# 5. Banking sector performance

The profitability of retail banks improved in the first half of 2017 over the same period last year, mainly due to higher net interest income and non-interest income. Banks maintained strong capital and liquidity positions, while lending grew more rapidly in the first half of 2017 amid the improved economic environment. Asset quality remained sound. Despite the US interest rate hikes, banks' funding costs remained low and stable, underpinned by a large retail deposit base. Nevertheless, with the widened interest rate differential between Hong Kong and the US, banks should remain vigilant about the risk of significant capital outflows and their impact on local interest rates amid the ongoing US monetary policy normalisation. Banks should also maintain prudent credit risk management as sharp rises in interest rates could test their asset quality given the rising levels of corporate leverage and increasing household debt-servicing burdens.

5.1 Profitability and capitalisation

Profitability

The aggregate pre-tax profit of retail banks[35] rose notably by 18.2% in the first half of 2017 compared with the same period last year. The improvement was broad-based, with increases in both net interest income and non-interest income. As a result, the return on assets[36] increased to 1.17% in the first half of 2017 from 1.07% in the same period of 2016 (the red line in Chart 5.1).

Chart 5.1
Profitability of retail banks
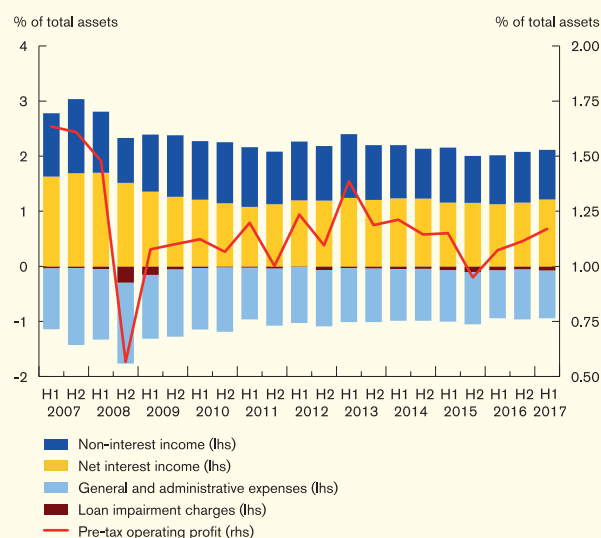
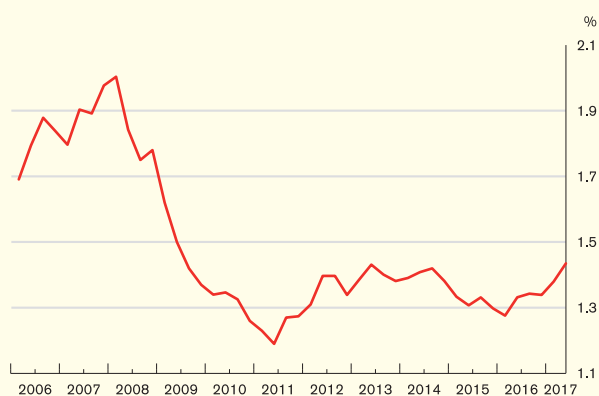Note: Semi-annually annualised figures.
Source: HKMA.

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[35] Throughout this chapter, figures for the banking sector relate to Hong Kong offices only unless otherwise stated.

[36] Return on assets is calculated based on aggregate pre-tax operating profits.

The net interest margin (NIM) of retail banks widened to 1.43% in the second quarter of 2017 from 1.33% in the same period of 2016 (Chart 5.2). The improvement in NIM was in line with anecdotal evidence of a rising average spread of Hong Kong dollar corporate loans that emerged from the syndicated loan market in Hong Kong (Chart 5.3).

Chart 5.2
NIM of retail banks

Note: Quarterly annualised figures.
Source: HKMA.

Chart 5.3
Average spread of Hong Kong dollar syndicated loans
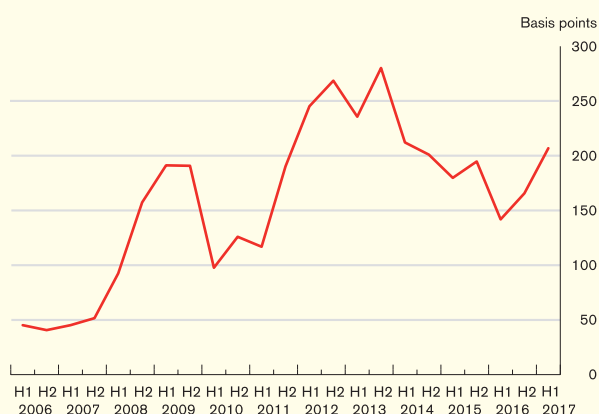
Note: The spread refers to the average spread over HIBOR for HIBOR-based Hong Kong dollar loans syndicated in Hong Kong, weighted by loan amounts.
Source: HKMA staff estimates based on data from LoanConnector.

Despite the two interest rate hikes by the Fed in March and June 2017, wholesale funding costs in Hong Kong have trended down from the recent peak, largely due to ample liquidity in the Hong Kong banking sector. The three-month HIBOR has declined to 0.78% from the post-crisis high of 1% recorded in December 2016 (the blue line in Chart 5.4). The Hong Kong dollar retail deposit rates remained low and stable in the review period. The composite interest rate, a measure of the average cost of Hong Kong dollar funds for retail banks, hovered at 0.31% at the end of June 2017.

Chart 5.4
Interest rates
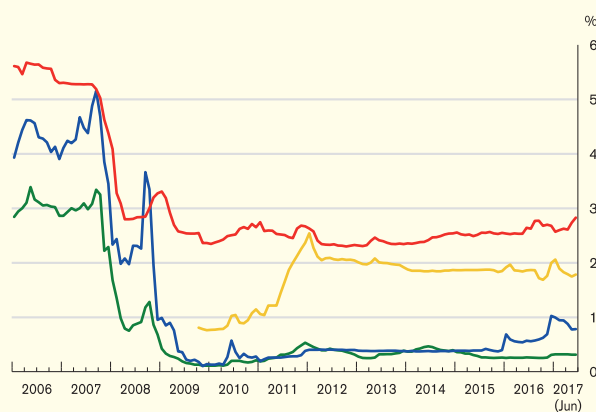
— Composite interest rate (a)
— 3-month HIBOR (a)
— Average mortgage rate for BLR-based mortgages (b)
— Average mortgage rate for HIBOR-based mortgages (b)

Notes:
(a) End of period figures.
(b) Period-average figures for newly approved loans.
Sources: HKMA and staff estimates.

More broadly, although the funding costs for licensed banks in Hong Kong as a whole began trending up since the Fed started its rate hike cycle in December 2015, the upward pace slowed somewhat in the review period. Specifically, the average overall Hong Kong and US dollar funding cost increased by 13 basis points in the first half of 2017 (the red line in Chart 5.5), compared with a 17-basis-point increase in the second half of 2016.

Chart 5.5
Hong Kong and US dollar funding cost and maturity of licensed banks
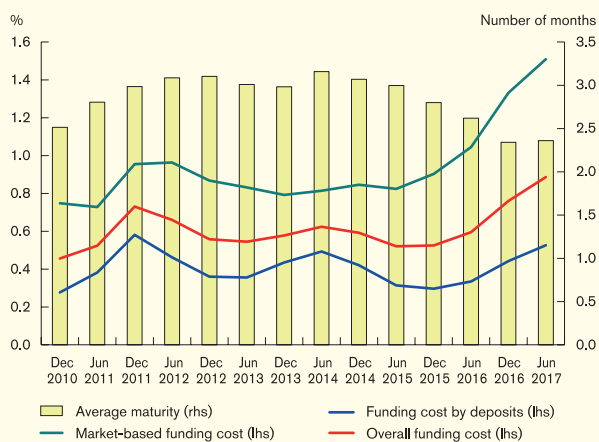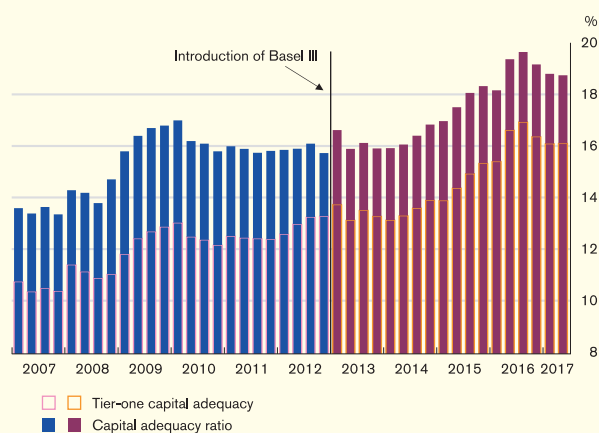

Source: HKMA.

Although the improvement in NIMs was underpinned by stable funding conditions amid US interest rate normalisation, such improvement may be partially offset by keen competition in the mortgage market. In particular, the average HIBOR-based mortgage rates for new mortgages have declined from 2.0% in December 2016 to 1.78% in June 2017. Looking ahead, with further US interest rate hikes in the pipeline as well as the Fed's plan to reduce its balance sheet later this year, banks may soon face a more significant upward pressure on their funding costs which could weigh on their NIMs.

Capitalisation
The consolidated capital adequacy ratio (CAR) of locally incorporated AIs fell slightly by 0.5 percentage points to 18.7% at the end of June 2017 (Chart 5.6). The tier-one CAR[37] also edged down to 16.1%, of which 15.1% was contributed by common equity tier-one (CET1) capital.[38] Nevertheless, capitalisation of the Hong Kong banking sector continued to be strong and well above the minimum international standards.

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[37] The ratio of tier-one capital to total risk-weighted assets.

[38] CET1 capital comprises the core capital of an AI including ordinary shares and retained earnings. Details of the definition can be found in the Banking (Capital) Rules, which are available online on the Hong Kong e-legislation website.

Chart 5.6
Capitalisation of locally incorporated AIs

Notes:
1. Consolidated positions.
2. With effect from 1 January 2013, a revised capital adequacy framework (Basel III) was introduced for locally incorporated AIs. The CARs from March 2013 onwards are therefore not directly comparable with those up to December 2012.
Source: HKMA.

5.2   Liquidity and interest rate risks

Liquidity and funding
The liquidity position of the banking sector, as measured by the Basel III Liquidity Coverage Ratio (LCR)[39] requirement, remained sound during the review period. While the average LCR of category 1 institutions fell from 156.3% in the fourth quarter of 2016 to 144.2% in the second quarter of 2017 (Chart 5.7), the LCR ratio remained well above the statutory minimum requirement of 80%. The average Liquidity Maintenance Ratio (LMR) of category 2 institutions remained steady at 49.7%. The strong liquidity positions of AIs suggest that the Hong Kong banking sector will be able to withstand liquidity shocks arising from possible capital outflows from Hong Kong.

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[39] The Basel III LCR requirement, phased-in from 1 January 2015, is designed to ensure that banks have sufficient high quality liquid assets to survive a significant stress scenario lasting 30 calendar days. In Hong Kong, AIs designated as category 1 institutions adopt the LCR; while category 2 institutions adopt the LMR. For details, see the HKMA's Supervisory Policy Manual (SPM) LM-1, "Regulatory Framework for Supervision of Liquidity Risk".

Chart 5.7
LCR
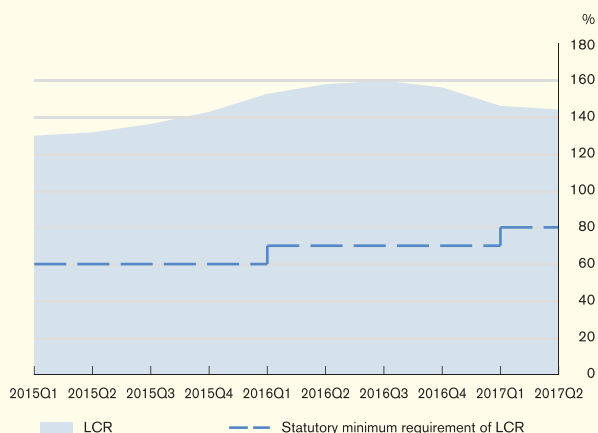
Notes:
1. Consolidated positions.
2. Quarterly average figures.
Source: HKMA.

Customer deposits continued to be the primary funding source for AIs, underpinning a stable funding structure. At the end of June 2017, the share of customer deposits to banks' total liabilities[40] remained unchanged at 56.8% from six months ago (Chart 5.8).

Chart 5.8
**The liability structure of all AIs**
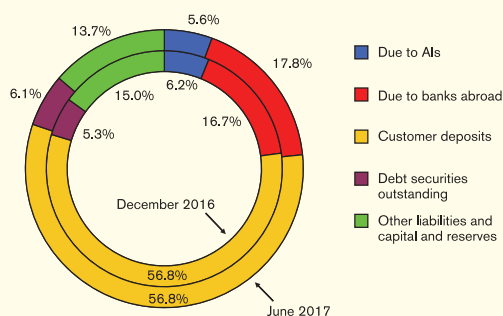
Notes:
1. Figures may not add up to total due to rounding.
2. Figures refer to the percentage of total liabilities (including capital and reserves).
3. Debt securities comprise negotiable certificates of deposit and all other negotiable debt instruments.
Source: HKMA.

Reflecting the faster growth in foreign currency-denominated loans and advances than deposits during the review period, the foreign

currency loan-to-deposit (LTD) ratio[41] of all AIs increased to 65.5% in June 2017 from 59.9% in December (Chart 5.9). Meanwhile, as Hong Kong dollar loans and deposits grew at a similar pace during the review period, the Hong Kong dollar LTD ratio remained unchanged at 77.1% in June 2017. Overall, the all-currency LTD ratio increased to 71.4% from 68.4% six months ago.

Chart 5.9
Average LTD ratios of all AIs
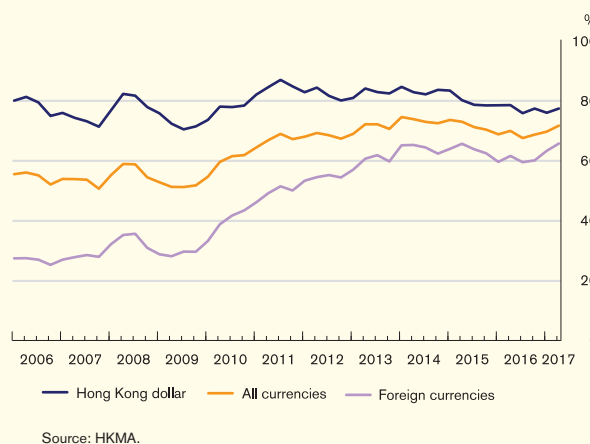
Source: HKMA.

Interest rate risk

The interest rate risk exposures of locally incorporated licensed banks remained stable at low levels. It is estimated that under a hypothetical shock of an across-the-board 200-basis-point increase in interest rates, the economic value of locally incorporated licensed banks' interest rate positions could be subject to a decline equivalent to 3.69% of their total capital base at the end of June 2017 (Chart 5.10).[42] Nevertheless, with expected US interest rate hikes and the Fed's forthcoming balance sheet normalisation, banks should assess the implications for their interest rate risk management.

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[40] The figures reported here are not comparable to those published in previous issues of this *Report* due to the different coverage of banks.

[41] The LTD figures reported here are not comparable to those published in previous issues of this *Report* due to the different coverage of banks.

[42] This estimation does not take into account for the effects of any mitigating actions by banks in response to the shock. The impact would be smaller if mitigating actions is taken.

Chart 5.10
Impact of an interest rate shock on locally incorporated licensed banks
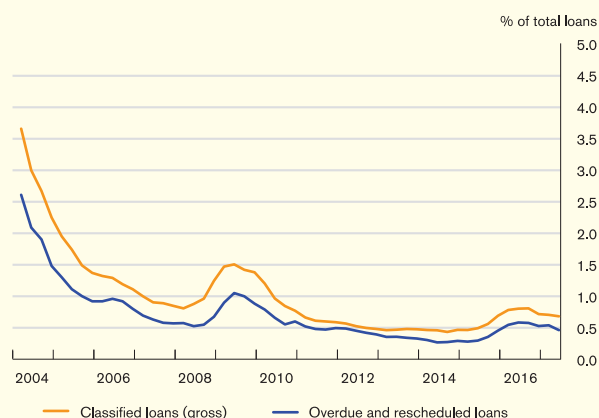
% of total capital base
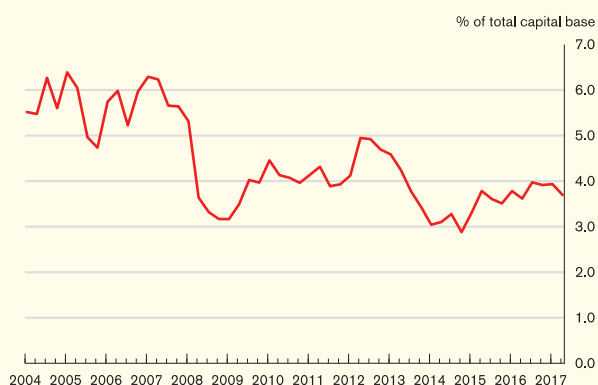
Notes:
1. Interest rate shock refers to a standardised 200-basis-point parallel rate shock to institutions' interest rate risk exposure.
2. The impact of the interest rate shock refers to its impact on the economic value of the banking and trading book[43], expressed as a percentage of the total capital base of banks.

Source: HKMA.

5.3   Credit risk

Overview

There was a slight improvement in the asset quality of banks' loan portfolios during the review period. The gross classified loan ratio and the ratio of overdue and rescheduled loans of all AIs reduced to 0.83% and 0.61% at the end of June 2017 respectively, compared with 0.85% and 0.67% at the end of 2016. For retail banks, both the gross classified loan ratio and the ratio of overdue and rescheduled loans edged down to 0.68% and 0.46% respectively (Chart 5.11).

Chart 5.11
Asset quality of retail banks

% of total loans

Notes:
1. Classified loans are those loans graded as "sub-standard", "doubtful" or "loss".
2. Figures prior to December 2015 are related to retail banks' Hong Kong offices and overseas branches. Starting from December 2015, the coverage was expanded to include the banks' major overseas subsidiaries as well.

Source: HKMA.

Credit growth continued to accelerate, largely supported by the improved domestic and external environments. On a half-year basis, total lending of AIs grew rapidly by a rate of 10.2% in the first half of 2017 compared with 4.2% in the second half of 2016.

However, expectations of credit growth in the near term have become more neutral. The results of the HKMA Opinion Survey on Credit Condition Outlook in June 2017 showed that the share of surveyed AIs expecting loan demand to remain the same in the next three months had increased notably to 86% from 62% in December 2016, while the share of AIs expecting higher loan demand had decreased to 5% (Table 5.A).

Table 5.A
Expectation of loan demand in the next three months

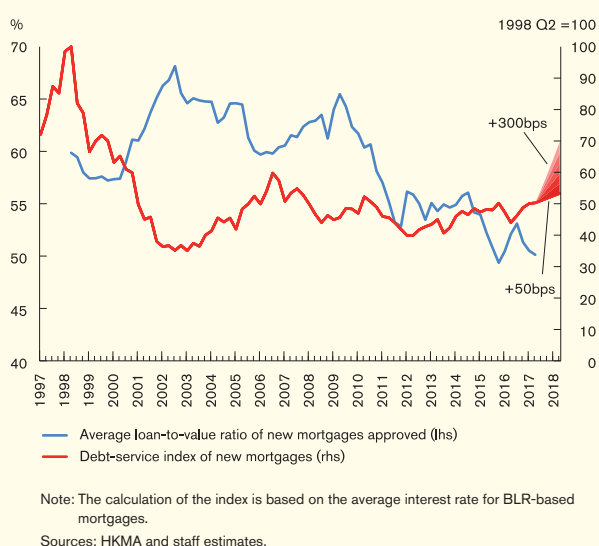| % of total respondents	Sep-16	Dec-16	Mar-17	Jun-17
Considerably higher	0	0	0	0
Somewhat higher	5	14	5	5
Same	71	62	81	86
Somewhat lower	24	24	14	10
Considerably lower	0	0	0	0
Total	100	100	100	100

Note: Figures may not add up to total due to rounding.
Source: HKMA.

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[43] Locally incorporated AIs subject to the market risk capital adequacy regime are required to report positions in the banking book only. Other locally incorporated AIs exempted from the market risk capital adequacy regime are required to report aggregate positions in the banking book and trading book.

Household exposure[44]

Credit risk of household loans stayed low during the review period. Banks' mortgage portfolios remained healthy, with the delinquency ratio at a low level of 0.03% at the end of June 2017. The average loan-to-value ratio (LTV) of new mortgage loans approved decreased further to 50.1% in the second quarter of 2017 from 51.3% in the last quarter of 2016 (Chart 5.12).

Chart 5.12
Average LTV ratio and household debt-servicing burden for new mortgage loans

Note: The calculation of the index is based on the average interest rate for BLR-based mortgages.
Sources: HKMA and staff estimates.

However, the debt-service index of new mortgages[45] increased further to 50.3 in the second quarter of 2017 from 48.8 in the fourth quarter of 2016 (the red line in Chart 5.12), mainly due to an increase in the average size of new mortgage loans (Chart 5.13). The ongoing US interest rate hikes and the prospective start to the Fed's balance sheet normalisation could weigh further on the already rising household debt-servicing burden. A sensitivity test suggests that the index could rise significantly to 69.6 in a four-quarter period if interest rates were to increase by 300 basis points[46], other things being constant. Therefore, the affordability of household could be under significant pressures if interest rates rise rapidly. To further strengthen banks' risk management of their mortgage loan portfolio, the HKMA implemented the eighth round of macro-prudential measures on banks' mortgage lending in May 2017.[47]

Chart 5.13
New mortgage loans of surveyed AIs
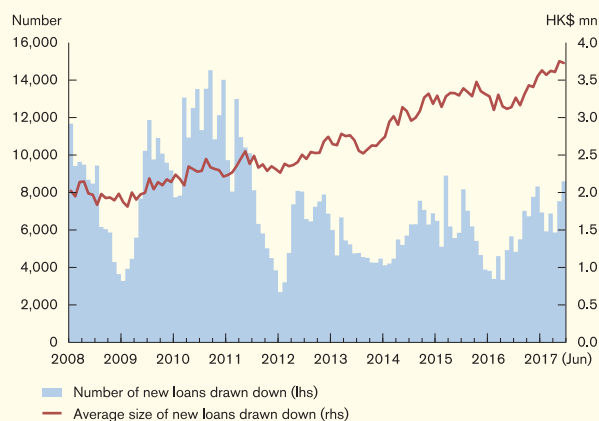
Source: HKMA Residential Mortgage Survey.

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[44] Loans to households constitute lending to professional and private individuals, excluding lending for other business purposes. Mortgage lending accounts for a major proportion of household loans while the remainder comprises mainly unsecured lending through credit card lending and other personal loans for private purposes. At the end of June, the share of household lending in domestic lending was 28.5%.

[45] A higher value of the debt-service index indicates that there is either a drop in household income, or an increase in interest rates, or an increase in the average mortgage loan amount drawn by households. Historical movements in the index suggest that a sharp rise in the index may lead to a deterioration in the asset quality of household debt.

[46] The assumption of a 300-basis-point rise in interest rates is consistent with the prudential measure that requires AIs to have a 3-percentage-point mortgage rate upward adjustment for stress testing property mortgage loan applicants' debt servicing ability.

[47] On 19 May 2017, the HKMA introduced a new round of prudential supervisory measures on property mortgage business, which included lowering the maximum LTV ratio and debt-servicing ratio for specified groups of borrowers, to strengthen the risk management of AIs and safeguard banking stability. The HKMA also requires AIs using the internal ratings-based approach to raise the risk-weight floor from 15% to 25% for new residential mortgage loans approved after 19 May 2017. For details, see HKMA press release "Prudential Measures for Property Mortgage Loans" on the same date.

The credit risk of unsecured household exposure remained contained in the first half of 2017, with the annualised credit card charge-off ratio and the delinquency ratio largely unchanged at 1.93% and 0.25% (Chart 5.14) at the end of June 2017 respectively.

Chart 5.14
Charge-off ratio and delinquency ratio for credit card lending and bankruptcy petitions
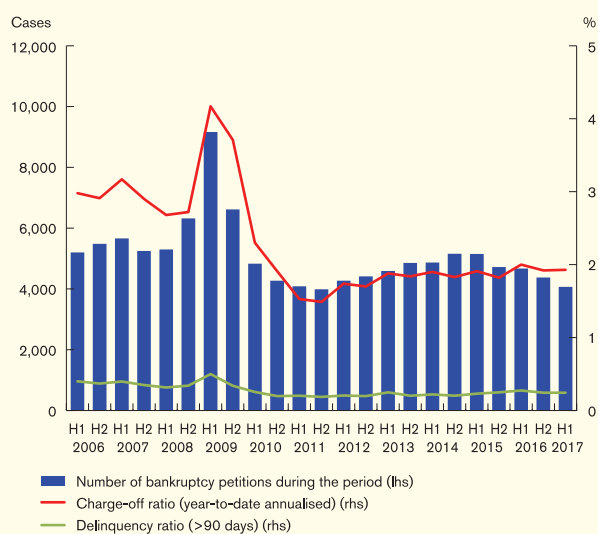

Sources: Official Receiver's Office and HKMA.

Corporate exposure[48]

The pace of US interest rate normalisation continued to be one key factor affecting the credit risk of corporate exposures, given the rising trends of corporate sector leverage (Chart 5.15). As discussed in previous issues of this *Report*,[49] the leverage of local and non-local corporates exhibited very different developments after the GFC, therefore it is important to separately assess the leverage of these two groups. Using accounting data up to the end of 2016, the leverage for non-local corporates (as measured by the weighted average debt-to-equity ratio) continued to stay high at around 81%, while the

leverage for local corporates also increased slightly to 42%. The higher level of leverage for non-local corporates implies that these corporates would be more vulnerable to interest rate shocks. As such, banks should carefully assess how interest rates rise will affect the credit risk in relation to their exposure to non-local corporates.

Looking ahead, given the recent strong growth in corporate loans and loans for use outside Hong Kong which were registered in the first half of 2017, the leverage for both local and non-local corporates would likely rise further. In view of the rising levels of corporate sector leverage, banks should maintain prudent credit risk management.

Chart 5.15
Leverage ratio of listed non-financial corporates in Hong Kong
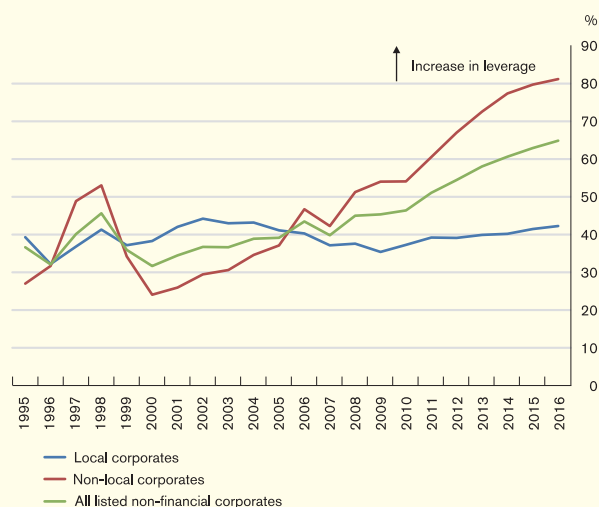
Notes:
1. Weighted average figures.
2. The leverage ratio is defined as the ratio of debt to equity. A higher value indicates higher leverage.
3. All non-financial corporates listed on the Hong Kong Stock Exchange are selected. Local and non-local corporates refer to listed firms that are domiciled in and outside Hong Kong respectively.
4. Figures are calculated based on information up to end-August 2017.

Source: HKMA staff estimates based on data from Bloomberg.

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[48]   Excluding interbank exposure. At the end of June, the share of corporate loans in domestic lending was 71.4%.

[49]   For details, see "Box 4: Assessing corporate leverage in Hong Kong", *Half-yearly Monetary and Financial Stability Report*, September 2016.

Mainland-related lending and non-bank exposures

The banking sector's Mainland-related lending increased during the first half of 2017. Total Mainland-related lending rose by 11.9% to HK$3,992 billion (16.6% of total assets) at the end of June 2017 from HK$3,566 billion (15.6% of total assets) at the end of 2016 (Table 5.B).

Other non-bank exposures also edged up by 4.8% to HK$1,298 billion (Table 5.C).

Table 5.B
Mainland-related lending

HK$ bn	Sep 2016	Dec 2016	Mar 2017	Jun 2017
Mainland-related loans	3,554	3,566	3,808	3,992
Mainland-related loans excluding trade finance	3,260	3,294	3,509	3,695
Trade finance	294	273	299	297
By type of AIs:				
Overseas incorporated AIs	1,552	1,531	1,686	1,777
Locally incorporated AIs*	1,442	1,490	1,548	1,613
Mainland banking subsidiaries of locally incorporated AIs	560	545	574	603
By type of borrowers:				
Mainland state-owned entities	1,481	1,436	1,545	1,663
Mainland private entities	772	834	921	969
Non Mainland entities	1,301	1,297	1,342	1,361

Notes:
1. * Including loans booked in Mainland branches of locally incorporated AIs.
2. Figures may not add up to total due to rounding.
Source: HKMA.

Table 5.C
Other non-bank exposures

HK$ bn	Sep 2016	Dec 2016	Mar 2017	Jun 2017
Negotiable debt instruments and other on-balance sheet exposures	709	722	764	815
Off-balance sheet exposures	453	517	483	483
Total	**1,162**	**1,238**	**1,246**	**1,298**

Note: Figures may not add up to total due to rounding.
Source: HKMA.

Despite the concerns over the rising share of banks' Mainland-related lending, the credit risks arising from this should remain manageable as 76% of the Mainland-related lending at the end of June 2017 was for state-owned enterprises and non-Mainland multinational companies, with the majority of loans to Mainland private entities being secured with collaterals or guarantees.

Partly reflecting improved economic conditions and market sentiment in Mainland China, the distance-to-default index,[50] a market-based default risk indicator, points to a broad-based reduction in the default risk of the Mainland corporate sector since early 2016 (Chart 5.16).

Chart 5.16
Distance-to-default index for the Mainland corporate sector
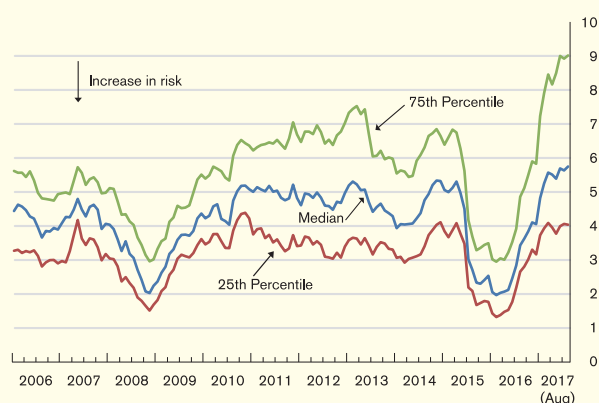
Note: Distance-to-default index is calculated based on the non-financial constituent companies (i.e. excluding investment companies and those engaged in banking, insurance and finance) of the Shanghai Stock Exchange 180 A-share index.
Source: HKMA staff estimates based on data from Bloomberg.

The gross classified loan ratio of Mainland-related lending of all AIs[51] increased marginally to 0.88% at the end of June 2017 from 0.80% at the end of 2016. In view of the rising trends of the credit-to-GDP ratio and corporate sector leverage in the Mainland (Chart 5.17 and Chart 5.18), banks are reminded to maintain prudent credit risk management for their Mainland-related lending.

[50] The distance-to-default is a market-based default risk indicator based on the framework by R. Merton (1974), "On the pricing of corporate debt: the risk structure of interest rates", *Journal of Finance*, Vol. 29, pages 449–470, in which equity prices, equity volatility, and companies' financial liabilities are the determinants of default risk. In essence, it measures the difference between the asset value of a firm and a default threshold in terms of the firm's asset volatility.

[51] Figures cover AIs' Hong Kong offices and Mainland branches and subsidiaries.
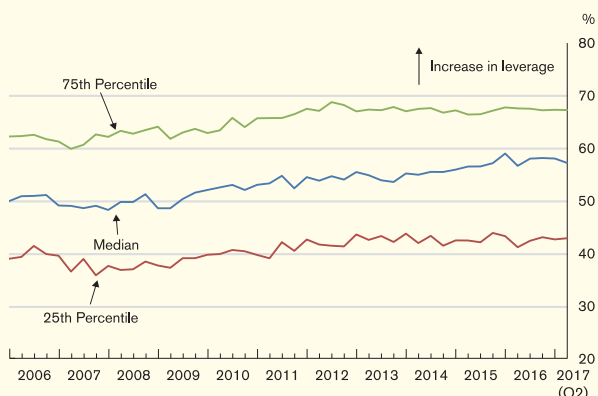
Chart 5.17
Credit-to-GDP ratio in Mainland China

% of annual nominal GDP
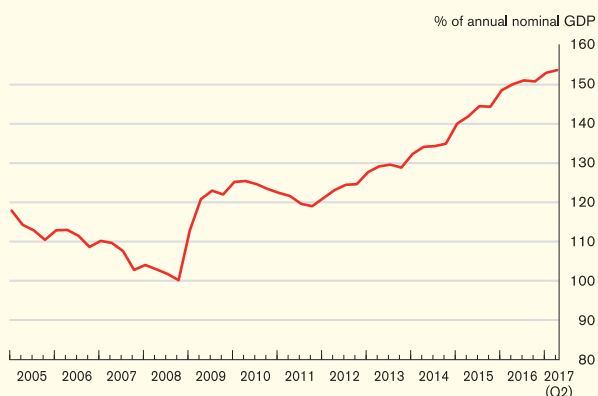
Note: Credit-to-GDP ratio is defined as the ratio of total bank loans (all currencies) to the sum of quarterly nominal GDP for the latest four quarters.
Sources: CEIC and HKMA staff estimates.

Chart 5.18
Leverage ratio for the Mainland corporate sector

Notes:
1. The leverage ratio is defined as the ratio of total liabilities to total assets.
2. It is calculated based on the non-financial constituent companies (i.e. excluding investment companies and those engaged in banking, insurance and finance) of the Shanghai Stock Exchange 180 A-share index.
Source: HKMA staff estimates based on data from Bloomberg.

### Macro stress testing of credit risk[52]
Results of the latest macro stress testing on retail banks' credit exposure suggest that the Hong Kong banking sector remains resilient and should be able to withstand rather severe

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macroeconomic shocks similar to those experienced during the Asian financial crisis. Chart 5.19 presents the simulated future credit loss rate of retail banks in the second quarter of 2019 under four specific macroeconomic shocks[53] using information up to the second quarter of 2017.

Taking account of tail risk, banks' credit losses (at the confidence level of 99.9%) under the stress scenarios range from 1.20% (Interest rate shock) to 2.74% (Hong Kong GDP shock), which are significant, but smaller than the estimated loan loss of 4.39% following the Asian financial crisis.

Chart 5.19
The mean and value-at-risk statistics of simulated credit loss distributions[1]
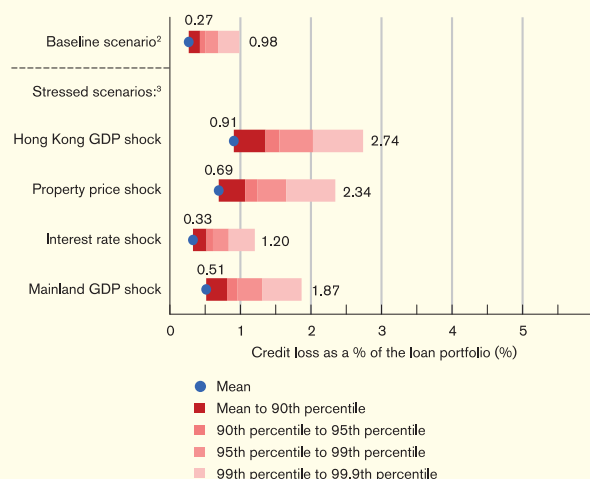
Notes:
1. The assessments assume the economic conditions in 2017 Q2 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
2. Baseline scenario: no shock throughout the two-year period.
3. Stressed scenarios:
   Hong Kong GDP shock: reductions in Hong Kong's real GDP by 2.3%, 2.8%, 1.6%, and 1.5% respectively in each of the four consecutive quarters starting from 2017 Q3 to 2018 Q2.
   Property price shock: Reductions in Hong Kong's real property prices by 4.4%, 14.5%, 10.8%, and 16.9% respectively in each of the four consecutive quarters starting from 2017 Q3 to 2018 Q2.
   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2017 Q3), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2018 Q2).
   Mainland GDP shock: Slowdown in the year-on-year annual real GDP growth rate to 4% in one year.
Source: HKMA staff estimates.

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[52] Macro stress testing refers to a range of techniques used to assess the vulnerability of a financial system to "exceptional but plausible" macroeconomic shocks. The credit loss estimates presented in this report are obtained based on a revised framework from J. Wong et al. (2006), "A framework for stress testing banks' credit risk", *Journal of Risk Model Validation*, Vol. 2(1), pages 3–23. All estimates in the current issue are not strictly comparable to those estimates from previous issues of this *Report*.

[53] These shocks are calibrated to be similar to those that occurred during the Asian financial crisis, except the Mainland GDP shock.

5.4   Systemic risk

Policy uncertainties in major advanced economies are one important factor affecting the systemic risk of the Hong Kong banking sector. In the US, the Fed's intention to implement balance sheet normalisation in the near term has raised market concerns about its potential impacts on global financial markets. Although the pace of the Fed's balance sheet normalisation is expected to be gradual, it remains to be seen how it will affect the US Treasury market. Should the Fed's balance sheet normalisation and the ongoing US rate hikes trigger significant volatilities in US interest rates, this may have ramifications for global financial conditions. If this scenario occurs, it could pose various challenges for banks in Hong Kong.

In particular, sharper-than-expected rises in US interest rates may translate into higher financing costs for corporates which affect their debt-servicing ability. This could in turn put pressure on banks' credit risk management in view of the rising levels of leverage among non-local corporates. Banks in Hong Kong could also face higher risks of mark-to-market losses in their investment portfolios, as they have generally increased holdings of government debt securities since the crisis.[54]

In view of the widened interest rate differential between the Hong Kong dollar and US dollar, the US monetary policy normalisation could heighten the risks of significant capital outflows from the Hong Kong banking sector, which may result in an overshooting of interest rates in Hong Kong.

In the UK, uncertainty about the outcome of the Brexit negotiations has increased following the results of the UK election. If the Brexit negotiations lead to an abrupt shift in cross-border banking flows between the UK and euro-area economies, the subsequent impact of spillover risks to the Hong Kong banking sector could be large, given the significant interbank linkage between Hong Kong and the UK. However, during the review period, there was no apparent deterioration in interbank funding conditions. The spread between the three-month US dollar LIBOR and its corresponding overnight index swap (OIS) rate[55], which is a common indicator of systemic liquidity risks in the short-term dollar funding market, has been broadly stable (Chart 5.20).

Chart 5.20
3-month US dollar LIBOR-OIS spreads

Source: Bloomberg.

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[54]   For details, see "Box 5: Changes in the business models of banks in Hong Kong after the crisis and their implications", *Half-yearly Monetary and Financial Stability Report*, March 2017.

[55]   An OIS is an interest rate swap in which the floating leg is linked to an index of daily overnight rates. The two parties agree to exchange at maturity, on an agreed notional amount, the difference between interest accrued at the agreed fixed rate and interest accrued at the floating index rate over the life of the swap. The fixed rate is a proxy for expected future overnight interest rates. As overnight lending generally bears lower credit and liquidity risks, the credit risk and liquidity risk premiums contained in the OIS rates should be small. Therefore, the LIBOR-OIS spread generally reflects the credit and liquidity risks in the interbank market.

Elsewhere, there has been market speculation on whether the ECB and the BoJ may start tapering their unconventional monetary policies. Although it is not expected to happen immediately, when it occurs, the potential spillover effects arising from the joint tightening of monetary policies to the Hong Kong banking sector should not be underestimated given the strong presence of global banks. Box 5 examines how foreign banks in Hong Kong respond to changes in monetary policies by major central banks. The findings suggest that the negative spillover effects arising from the joint tightening of monetary policies in these economies would exert pressure on US dollar credit availability in Hong Kong. Nevertheless, the ongoing regulatory reforms and prudential measures, which encourage banks to develop more resilient capital and liquidity positions, may help to mitigate the adverse impact.

The countercyclical capital buffer (CCyB) for Hong Kong

The CCyB is part of the internationally agreed Basel III standards and is designed to enhance the resilience of the banking sector against system-wide risks associated with excessive aggregate credit growth. Hong Kong is implementing the CCyB in line with the Basel III implementation schedule. The Monetary Authority announced on 27 January 2017 that the CCyB ratio for Hong Kong will increase to 1.875% with effect from 1 January 2018, from the current 1.25%.[56] This reflects the fact that, under the Basel III phase-in arrangements, the maximum CCyB under Basel III will increase to 1.875% of banks' risk-weighted assets on 1 January 2018 from 1.25% effective from 1 January 2017.[57]

In setting the CCyB rate, the Monetary Authority considered a series of indicators (Table 5.D), including an "indicative buffer guide" (which is a metric providing a guide for CCyB rates based on credit-to-GDP and property price-to-rent gaps[58]). Based on the information up to the decision date at the end of the second quarter, both the credit-to-GDP gap and the property price-to-rent gap widened to 13.4% and 10.0% respectively, from 11.5% and 8.2% on the last announcement date. Both gaps remained at elevated levels and the risks associated with credit and property market conditions have not abated. A simple mapping from the indicative buffer guide would signal a CCyB rate of 2.5%, which is at the upper end of the Basel III range.

In addition, the information drawn from other reference indicators[59] was, in the view of the Monetary Authority, consistent with the signal from the indicative buffer guide.

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[56] Further details of the decision may be found in the press release "Monetary Authority Announces Countercyclical Capital Buffer for Hong Kong" issued on 27 January 2017 which is available on the HKMA website.

[57] Under the Basel III phase-in arrangements, the maximum CCyB rate was capped at 0.625% on 1 January 2016, with the cap rising by 0.625 percentage points each subsequent year until it reaches 2.5% on 1 January 2019.

[58] The gaps between the ratio of credit to GDP and its long term trend, and between the ratio of residential property prices to rentals and its long-term trend.

[59] These included measures of bank, corporate and household leverage; debt servicing capacity; profitability and funding conditions within the banking sector and macroeconomic imbalances.

Table 5.D
Information related to the Hong Kong jurisdictional CCyB rate

	14-Jan-16	27-Jan-17	Q2-2017
Announced CCyB rate	1.25%	1.875%	
Date effective	01/01/2017	01/01/2018	
Indicative buffer guide	2.5%	2.4%	2.5%
Basel Common Reference Guide	2.5%	2.5%	2.5%
Property Buffer Guide	2.5%	2.0%	2.5%
Composite CCyB Guide	2.5%	2.4%	2.5%
Indicative CCyB Ceiling	None	None	None
Primary gap indicators			
Credit/GDP gap	15.3%	11.5%	13.4%
Property price/rent gap	13.1%	8.2%	10.0%
Primary stress indicators			
3-month HIBOR spread (percentage points)	0.30%	0.75%	0.47%*
Quarterly change in classified loan ratio (percentage points)	0.07%	0.01%	-0.02%

Notes:

1. The values of all CCyB guides, the Indicative CCyB Ceiling and their respective input variables are based on public data available prior to the corresponding review/ announcement date, and may not be the most recent available as of each quarter end (refer to SPM CA-B-1 for explanations of the variables). If there is a CCyB announcement, the date of the announcement is shown at the top of the respective column. If there is no CCyB announcement, the quarter in which a CCyB review takes place (normally close to quarter end) is shown at the top of the column.

2. * Following a review of the appropriate risk-free rate benchmark (previously identified as the 3-month OIS rate), the HKMA has decided to amend the definition of the interbank market spread to the difference between 3-month HIBOR and 3-month Exchange Fund Bill yield, effective from April 2017.

Source: HKMA.

Key performance indicators of the banking sector are provided in Table 5.E.

Table 5.E
Key performance indicators of the banking sector[1] (%)

	Jun 2016	Mar 2017	Jun 2017
Interest rates			
1-month HIBOR fixing[2] (quarterly average)	0.22	0.55	0.40
3-month HIBOR fixing (quarterly average)	0.54	0.97	0.83
BLR[3] and 1-month HIBOR fixing spread (quarterly average)	4.78	4.45	4.60
BLR and 3-month HIBOR fixing spread (quarterly average)	4.46	4.03	4.17
Composite interest rate[4]	0.26	0.32	0.31
All AIs			
Balance sheet developments[5]			
Total deposits	0.7	3.0	2.4
Hong Kong dollar	1.8	5.1	4.0
Foreign currency	-0.4	1.0	0.9
Total loans	2.4	4.6	5.4
Domestic lending[6]	3.1	4.0	5.2
Loans for use outside Hong Kong[7]	0.7	6.0	5.9
Negotiable instruments			
Negotiable certificates of deposit (NCDs) issued	1.3	7.4	8.1
Negotiable debt instruments held (excluding NCDs)	2.1	1.4	-1.7
Asset quality			
As a percentage of total loans[8]			
Pass loans	97.36	97.51	97.77
Special mention loans	1.74	1.66	1.40
Classified loans[9] (gross)	0.90	0.83	0.83
Classified loans (net)[10]	0.58	0.50	0.47
Overdue > 3 months and rescheduled loans	0.69	0.68	0.61
Classified loan ratio (gross) of Mainland related lending[11]	0.87	0.78	0.88
Liquidity ratios (quarterly average, consolidated)			
Liquidity Coverage Ratio — category 1 institutions	158.0	146.2	144.2
Liquidity Maintenance Ratio — category 2 institutions	53.8	49.9	49.7
Retail banks			
Profitability			
Loan impairment charges as a percentage of average total assets[12]	0.07	0.06	0.08
Net interest margin[12]	1.30	1.38	1.41
Cost-to-income ratio[13]	42.7	41.1	40.7
Surveyed institutions			
Asset quality			
Delinquency ratio of residential mortgage loans	0.04	0.04	0.03
Credit card lending			
Delinquency ratio	0.27	0.27	0.25
Charge-off ratio — quarterly annualised	2.17	1.88	2.08
— year-to-date annualised	2.00	1.88	1.93
All locally incorporated AIs			
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	15.8	15.2	15.1
Tier 1 capital ratio	16.6	16.1	16.1
Total capital ratio	19.4	18.8	18.7

Notes:
1. Figures are related to Hong Kong offices only except where otherwise stated.
2. The Hong Kong Interbank Offered Rates are released by the Hong Kong Association of Banks.
3. With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
4. The composite interest rate is a weighted average interest rate of all Hong Kong-dollar interest-bearing liabilities, which include deposits from customers, amounts due to banks, negotiable certificates of deposit and other debt instruments, and Hong Kong-dollar non-interest-bearing demand deposits on the books of banks. Further details can be found on the HKMA website.
5. Quarterly change.
6. Loans for use in Hong Kong plus trade finance.
7. Including "others" (i.e. unallocated).
8. Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' overseas branches and major overseas subsidiaries.
9. Classified loans are those loans graded as "substandard", "doubtful" or "loss".
10. Net of specific provisions/individual impairment allowances.
11. Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' Mainland branches and subsidiaries.
12. Year-to-date annualised.
13. Year-to-date figures.

Box 5
Inward monetary policy spillover and implications for US dollar lending of foreign banks in Hong Kong

Introduction

Foreign banks are important vehicles for transmitting foreign monetary policies to host countries. 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 and the Bank of Japan may possibly wind down their unconventional monetary policies (UMPs), the supply of US dollar loans of foreign banks in Hong Kong (FBHKs)[60] could be affected significantly amid tighter liquidity conditions. The issue deserves an in-depth assessment in view of the fact that many foreign bank branches in Hong Kong have been more active in the dollar loan market since the global financial crisis. And, they have funded their dollar loans primarily by overseas funding, particularly from countries adopting UMPs.[61]

Against such a background, this box empirically examines how the supply of dollar loans of FBHKs would be affected if major advanced economies that have adopted UMPs (i.e. the US, euro area, Japan and the UK, and henceforth referred to as UMP countries) tighten their monetary policies.

The empirical models

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 FBHKs in the logarithm form (ΔL) by quarterly changes of the MPI (ΔMPI) and other factors.

We construct the MPI as follows. First, we obtain a shadow policy rate for each of the four UMP countries as estimated by Krippner (2015).[62] In essence, the shadow rate coincides with the policy rate before it hits zero, and contains information about the monetary policy stance when the policy rate reaches the zero lower bound. Chart B5.1 shows the shadow policy rate for the four countries. Apart from the US, which started its monetary policy normalisation in December 2015, shadow policy rates of other countries remained at negative levels as their central banks continued to adopt UMPs.

Chart B5.1
Shadow policy rates for UMP countries
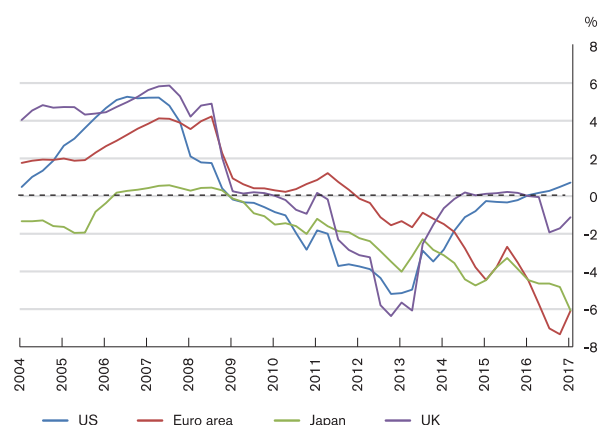
Source: Estimated shadow rates are sourced from Krippner (2015).

Secondly, for each FBHK, we compute a weighted average of the four shadow rates for each time point, with the weights reflecting funding dependence of the FBHK with respective countries. More specifically, we proxy the funding dependence of the FBHK on a UMP country by its net US dollar cross-border

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[60] Foreign banks include both foreign bank branches and subsidiaries.

[61] 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.

[62] 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.

liabilities from the banking sector of that country as a share of the FBHK's total liabilities in the previous quarter.[63] Essentially, we assume that an FBHK 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 FBHK to the monetary policy in that UMP country.[64]

Apart from direct dollar funding flows from the four UMP countries, FBHKs may also source dollar funding from parent banks. Since a typical way for parent banks to obtain dollar funding is from the US wholesale funding market,[65] FBHKs may be responsive to monetary policy in the US through this indirect channel. In order to capture the potential spillover effect through this indirect channel in constructing the MPI, we increase the weight for the US shadow rate if the FBHK receives net dollar funding from its home country's banking sector.[66] We define the resulting bank-specific time series as the MPI. By construction, a positive value of ∆MPI indicates a tighter monetary policy condition of the four major UMP countries.

To capture a fuller effect of ∆MPI on ∆L, our benchmark model includes the contemporaneous and the first three lag terms of ∆MPI as explanatory variables. We also include bank-fixed and time-fixed effects in the model. The former captures unobservable time-invariant

characteristics of FBHKs, while the latter takes into account changes in loan demand and economic conditions in Hong Kong that commonly affect FBHKs over time.[67] Under this specification, the sum of the estimated coefficients of contemporaneous and lag terms of ∆MPI can be interpreted as the cumulative effect of ∆MPI on changes in the supply of dollar loans of FBHKs 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 FBHKs with a higher capital ratio (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. Also, FBHKs with a more stable funding structure, such as taking more local retail deposits and long-term funding, are arguably less subject to inward monetary policy spillover or, at least, tend to have a smaller immediate spillover effect.

To test these two conjectures, we include the tier-one capital ratio of the parent bank and the ratio of the sum of customer deposits and non-deposit liabilities with a maturity over three months to total liabilities (henceforth referred to as the stable funding ratio) of FBHKs in the model. These two variables are separately interacted with all ∆MPI terms in the regression equation to reveal how these two balance sheet factors affect the extent of inward monetary policy spillover. The structure of the empirical model is summarised by Chart B5.2.

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

[64]   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 (FX) swap markets before lending to FBHKs.

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

[66]   In practice, the weight for the US shadow rate is increased by the ratio of FBHK'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.

[67]   The model also includes some control variables, including (1) log assets of parent bank; (2) tier-one capital ratio of FBHK's parent bank; (3) FBHK's total loans as a share of its assets; and (4) FBHK's stable funding as a share of its liabilities.

Chart B5.2
The structure of the empirical models
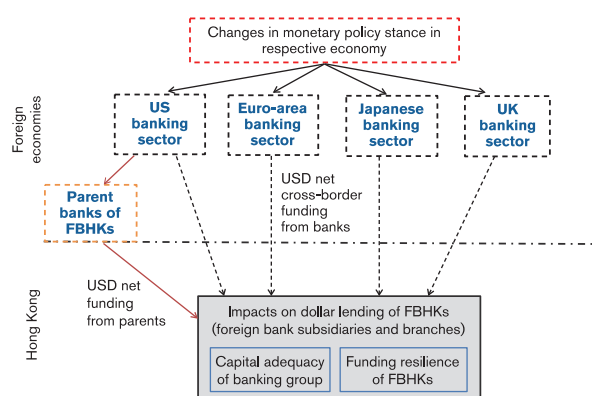
The model is estimated using a quarterly panel dataset of 79 foreign banks in Hong Kong covering from the first quarter of 2004 to the first quarter of 2017. The foreign branch- and subsidiaries-level variables are constructed using regulatory data filed by FBHKs to the HKMA, while parent-level variables are constructed using consolidated balance sheet data of their respective parents from *SNL* and *Capital IQ.*

Estimation results and scenario analysis

Table B5.1
Estimated impact of inward monetary policy spillover on dollar lending of foreign banks in Hong Kong

Explanatory variables	ΔUSD Loans	ΔUSD Loans
ΣΔMPI (t to t-3)	–**	–***
ΣΔMPI (t to t-3) * T1 ratio		+**
ΣΔMPI (t to t-3) * stable funding ratio		+*
Bank control	Yes	Yes
Bank fixed effect	Yes	Yes
Time fixed effect	Yes	Yes

Note: ***, ** and * denote the estimated coefficients are significant at 1%, 5% and 10% levels respectively.
Source: HKMA staff estimates.

Our preliminary estimation results are summarised in Table B5.1, which are in line with our expectations. In particular –

(1) First, estimation results from the benchmark model (i.e. the first column of Table B5.1) show that FBHKs 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 FBHKs 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. see the second column of Table B5.1). Specifically, those FBHKs 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 FBHKs.

Based on the estimation results from the modified model, we further conduct analysis based on two hypothetical scenarios. We assume a 100-basis-point increase in the shadow policy rates in a one-year horizon by the US Fed in the first scenario, and by all the four UMP countries jointly in the second scenario. We put our focus on the estimated impact of dollar loans of FBHKs from the four UMP countries for two reasons. First, European and Japanese banks and, to a lesser extent, US banks are major providers of dollar loans. Secondly, analysing granular data finds that this group of FBHKs relied much more on funding from UMP countries than other FBHKs, suggesting that the inward monetary spillover effect would mainly pass through FBHKs from UMP countries.

Chart B5.3 presents the estimated cumulative impact[68] on dollar loans for the two hypothetical scenarios based on the latest average balance sheet position of FBHKs from the UMP countries. The FBHKs from UMP countries are estimated to reduce their dollar loans by 1.9% if the US Fed raises the policy rate 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).

Chart B5.3
Estimated cumulative impact on dollar lending of a 100-basis-point rise in shadow rates in the US and in all four UMP countries
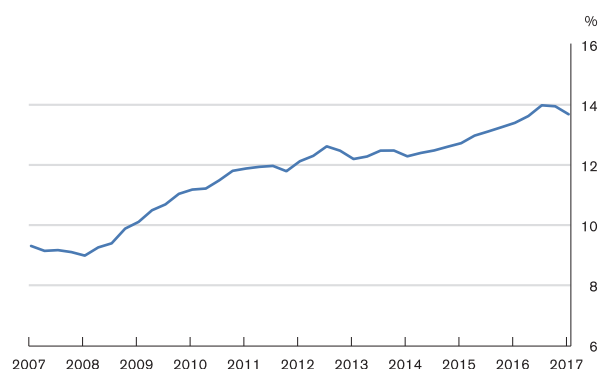

Source: HKMA staff estimates.
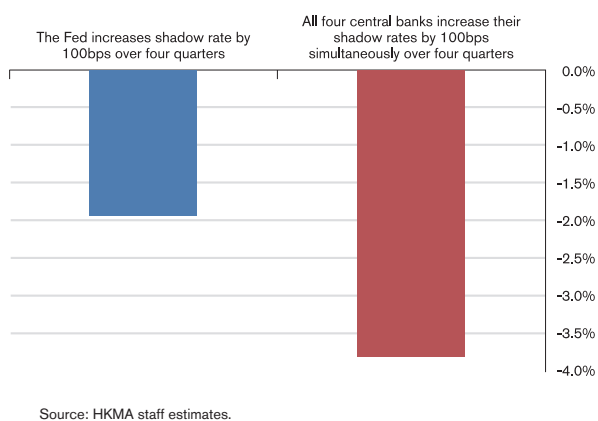
The relatively moderate estimated impact on dollar loans[69] may be partly attributable to post-crisis development in the balance sheet characteristics of FBHKs. Specifically, both the average tier-one capital ratio and the stable funding ratio of FBHKs have improved notably after the crisis and even surpassed their pre-crisis levels (Charts B5.4 and B5.5). These developments partly reflect the policy effects of Basel III capital requirements introduced since 2007 and the Stable Funding Requirement introduced by the HKMA in 2013.

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[68]   We assume a 25-basis-point increase in the policy rate 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.

[69]   As a reference, dollar loans of the Hong Kong banking sector declined by 4.6% in the fourth quarter of 2006 after a total of 84 basis points increase in the effective Fed Fund Rate from March to December 2006.
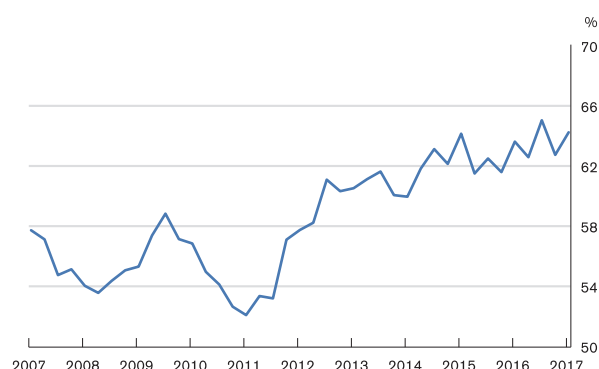
Chart B5.4
Average tier-one capital ratio of FBHKs

Note: Figures refer to the simple average of the consolidated tier-one capital ratio of parent banks of FBHKs.
Source: HKMA staff estimates based on data obtained from SNL and Capital IQ.

Chart B5.5
Stable funding ratio of FBHKs

Note: Stable funding sources are defined as the sum of customer deposits and non-deposit liabilities with maturity over three months.
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 FBHKs from UMP countries 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 B5.3 previously. Had their balance sheets not improved after the crisis, FBHKs from UMP countries would reduce their dollar loans more significantly by 4.8% if the US Fed raises the policy rate by 100 basis points in the first scenario, while the estimated decline in dollar loans in the second scenario is larger at 9.5%.

Conclusion

Our study finds that the Hong Kong banking sector is not immune from the inward spillover of monetary policy. In particular, FBHKs' 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 FBHKs' capitalisation and funding structure. Looking ahead, the stronger balance sheet of FBHKs 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 unconventional monetary policies.