_{b,t-1} + f_b + f_t + \varepsilon_{b,t} \qquad (1)$$

To capture a fuller effect of *ΔMPI* on *ΔL*, our benchmark model includes the contemporaneous and the first three lag terms of *ΔMPI* as explanatory variables. We also include bank-fixed (f_b) and time-fixed effects (f_t) in the model. The former captures unobservable time-invariant characteristics of foreign banks in Hong Kong, while the latter takes into account changes in loan demand and economic conditions in Hong Kong that commonly affect foreign banks in Hong Kong over time. The model also includes some control variables ($X_{b,t-1}$), including parent bank's log assets and tier-one capital ratio, loans-to-assets ratio of foreign banks in Hong Kong and their stable funding ratio (defined as the sum of customer deposits and non-deposit liabilities with a maturity over three months to total liabilities). Under this specification, the sum of the estimated coefficients of contemporaneous and lag terms of *ΔMPI* can be interpreted as the cumulative effect of *ΔMPI* on changes in the supply of dollar loans of foreign banks in a one-year horizon.

We also consider a modified model that studies how balance sheet factors would affect the extent of inward monetary policy spillover. In particular, we conjecture that a foreign bank in Hong Kong with higher capital (at the parent level) and a more stable funding structure would be less responsive to monetary policy changes in the UMP countries. For the former factor, we argue that highly capitalised banks could have broader access to alternative funding other than retail deposits, by which they can counterbalance some of the contractionary effect of monetary policy tightening (De has and van Lelyveld, 2010). Also, a bank with a more stable funding structure, such as taking more local retail deposits and long-term funding, is arguably less subject to inward monetary policy spillover or,

[6] In practice, the weight for the US shadow rate is increased by the ratio of foreign bank's net US dollar cross-border liabilities from the home-country's banking sector to its total liabilities in the previous quarter if the ratio is positive.

at least, tends to have a smaller immediate spillover effect.[7] The modified model is specified as Equation (2):

$$\Delta L_{b,t} = \alpha_0 + \sum_{i=0}^{3} \beta_{1,i} \Delta MPI_{b,t-i} + \sum_{i=0}^{3} \beta_{2,i} \Delta MPI_{b,t-i} * TR_{b,t-1} + \sum_{i=0}^{3} \beta_{3,i} \Delta MPI_{b,t-i} * SR_{b,t-1} + \alpha_1 X_{b,t-1} + f_b + f_t + \varepsilon_{b,t} \quad (2)$$

To test these two conjectures, we include the tier-one capital ratio (TR) of the parent bank and the stable funding ratio (SR) of foreign banks in Hong Kong in the model. These two variables are separately interacted with all ΔMPI terms in the regression equation to reveal how these two balance sheet factors affect the extent of inward monetary policy spillover.

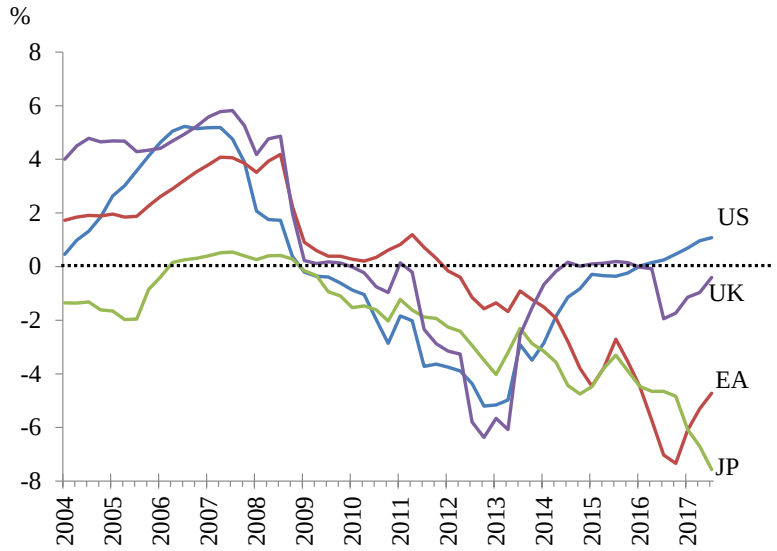
b. Data

Measures for monetary policy stance

Shadow rates in this study are obtained from Krippner (2015, 2016). In essence, shadow rates coincide with the respective policy rates before hitting the lower bound. Once a policy rate hits the lower bound, the shadow rate is estimated using the slope and level of the yield curve. By construction, a downward shift or flattening of the yield curve after implementing UMP would drive down the shadow rate in the negative region. Therefore, the shadow rate contains useful information about the monetary policy stance when the policy rate is constrained by the zero lower bound. Chart 2 shows the shadow policy rate for the four countries. The latest reading of shadow rates suggest that apart from the US there are signs of unwinding of UMPs in the UK and euro-area, while Japan shows no sign of unwinding of its UMP yet.

[7] Disyatat (2011) shows that changes in the quantity of loan supply are driven by changes in external finance premium. In particular, it argues that when banks are dependent on non-deposits funding, an increase of the policy rate may lead to an increased external financial premium for banks' non-deposit funding.

Chart 2: Shadow policy rates for UMP countries



Source: Krippner (2015, 2016).

Bank-level data

The regression models are estimated using a quarterly panel dataset of 79 foreign banks in Hong Kong covering from the first quarter of 2004 to the first quarter of 2017. The foreign branch- and subsidiaries-level variables are constructed using regulatory data filed by foreign banks in Hong Kong to the HKMA, while parent-level variables are constructed using consolidated balance sheet data of their respective parents from SNL and S&P Capital IQ.[8&9]

[8] We identify parent banks using information on the organization structure of banking groups available at S&P Capital IQ.

[9] Since quarterly data are only available in recent years for most of our sample, missing quarterly data in the early part of the estimation period are obtained by linearly interpolating the annual data.

III. ESTIMATION RESULTS AND SCENARIO SNALYSIS

Our estimation results are presented in Table 1, which are in line with our expectations.

Table 1: Estimation results

	(1)	(2)
Dependent variable	Δ USD loans	Δ USD loans
$\Sigma\Delta MPI_{b,t\ to\ t-3}$	-0.132***	-0.536***
	(0.006)	(0.008)
$\Sigma\Delta MPI_{b,t\ to\ t-3} * TR_{b,t-1}$ (parent's level)		0.022**
		(0.048)
$\Sigma\Delta MPI_{b,t\ to\ t-3} * SR_{b,t-1}$		0.004*
		(0.067)
Log assests $_{b,t-1}$ (parent's level)	-2.558*	-2.807*
	(0.090)	(0.068)
$TR_{b,t-1}$ (parent's level)	0.484	0.459
	(0.208)	(0.236)
$SR_{b,t-1}$	-0.011	-0.012
	(0.802)	(0.790)
Loan-to-asset ratio $_{b,t-1}$	-0.103**	-0.102**
	(0.010)	(0.011)
Observations	2,679	2,679
R-squared	0.089	0.093
Adjusted R-squared	0.068	0.068
Number of bank	79	79
Cluster	bank	bank
Time-fixed effect	Yes	Yes
Bank-fixed effect	Yes	Yes

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level respectively. Figures in the parentheses are the p-values. Standard errors are clustered by bank.

The key results are summarised as follows:

(1) First, estimation results from the benchmark model (i.e. column 1 of Table 1) show that foreign banks in Hong Kong would reduce their dollar lending in response to monetary policy tightening in the UMP countries. As

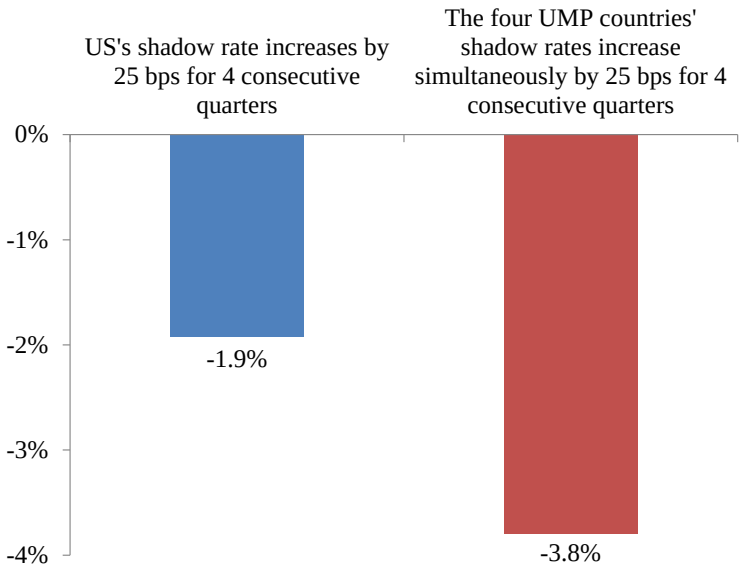
implied by the construction of the MPI, the estimated impact tends to be larger for those foreign banks that rely more on funding from UMP countries and the home country.

(2) Secondly, the balance sheet factors are found to significantly affect the extent of inward monetary spillover (i.e. column 2 of Table 1). Specifically, those foreign banks that have a higher tier-one capital ratio (at the parent level) or a higher stable funding ratio tend to have a smaller reduction in dollar lending in response to monetary policy tightening in UMP countries than other foreign banks in Hong Kong.

To quantify the impact of tightening in UMPs on dollar lending, we conduct scenario analysis based on the estimation results from the modified model. We consider two hypothetical scenarios. In the first scenario, we assume a 100-basis-point increase in the shadow policy rate in the US in a one-year horizon, while in the second scenario, shadow rates in all the four UMP countries increase jointly by the same magnitude. Chart 4 presents the estimated cumulative impact[10] on dollar loans for the two hypothetical scenarios based on the latest average balance sheet position of UMP banks. UMP banks are estimated to reduce their dollar loans by 1.9% if the shadow rate in the US raises by 100 basis points (i.e. the first scenario), while in the more extreme scenario, the estimated decline in dollar loans is much larger at 3.8% (the second scenario). As can be seen from the chart, the loan impacts are relatively mild for both scenarios.

[10] We assume a 25-basis-point increase in shadow rates for four consecutive quarters. The cumulative impact is defined as the sum of the estimated impact of each quarter rise in the policy rate on dollar loans over four quarters.

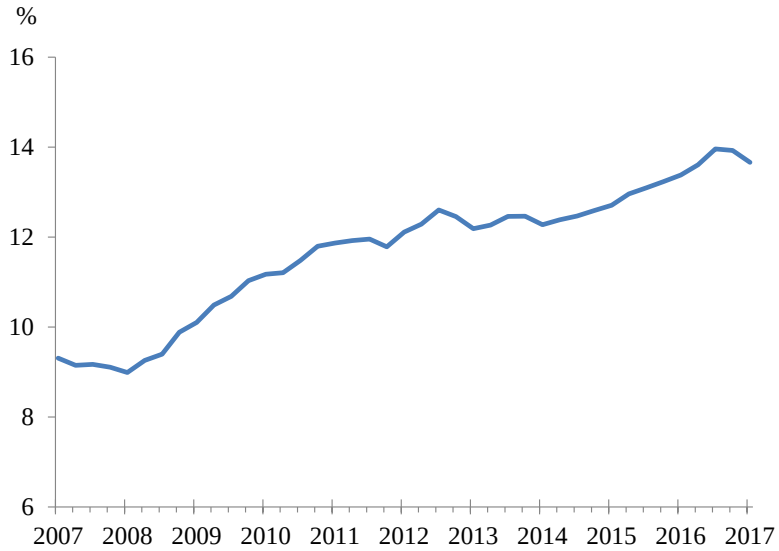
Chart 4: Estimated cumulative impact on dollar lending of a 100-basis-point rise in shadow rates in the US and in all four UMP countries



Source: HKMA staff estimates

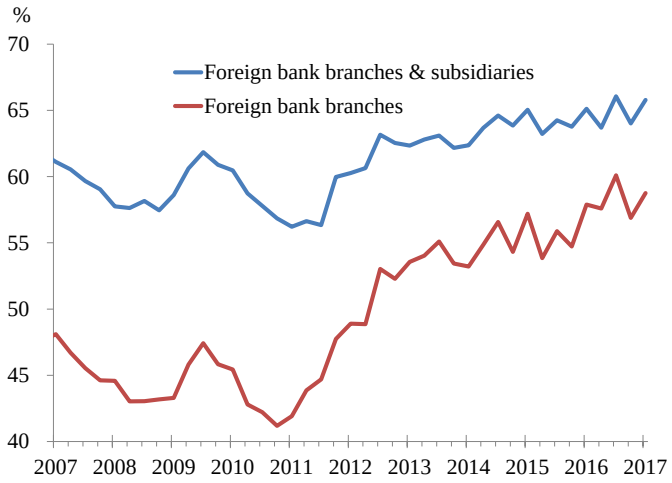
The relatively moderate estimated impact on dollar loans may be attributable to post-crisis development in the balance sheet characteristics of foreign banks in Hong Kong. Specifically, tier-one capital ratio of parent banks on average increased significantly from around 8% before the crisis to 13-14% after the crisis (Chart 5). Meanwhile, there has also been a notable improvement in liquidity of foreign banks in Hong Kong, particularly for foreign bank branches, as measured by the stable funding ratio (Chart 6). These developments partly reflect the policy effects of Basel III capital and liquidity requirements, while the Stable Funding Requirement introduced by the HKMA in late 2013 also contributed.

Chart 5: Average tier-one capital ratio of parent banks



Note: Figures refer to the simple average of the consolidated tier-one capital ratio of parent banks of foreign banks in Hong Kong.
Source: HKMA staff estimates based on data obtained from SNL and S&P Capital IQ.

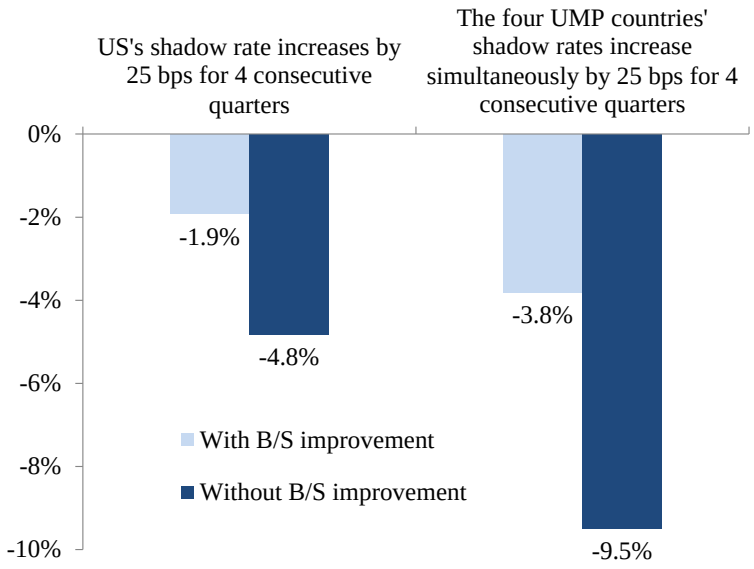
Chart 6: Stable funding ratio of foreign banks in Hong Kong



Note: Stable funding ratio is defined as the sum of customer deposits and non-deposit liabilities with maturity over three months to total liabilities.
Source: HKMA.

To evaluate how far the post-crisis improvement in bank balance sheet factors may have dampened the inward monetary policy spillover effect, we conduct a counterfactual exercise by assuming that the average tier-one capital ratio and stable funding ratio of UMP banks were to stay at their levels at the end of 2008. We then re-estimate the loan responses in two hypothetical scenarios as shown in Chart 4 previously. The results suggest that had their balance sheets not improved after the crisis, UMP banks in Hong Kong would reduce their dollar loans more significantly by 4.8% if the US's shadow rate raises by 100 basis points (in the first scenario), while the estimated decline in dollar loans in the second scenario is larger at 9.5% (Chart 7). The impact is found to be much larger than the previous estimate, which confirms that the post-crisis improvements in capital and liquidity would help mitigate the loan impact stemming from the unwinding of UMPs.

Chart 7: Estimated cumulative impact on dollar lending if without balance sheet improvement



Note: Assume tier-one capital ratio and stable funding ratio of foreign banks from UMP countries were to stay at their levels at the end of 2008
Source: HKMA staff estimates.

IV. CONCLUSION

Our study shows that the Hong Kong banking sector is not immune from the inward spillover of monetary policy. In particular, foreign banks' cross-border funding linkages with UMP countries are one significant channel through which the supply of dollar loans could be affected by monetary policy tightening in UMP countries. Yet, our empirical results suggest that the potential impact on the supply of dollar loans would be much smaller than before because of the notable post-crisis improvement in foreign banks' capitalisation and liquidity. One key implication is that policy effects of prudential measures could help mitigate the potential loan impact from the tightening of monetary policies in UMP countries. Looking ahead, the stronger balance sheet of foreign banks in Hong Kong may help reduce the risk of a sharp disruption in the supply of dollar loans in the Hong Kong banking sector when major advanced economies eventually unwind their UMPs.

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