5. Banking sector performance

Despite a less sanguine external environment, the Hong Kong banking sector remained healthy, characterised by a broadly steady level of earnings, favourable liquidity conditions, sound asset quality and strong capital positions. Looking forward, uncertainties in the timing and pace of interest rate rises in the US could pose significant challenges for banks in managing their funding and liquidity risks. Banks should also continue to be attentive to risks associated with the upward trends of corporate leverage and household debt-servicing burdens, as well as the implications of slower economic growth in Mainland China for their increasing Mainland-related lending. As such, banks should continue to maintain stringent prudential management of their credit exposures.

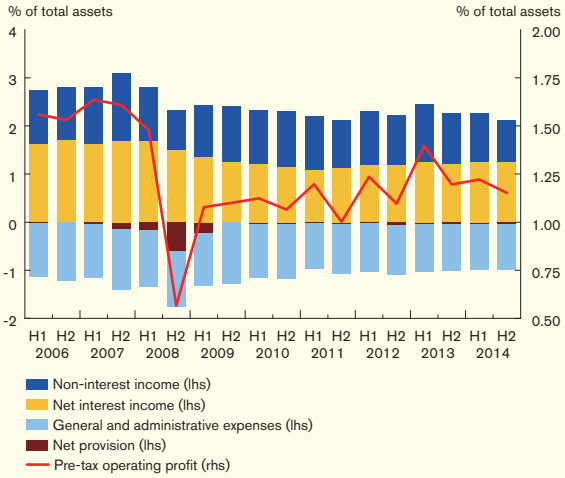
5.1 Profitability and capitalisation

Profitability

Despite a less sanguine external environment, retail banks[40] sustained a broadly steady level of earnings in the second half of 2014, with pre-tax operating profits edging down 0.5% from the first half of 2014. The slight decline in profitability was mainly due to a lower non-interest income, which more than offset an increase in net interest income. Reflecting this, the return on assets of retail banks dropped slightly to 1.15% in the second half of 2014 from 1.22% in the first half (Chart 5.1).

For 2014 as a whole, the aggregate pre-tax operating profits of retail banks registered a moderate increase of 3.6%. The average return on assets, however, dropped to 1.19% from 1.29% in 2013 due to a faster increase in assets. Nonetheless, the performance in 2014 remained better than the average observed after the global financial crisis.

Chart 5.1
Profitability of retail banks

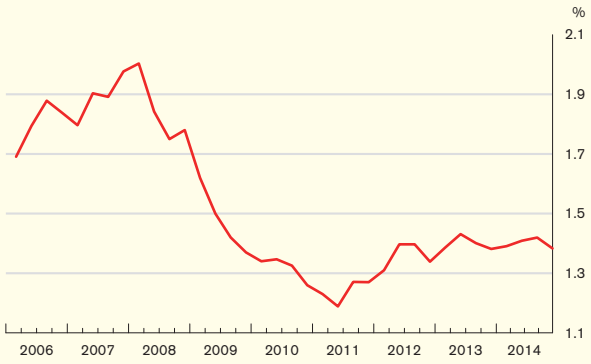


Note: Semi-annually annualised figures.
Source: HKMA.

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

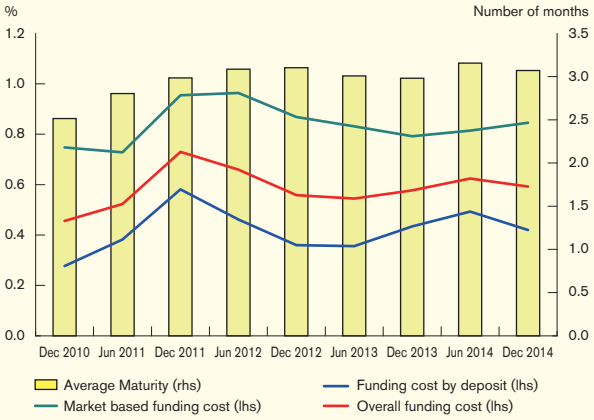
The net interest margin of retail banks remained largely stable, averaging 1.4% in the second half of 2014 (Chart 5.2). For licensed banks as a whole, their overall interest costs registered a mild decrease of 3 basis points in the second half of 2014, driven by a fall in deposit funding cost which outpaced an increase in market-based funding cost (Chart 5.3).[41] Similarly, the composite interest rate, a measure of the average cost of Hong Kong dollar funds for retail banks, declined to 0.39% at the end of 2014 from a recent high of 0.47% at the end of June (Chart 5.4).

Chart 5.2
Net interest margin of retail banks



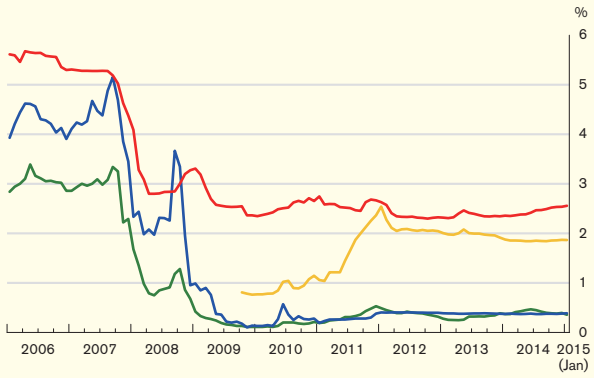
Note: Quarterly annualised figures.
Source: HKMA.

Chart 5.3
Hong Kong and US dollar funding cost and maturity of licensed banks



Source: HKMA.

Chart 5.4
Interest rates



Notes:
(a) End of period figures.
(b) Period-average figures for approved loans. All mortgage rates are estimates only.
Sources: HKMA and staff estimates.

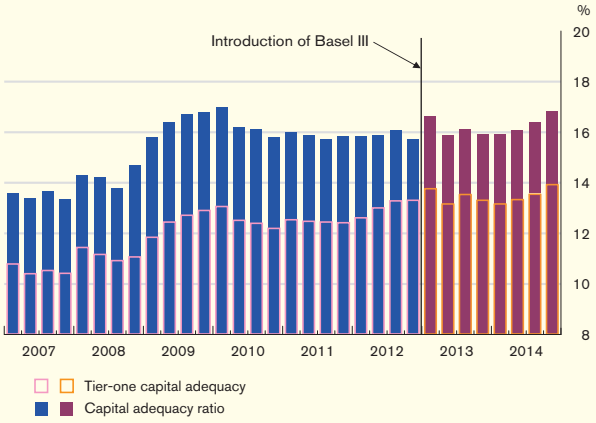
During the second half of 2014, both the HIBOR-based and the best lending rate-based (BLR-based) mortgage rates increased slightly, with the latter rising by a larger extent. Partly in response to the widening gap between the two mortgage rates, the share of HIBOR-based mortgages amongst newly approved mortgage loans increased further to 84.5% at the end of 2014 from 76.7% at the end of June.

[41] Market-based funding cost is measured by the interest costs of banks' non-deposit interest bearing liabilities.

Capitalisation

Capitalisation of the banking sector remained well above the minimum international standards. The consolidated capital adequacy ratio of locally incorporated AIs increased slightly to 16.8% at the end of December 2014 from 16.1% at the end of June (Chart 5.5), with the tier-one capital adequacy ratio (the ratio of tier-one capital to total risk-weighted assets) increasing to 13.9% from 13.3%.

Chart 5.5
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 capital adequacy ratios from March 2013 onwards are therefore not directly comparable with those up to December 2012.

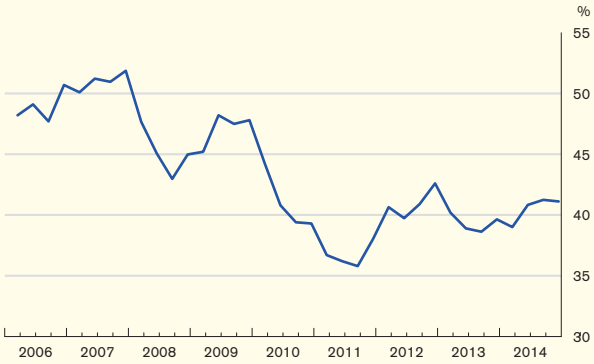
Source: HKMA.

5.2 *Liquidity, interest rate and credit risks*

Liquidity and funding

The liquidity position of the banking sector remained favourable, with the average liquidity ratio[42] of retail banks improving to 41.1% in the fourth quarter of 2014, from 40.8% in the second quarter (Chart 5.6), remaining well above the regulatory minimum of 25%.

Chart 5.6
Liquidity ratio of retail banks

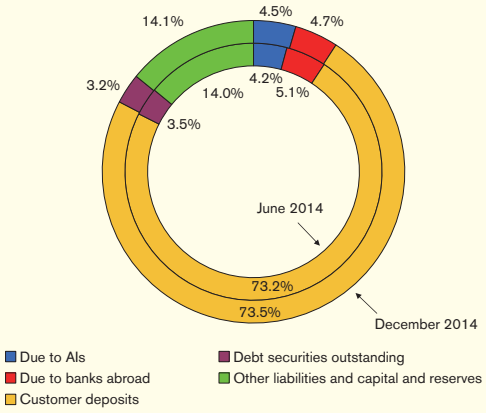


Note: Quarterly average figures.
Source: HKMA.

Customer deposits continued to be the primary funding source for retail banks, underpinning a stable funding structure. The share of customer deposits to banks' total liabilities was 73.5% at the end 2014, slightly higher than 73.2% at the end of June 2014 (Chart 5.7).

[42] This is calculated as the ratio of liquefiable assets (e.g. marketable debt securities and loans repayable within one month subject to their respective liquidity conversion factors) to qualifying liabilities (basically all liabilities due within one month).

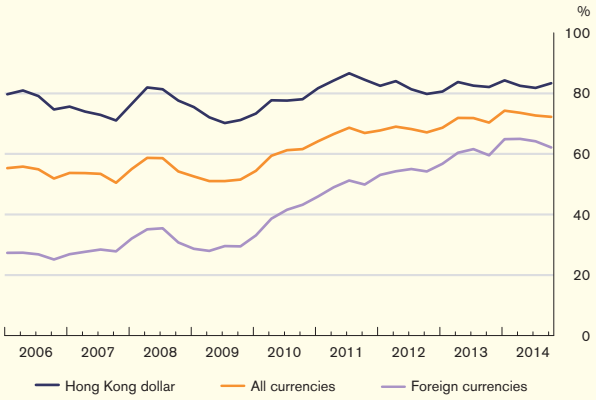
Chart 5.7
Liabilities structure of retail banks



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.

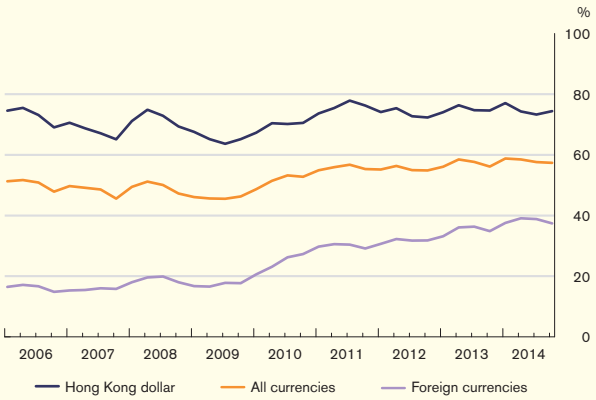
Source: HKMA.

Chart 5.8
Loan-to-deposit ratios of all AIs



Source: HKMA.

Chart 5.9
Loan-to-deposit ratios of retail banks



Source: HKMA.

Partly reflecting the effect of the Stable Funding Requirement[43], the all-currency loan-to-deposit (LTD) ratio for all AIs declined slightly to 72.2% at the end of 2014, compared with 73.6% at the end of June (Chart 5.8). Meanwhile, the foreign currency LTD ratio fell from 65% to 62.1%, while the HKD LTD ratio hovered at 83.3% at the end of 2014.

For retail banks, the HKD LTD ratio remained largely unchanged at 74.4% at the end 2014, while the foreign currency LTD ratio declined to 37.4% from 39.1%. The all-currency LTD ratio also edged down to 57.3% from 58.5% (Chart 5.9).

The Basel III Liquidity Coverage Ratio (LCR) [44] requirement began to be phased-in from 1 January 2015, in accordance with the transitional timeline specified by the Basel Committee on Banking Supervision. Market information so far has revealed no notable impact associated with the introduction of the LCR requirement, although the full impact may take a longer time to emerge. Nevertheless, the smooth phase-in suggests that AIs in Hong Kong are generally not expected to encounter major difficulties in complying with the new liquidity standard over the transition period.

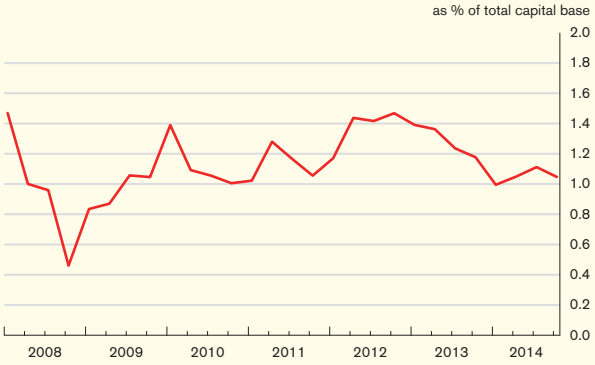
[43] The HKMA introduced the Stable Funding Requirement (SFR) in October 2013 requiring AIs with significant loan growth to ensure adequate stable funding to support their lending business from 2014 onwards. The HKMA implemented several refinements to the SFR with effect from January 2015 to streamline the operation of the SFR and alleviate AIs' reporting burden. Further details of the refinements can be found in the HKMA circular "Stable Funding Requirement" released on 28 November 2014, which is available on the HKMA website.

[44] LCR is a new minimum liquidity standard introduced in Basel III, designed to ensure that banks have sufficient high-quality liquid assets to survive a significant stressed scenario lasting 30 calendar days.

Interest rate risk

Interest rate risk exposures of retail banks remained manageable during the review period. It is estimated that under a hypothetical shock of an across-the-board 200-basis-point increase in interest rates, the economic value of retail banks' interest rate positions could be subject to a decline equivalent to 1.05% of their total capital base as of December 2014 (Chart 5.10).

Chart 5.10
Impact of interest rate shock on retail banks



Notes:

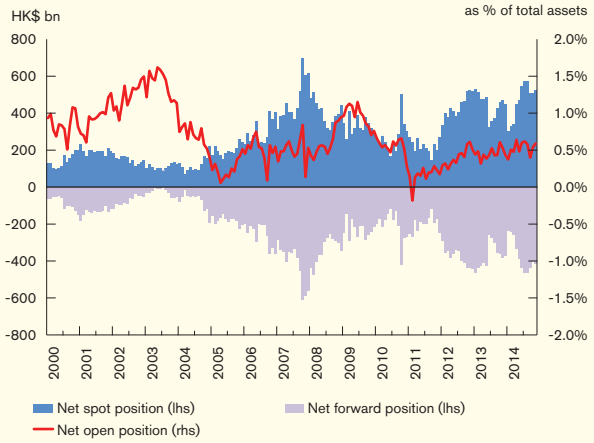
1. Interest rate shock refers to a standardised 200-basis-point parallel rate shock to institutions' interest rate risk exposures.
2. The impact of the interest rate shock refers to its impact on the economic value of banking and trading book[45], expressed as a percentage of the total capital base of banks.

Source: HKMA staff estimates.

Foreign currency position

The exchange rates of some major currencies have shown increasing volatilities amid the divergence of monetary policy stances in advanced economies. Nevertheless the potential impact on the Hong Kong banking sector should be low, as the aggregate foreign currency positions of AIs, including both spot and forward positions, amounted to HK$101 billion at the end of 2014 (Chart 5.11) which was only around 0.6% of total assets.

Chart 5.11
The foreign currency position of AIs



Notes:

1. The net spot position is the spot assets minus spot liabilities of foreign currencies. The net forward position is the forward purchases minus forward sales of foreign currencies.
2. Net open position is defined as the net spot position plus net forward position.
3. Structural assets and liabilities, such as investment in fixed assets and premises, overseas branch capital, investment in overseas subsidiaries and related companies and loan capital, are excluded for the calculations.

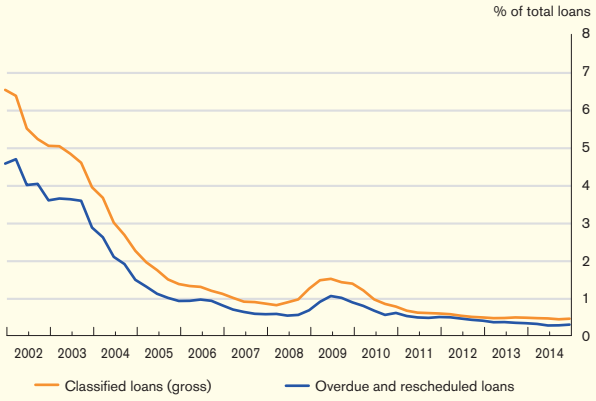
Source: HKMA.

[45] 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 and overseas incorporated institutions are required to report aggregate positions in the banking book and trading book.

Credit risk

The asset quality of retail banks' loan portfolios remained healthy, with the classified loan ratio declining slightly to 0.45% at the end of 2014, from 0.46% at the end of June, while the ratio of overdue and rescheduled loans edged up to 0.29% from 0.27% during the period (Chart 5.12).

Chart 5.12
Asset quality of retail banks



Notes:
1. Classified loans are those loans graded as "sub-standard", "doubtful" or "loss".
2. Figures related to retail banks' Hong Kong office(s) and overseas branches.

Source: HKMA.

Credit growth moderated in the second half of 2014, after its rapid expansion in the first half of the year. On a half-year basis, the growth of domestic lending[46] of AIs slowed considerably from 11.3% in the first half to 0.7% in the second half mainly driven by a decline in trade finance.

According to the results of the HKMA Opinion Survey on Credit Condition Outlook of December 2014, the share of surveyed AIs expecting loan demand to remain the same in the next three months had increased to 90%, whereas the share expecting higher loan demand had decreased slightly (Table 5.A).

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

As % of total respondents	Mar 2014	Jun 2014	Sep 2014	Dec 2014
Considerably higher	0	0	0	0
Somewhat higher	24	10	19	10
Same	71	86	81	90
Somewhat lower	5	5	0	0
Considerably lower	0	0	0	0
Total	100	100	100	100

Source: HKMA.

Household exposure

Household loans[47] grew at a relatively faster pace of 5.9% in the second half of 2014 from 4.6% in the first half (Table 5.B). Partly reflecting the more buoyant residential property market and a tangible pickup in property transaction volumes since the first quarter of 2014, both the number of new mortgage loans drawn down and the average size of new mortgage loans have risen notably during the same period (Chart 5.13). As a result, the outstanding mortgage lending expanded further by 5.2% in the second half of 2014, following a 3.1% increase in the first half.

Partly reflecting the impact of the strengthened prudential requirements on personal lending business set out by the HKMA in January 2014, there was a moderation in the growth rate of other loans for private purposes (i.e. personal loans). On a half-year basis, the growth rate of these loans slowed to 6.9% in the second half of 2014, from a much stronger growth of 13.9% in the first half.

[46] Defined as loans for use in Hong Kong plus trade-financing loans.

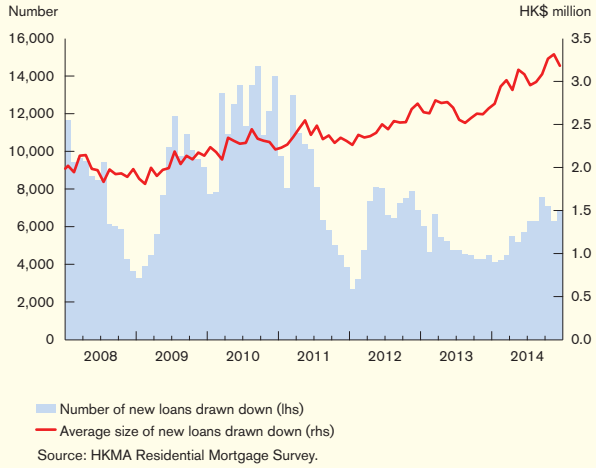
[47] Loans to households constitute lending to professional and private individuals, excluding lending for other business purposes. Mortgage lending accounts for a major proportion of household loans while the remainder comprises mainly unsecured lending through credit card lending and other personal loans for private purposes. At the end of 2014, the share of household lending in domestic lending was 28.9%.

Table 5.B
Half-yearly growth of loans to households of all AIs

	2011		2012		2013		2014	
(%)	H1	H2	H1	H2	H1	H2	H1	H2
Mortgages	5.5	1.2	2.5	5.0	3.1	0.8	3.1	5.2
Credit cards	-1.4	15.9	-1.6	15.3	-4.0	10.2	-4.1	10.4
Other loans for private purposes	9.4	3.8	5.0	9.3	10.6	10.5	13.9	6.9
Total loans to households	5.6	2.7	2.6	6.5	3.8	3.3	4.6	5.9

Source: HKMA.

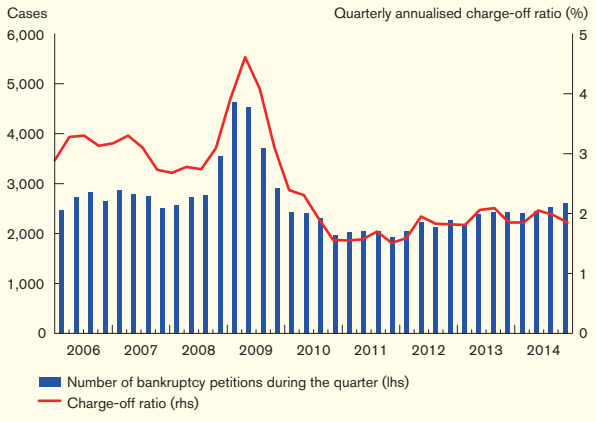
Chart 5.13
New mortgage loans of surveyed AIs



Source: HKMA Residential Mortgage Survey.

The credit risk of unsecured household exposure remained contained in the second half of 2014, with the annualised credit card charge-off ratio and the number of bankruptcy petitions staying relatively low (Chart 5.14).

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



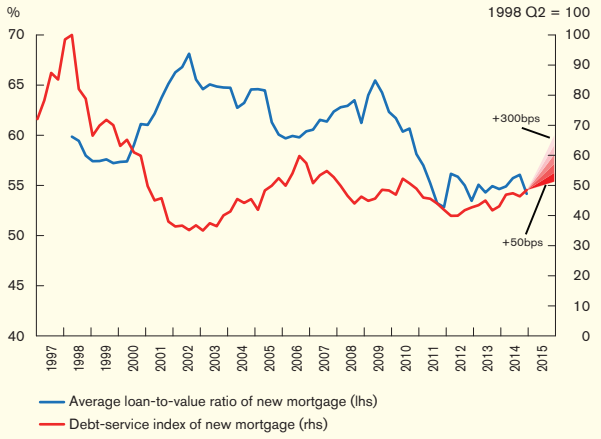
Sources: Official Receiver's Office and the HKMA.

Banks' mortgage portfolios remained healthy, with the delinquency ratio hovering at 0.03%. In addition, the average loan-to-value ratio of new mortgage loans approved edged down to 54.2% at the end of the fourth quarter of 2014 from 55.7% at the end of the second quarter, suggesting that banks' resilience to property price shocks continued to be strong (Chart 5.15). However, the debt-service index of new mortgages[48] rose to 48.5 at the end the fourth quarter of 2014 from 47.4 at the end of the second quarter. The deterioration in household repayment ability mainly reflected an expansion in the average size of mortgage loans, which outpaced the growth in household income. Moreover, a sensitivity test suggests that if interest rates were to increase by 300 basis points and other things being constant, the debt-service index would rise significantly to 66.7. Households' debt servicing ability could come under significant pressures should the US monetary conditions normalise and interest rates rise. In order to strengthen banks' risk management and resilience, the HKMA has introduced a new round of supervisory measures for mortgage lending.[49]

[48] 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 deterioration in the asset quality of household debt.

[49] On 27 February 2015, the HKMA introduced a new round of prudential supervisory measures on property mortgage business, which included lowering the maximum loan-to-value ratio and debt-servicing ratio, to strengthen banks' risk management and resilience. Meanwhile, the HKMA also required AIs using the internal ratings-based approach to extend, by end-June 2016, the risk-weight floor of 15% to residential mortgage loans approved before February 2013. For details, see HKMA press release "Prudential Supervisory Measures for Mortgage Lending" issued on the same date.

Chart 5.15
Average loan-to-value ratio and household debt-servicing burden in respect of new mortgages



Note: The calculation of the index is based on the average interest rate for BLR-based mortgages.

Sources: HKMA and staff estimates.

Corporate exposure [50]

In contrast to household loans, domestic loans to corporations declined by 1.3% in the second half of 2014, after growing robustly by 14.2% in the first half. The decline in corporate loans was driven by a broad-based slowdown in growth in loan to major business sectors and a notable decline in trade financing.[51] At the end of 2014, corporate loans accounted for 70.8% of domestic lending.

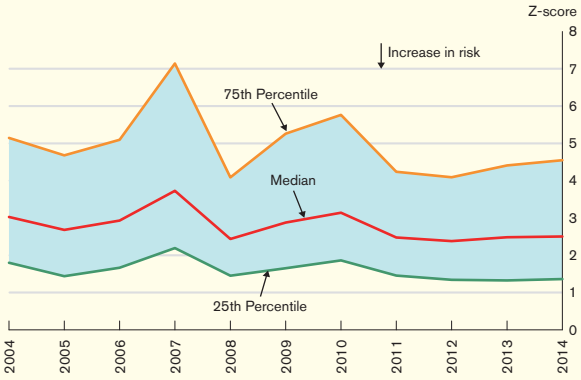
While the Altman's Z-score (Chart 5.16) and the number of compulsory winding-up orders of companies remained broadly steady, there are indicators suggesting that credit risk in respect of banks' corporate exposures may be heightening. In particular, the debt leverage of the corporate sector as measured by weighted average debt-to-equity ratio has continued an upward trend in recent years, with the ratio rising to 63.8% at the end of 2014 (Chart 5.17). Meanwhile, the rise in debt-service ratio, as measured by total interest expenses divided by earnings before interest and taxes (EBIT), suggests a general deterioration of local corporations' debt-servicing ability (Chart 5.18). These indicators suggest that the debt-servicing ability of the corporate sector could be under test and credit risks could be amplified by the high level of leverage when interest rates rise.

Meanwhile, given the prolonged period of low interest rate environment in major advanced economies, corporations may be encouraged to take on excessive foreign exchange exposure due to attractive borrowing rates without regard to the possible impact on the currency mismatch between their funding and earnings. Such currency mismatch could translate into significant losses and thus increase their default risk if exchange rates move unfavourably. Banks should remain vigilant to corporate currency mismatch risk.

50 Excluding interbank exposure.

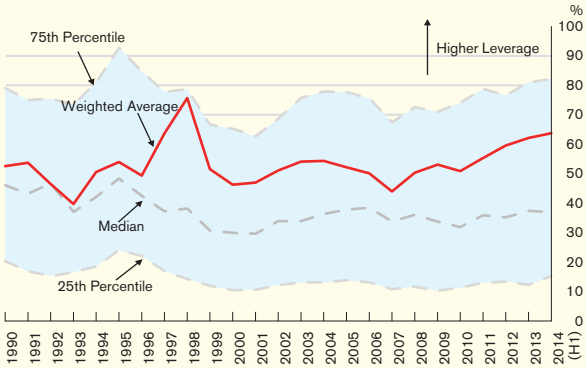
51 Trade financing decreased significantly by 14.3% in the second half of 2014, after growing by 15.1% in the first half of 2014.

Chart 5.16
Altman's Z-score: A bankruptcy risk indicator of listed non-financial companies



Note: A lower Z-score indicates a higher likelihood of a company default.
Source: HKMA staff estimates based on data from Bloomberg.

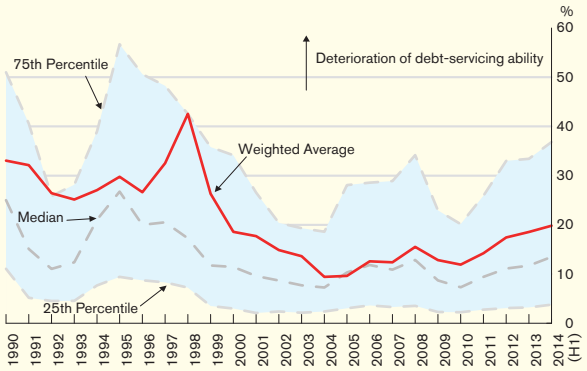
Chart 5.17
Leverage ratio of listed non-financial companies in Hong Kong



Notes:
1. The leverage ratio is defined as the ratio of debt to equity. A higher value indicates higher leverage.
2. All non-financial corporations listed on the Hong Kong Stock Exchange are selected.

Source: HKMA staff estimates based on data from Bloomberg.

Chart 5.18
Debt-service ratio of listed non-financial companies in Hong Kong



Notes:
1. Debt-service ratio is calculated by the total interest expenses divided by the earnings before interest and tax (EBIT). Companies with negative EBIT are excluded from the calculation.
2. All non-financial corporations listed on the Hong Kong Stock Exchange are selected.

Source: HKMA staff estimates based on data from Bloomberg.

Mainland-related lending and non-bank exposures

The banking sector continued to expand its business in Mainland China during the review period. Total Mainland-related lending increased by 5.4% to HK$3,117 billion (14.9% of total assets) at the end of 2014 from HK$2,956 billion (14.4% of total assets) at the end of second quarter of 2014 (Table 5.C). During the review period, other non-bank exposures increased by 1.77% to HK$997 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK$ bn	Mar 2014	Jun 2014	Sep 2014	Dec 2014
Mainland-related loans	2,867	2,956	3,058	3,117
Mainland-related loans excluding trade finance	2,461	2,546	2,638	2,775
Trade finance	406	410	420	341
By type of AIs:				
Overseas-incorporated AIs	1,244	1,263	1,312	1,340
Locally-incorporated AIs*	1,111	1,164	1,205	1,227
Mainland banking subsidiaries of locally-incorporated AIs	512	530	542	550
By type of borrowers:				
Mainland state-owned entities	1,453	1,480	1,425	1,463
Mainland private entities	528	562	566	562
Non-Mainland entities	886	914	1,067	1,092

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

Source: HKMA.

Table 5.D
Other non-bank exposures

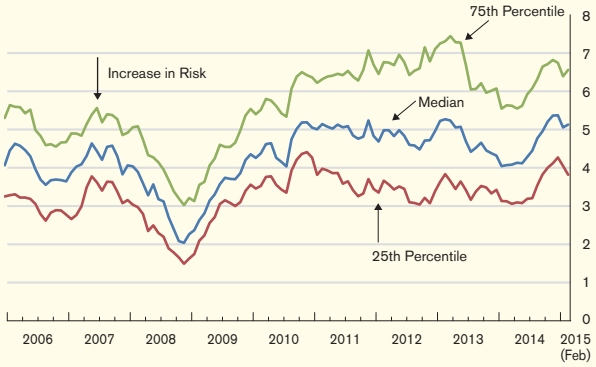
HK$ bn	Mar 2014	Jun 2014	Sep 2014	Dec 2014
Negotiable debt instruments and other on-balance sheet exposures	530	584	597	619
Off-balance sheet exposures	415	396	435	378
Total	**944**	**980**	**1,033**	**997**

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

Source: HKMA.

The aggregate distance-to-default index of the Mainland's corporate sector improved notably in 2014, which may reflect the effect of various liquidity loosening measures by Mainland authorities (Chart 5.19).[52&53] However, signs of deterioration in the index have appeared since January 2015, raising a question-mark on the longer-term effects of these measures on the Mainland's corporate sector. Banks should maintain a close focus on the prudent management of credit risk in the Mainland market.

Chart 5.19
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.

Macro stress testing of credit risk[54]

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 macroeconomic shocks, similar to those experienced during the Asian financial crisis. Chart 5.20 presents the simulated future credit loss rate of retail banks in the fourth quarter of

52 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.

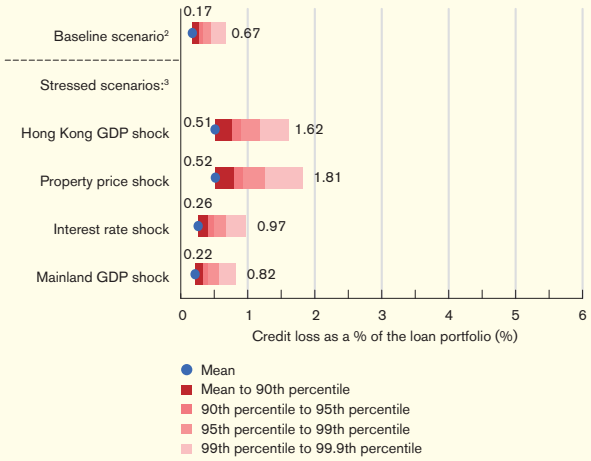
53 These measures include a reduction of the required reserve ratios for targeted financial institutions in April 2014, a cut in the benchmark lending rate in November and a further round of reduction in the benchmark lending rate and the required reserve requirement in February 2015. For details, refer to section 2.2 of the report.

54 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 report are not strictly comparable to those estimates from previous reports.

2016 under four specific macroeconomic shocks[55] using information up to the fourth quarter of 2014. The expected credit losses for retail banks' aggregate loan portfolios two years after the different hypothetical macroeconomic shocks are estimated to be moderate, ranging from 0.22% (Mainland GDP shock) to 0.52% (Property price shock).

Taking account of tail risk, banks' maximum credit losses (at the confidence level of 99.9%) under the stress scenarios range from 0.82% (Mainland GDP shock) to 1.81% (Property price shock), which are significant, but smaller than an estimated loan loss of 4.39% following the Asian financial crisis.

Chart 5.20
The mean and value-at-risk statistics of simulated credit loss distributions[1]



Notes:
1. The assessments assume the economic conditions in 2014 Q4 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 2015 Q1 to 2015 Q4.
   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 2015 Q1 to 2015 Q4.
   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2015 Q1), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2015 Q4).
   Mainland GDP shock: Slowdown in the year-on-year annual real GDP growth rate to 4% in one year.

Source: HKMA staff estimates.

Impacts of the divergence of monetary policies in advanced economies on US dollar credit

One important question for policymakers in the Asia-Pacific region is how US dollar liquidity would be affected by the divergence of monetary policies in advanced economies. Box 6 "Unconventional monetary policies and international US-dollar credit" of the previous report published in September 2014 shed light on this question by estimating the overall effect of the divergence of monetary policy paths in the US and Japan on dollar credit by Japanese banks. The result concluded that aggressive monetary policy adopted by the Bank of Japan may help cushion US dollar liquidity.

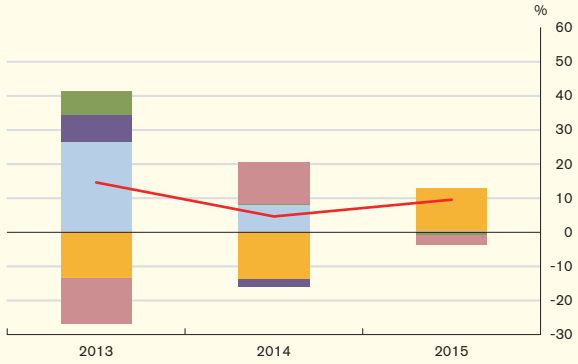
As the ECB announced details of its asset purchase programme on 22 January 2015, a similar estimation on the impact on US dollar credit by euro-area banks and thus a fuller assessment can possibly be conducted.

Charts 5.21 and 5.22 present the estimated annual growth rate of US dollar credit to the Asia-Pacific region by euro-area banks in the baseline and stressed scenarios. Qualitatively, the estimation results are similar to those for Japanese banks presented in Box 6 of the previous report, and point to the same conclusion that the contractionary effect of the US monetary normalisation on global liquidity would be partly offset by the expansionary effect of continued supply of US dollar credit by euro-area and Japanese banks. The results under the baseline scenario show that the US dollar loans extended by euro-area banks to the Asia-Pacific region would grow at a faster pace of 9.6% in 2015 from 4.6% in 2014 (Chart 5.21). The net effect, however, would be crucially dependent on

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

the functioning of the foreign exchange swap market. In particular, if there is a sharp rise in the swap cost, as specified in the stressed scenario, the US dollar loans extended by euro-area banks would decline by 10.8% in 2015 (Chart 5.22).

Chart 5.21
Estimated contribution by factors to the annual growth rate of US dollar loans to the Asia-Pacific region by euro-area banks



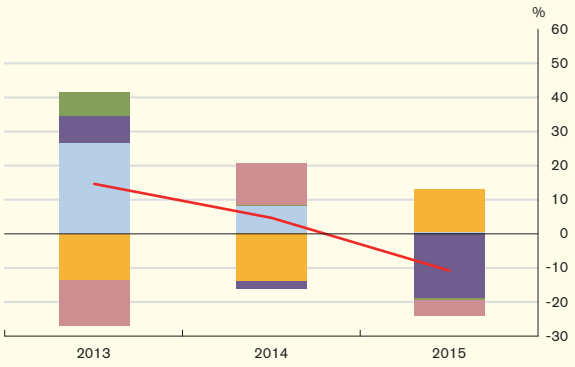
Fed's balance sheet
Eurosystem's balance sheet in US dollars
The swap cost for converting EUR to US dollars
The average CDS spread for euro-area banks
Other factors
Annual growth rates of USD loans by euro-area banks to the Asia-Pacific region

Notes:

1. The growth rates of US dollar loans before 2014 Q3 are computed based on actual data, while the results thereafter are generated based on the estimated contribution by the respective factors.
2. The Fed's balance sheet is assumed to increase at the long-run trend rate from 2014 Q4 onwards and financial assets held by the Fed with a remaining maturity below one year are assumed to be matured by the end of 2015.
3. The Eurosystem's balance sheet is assumed to expand at a monthly pace of 60 billion euro from Jan 2015 onwards, consistent with its latest asset purchase programme introduced in Jan 2015. The size of the Eurosystem's balance sheet is converted into US dollars in estimation. The exchange rate of EUR/USD is assumed to be unchanged since 2014 Q4.
4. The change of swap cost and that of the average CDS spread for euro-area banks since 2014 Q3 are assumed to follow the respective trends in the recent four quarters.

Source: HKMA staff estimates.

Chart 5.22
Estimated contribution by factors to the annual growth rate of US dollar loans to the Asia-Pacific region by euro-area banks under a stressed scenario



Fed's balance sheet
Eurosystem's balance sheet in US dollars
The swap cost for converting EUR to US dollars
The average CDS spread for euro-area banks
Other factors
Annual growth rates of USD loans by euro-area banks to the Asia-Pacific region

Notes:

1. The growth rates of US dollar loans before 2014 Q3 are computed based on the actual data, while the results thereafter are generated based on the estimated contribution by the respective factors.
2. For assumptions on the balance sheets of the Fed and Eurosystem, and the average CDS spread for euro-area banks, see footnotes 2 to 4 under Chart 5.21 respectively.
3. The change of swap cost for euro is assumed to increase linearly from 2014 Q4 to 2015 Q4 to 129 basis points. This assumption simulates a hypothetical scenario that euro-area banks face a sharp rise in the swap cost which is equivalent to half of the magnitude as occurred during the global financial crisis.

Source: HKMA staff estimates.

The assessment highlights that global liquidity remains highly uncertain amid the divergence of monetary policies in advanced economies. Findings in Box 5 further suggest that any initial contraction in global liquidity could be amplified, as banks would react to the liquidity shock by reducing their leverage and thus lending capacity. The implications for liquidity risk merit close attention.

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 HKMA announced on 27 January 2015 that the CCyB for Hong Kong will be 0.625% with effect from 1 January 2016.[56] Under the phase-in arrangement for the CCyB, the maximum CCyB under Basel III will begin at 0.625% of banks' risk-weighted assets on 1 January 2016.[57]

In setting the CCyB rate, the Monetary Authority considered a series of indicators (Table 5.E), including an "indicative buffer guide" (which is a metric providing a guide for CCyB rates based on credit and property price gaps[58]). The credit and property price gaps remain at elevated levels and a simple mapping from the indicative buffer guide would signal a CCyB of 2.5% at the upper end of the Basel III range.

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

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

	Q1-2015
Announced CCyB rate	0.625%
Date effective	01/01/2016
Indicative buffer guide	2.50%
Basel Common Reference Guide	2.50%
Property Buffer Guide	2.50%
Composite CCyB Guide	2.50%
Indicative CCyB Ceiling	None
Primary gap indicators	
Credit/GDP gap	32.80%
Property price/rent gap	14.20%
Primary stress indicators	
3-month HIBOR OIS spread (percentage points)	0.17%
Quarterly change in classified loan ratio (percentage points)	-0.01%

Note: 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 decision, and may not be the most recent available as of each quarter end. (Refer to SPM CA-B-1 for explanations of the variables).

Source: HKMA.

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

[56] Further details of the decision can be found in the "Announcement of the CCyB to authorized institutions" released on 27 January 2015 which is available on the HKMA website.

[57] Under the phase-in arrangement, the maximum CCyB rate would be 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 gap 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.F
Key performance indicators of the banking sector [1] (%)

	Dec 2013	Sep 2014	Dec 2014
Interest rate			
1-month HIBOR fixing [2] (quarterly average)	0.21	0.22	0.23
3-month HIBOR fixing (quarterly average)	0.38	0.37	0.38
BLR [3] and 1-month HIBOR fixing spread (quarterly average)	4.79	4.78	4.77
BLR and 3-month HIBOR fixing spread (quarterly average)	4.62	4.63	4.62
Composite interest rate [4]	0.39	0.40	0.39
		Retail banks	
Balance sheet developments [5]			
Total deposits	5.3	2.4	2.1
Hong Kong dollar	1.5	1.3	0.9
Foreign currency	10.1	3.7	3.4
Total loans	2.6	0.9	1.6
Domestic lending [6]	2.5	-0.3	1.2
Loans for use outside Hong Kong [7]	2.7	6.2	3.2
Negotiable instruments			
Negotiable certificates of deposit (NCD) issued	10.5	-3.9	-4.6
Negotiable debt instruments held (excluding NCD)	3.7	-0.4	-2.7
Asset quality [8]			
As a percentage of total loans			
Pass loans	98.33	98.53	98.56
Special mention loans	1.20	1.04	0.99
Classified loans [9] (gross)	0.48	0.43	0.45
Classified loans (net) [10]	0.34	0.31	0.31
Overdue > 3 months and rescheduled loans	0.33	0.27	0.29
Profitability			
Bad debt charge as percentage of average total assets [11]	0.04	0.05	0.05
Net interest margin [11]	1.40	1.41	1.40
Cost-to-income ratio [12]	42.4	42.5	43.5
Liquidity ratio (quarterly average)	39.6	41.2	41.1
		Surveyed institutions	
Asset quality			
Delinquency ratio of residential mortgage loans	0.02	0.02	0.03
Credit card lending			
Delinquency ratio	0.20	0.22	0.20
Charge-off ratio – quarterly annualised	1.85	1.98	1.85
– year-to-date annualised	1.84	1.90	1.83
		All locally incorporated AIs	
Capital adequacy ratio (consolidated) [13]	15.9	16.4	16.8

Notes:

1. Figures are related to Hong Kong office(s) only except where otherwise stated.
2. The Hong Kong Dollar Interest Settlement 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 in 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 retail banks' Hong Kong office(s) and overseas branches.
9. Classified loans are those loans graded as "substandard", "doubtful" or "loss".
10. Net of specific provisions/individual impairment allowances.
11. Year-to-date annualised.
12. Year-to-date figures.
13. With effect from 1 January 2013, a revised capital adequacy framework (Basel III) was introduced for locally incorporated authorized institutions.

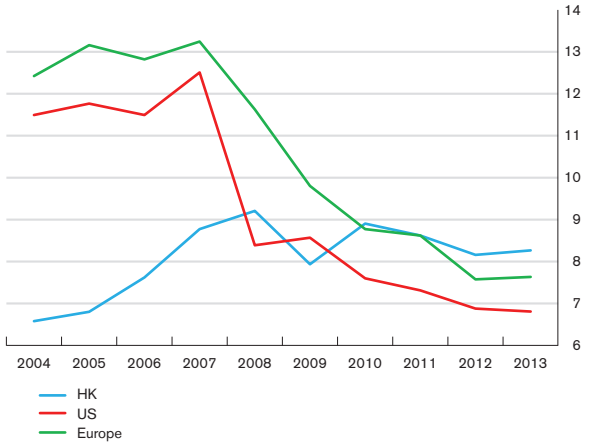
Box 5
Global liquidity and leverage management: A case in Hong Kong

In the aftermath of the global financial crisis, the G20 leaders declared that excessive leverage was one of the root causes for the crisis during the Washington Summit in 2008. Despite sharing the common trend of a rise in leverage prior to the onset of the global financial crisis, banks in Hong Kong have not so far experienced an extended period of deleveraging when compared with banks in the US and Europe (Chart B5.1). This could partly reflect a more benign level of leverage of Hong Kong banks over the observed period. Nevertheless, recent studies have highlighted that the prevailing abundant global liquidity generated from unprecedented monetary policies by central banks in the advanced economies may add further complications to the dynamics of banks' leverage.[60] Against this background, this box examines the extent to which the abundant global liquidity conditions may affect the adjustment mechanism of banks' leverage in Hong Kong.

As a major international financial centre, Hong Kong has a highly competitive banking sector, encompassing more than 200 banks with 27 out of 29 of the global systemically important banks identified by the Financial Stability Board operating in the form of bank branches and subsidiaries. In 2013, 19 of the top 100 global banking organisations had established a foreign bank subsidiary in Hong Kong and 63 of the top 100 global banking organisations had established operations in the form of foreign bank branches.

The strong presence of foreign banks in Hong Kong provides a suitable empirical setting to study how the capital management of a bank may be affected by global liquidity conditions.

Chart B5.1: Cross-country comparison of banks' leverage



Notes:

(1) Figures refer to the median risk-weighted assets over Tier 1 capital (Tier 1 capital leverage) of the respective banking sector.

(2) Hong Kong banks refer to 19 major locally incorporated banks in Hong Kong.

(3) Europe banks refer to Banco Santander, BBVA, BNP Paribas, BPCE Group, Credit Agricole Group, Credit Suisse, Deutsche Bank, ING Bank, Nordea Bank, Societe Generale, UBS, UniCredit SpA, Barclays PLC, HSBC, Lloyds, Royal Bank of Scotland and Standard Chartered PLC. US banks refer to Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, State Street and Wells Fargo.

Source: Bankscope.

The theoretical framework

The theoretical framework is based on the trade-off theory of bank leverage.[61] Specifically, the trade-off theory assumes that banks would actively manage their leverage towards their preferred capital structure (the target leverage), as

[60] For studies that highlight the impact of global liquidity on banks' behaviour, see Rey (2013), "Dilemma not Trilemma: The Global Financial Cycle and Monetary Policy Independence," Jackson Hole Economic Symposium, and Bruno and Shin (2013), "Capital Flows, Cross-Border Banking and Global Liquidity," NBER working paper No. 19038.

[61] The trade-off theory is a commonly used framework to examine non-financial firms' leverage. A number of studies have found that bank's behaviour towards capital structure is not much different from that of non-financial firms. See Gropp and Heider (2010), "The Determinants of Bank Capital Structure," Review of Finance 14: 587-622. Berger et.al (2008), "How do Large Banking Organizations Manage their Capital Ratios?" Journal of Financial Services Research 34: 123-49.

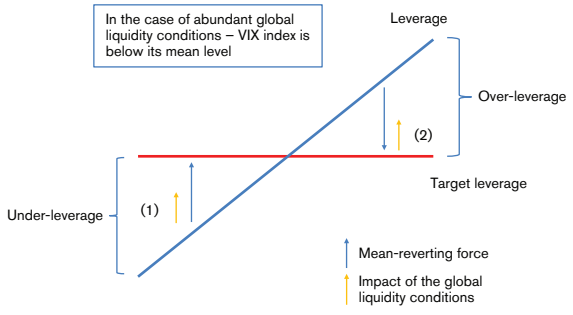
opposed to keeping the capital level at the minimum capital requirement. The model is consistent with survey results that banks consider a target leverage ratio or range when making their capital decisions.[62]

Meanwhile, the fact that the capital adequacy ratio of locally incorporated AIs in Hong Kong has been consistently above the minimum international standard with variations over time appears to support the predictions from the trade-off theory of leverage.[63]

The theory postulates that banks' target leverage could be inferred by standard determinants of leverage which include a bank's profitability, growth potential, tangibility, size and asset quality. However, the adjustment costs involved in changing the leverage prevent banks from attaining the target ratio quickly. Instead, the model assumes that a bank closes a constant proportion of the gap between its current and target leverage each period. The implication from the model is that there is a mean-reverting force which acts as a self-correcting mechanism for banks' leverage, with over-leveraged banks (i.e., banks with actual leverage level higher than the targeted level) having a tendency to decrease their leverage, and vice versa. Because of the prevailing abundance of liquidity globally, which could complicate the dynamics of bank leverage, we further hypothesise the mean-reverting force could at times be unduly disturbed by the global liquidity conditions.

To better understand this, a graphical illustration of the model mechanism is provided (Chart B5.2). The upward sloping line indicates the actual leverage of a bank and the horizontal line is its target leverage, which is assumed to be constant for simplicity. The intersection of the two lines occurs when a bank is neither over-leveraged nor under-leveraged. On the left side of the intersection (Region 1), a bank is under-leveraged while the same bank is over-leveraged on the right side (Region 2). Suppose a bank is initially in Region 1, the mean-reverting factor predicts an increase in leverage to narrow the gap. Given that favourable liquidity conditions also induce a bank to increase leverage, this further accelerates the bank's adjustment towards its target. However, the net impact is uncertain when a bank's leverage is above its target (Region 2). As shown by the opposite direction of the arrows, while the mean-reverting factor predicts a decrease in leverage, more abundant global liquidity exerts an opposite effect which could lead to an increase in leverage; the net impact depends on which force is bigger. If the mean-reverting factor dominates, the net impact is a decrease in leverage. However, if global liquidity is a more important factor, the net impact is an increase in leverage and a further widening of the gap.

Chart B5.2: A graphical illustration of how global liquidity may affect the dynamics of banks' leverage



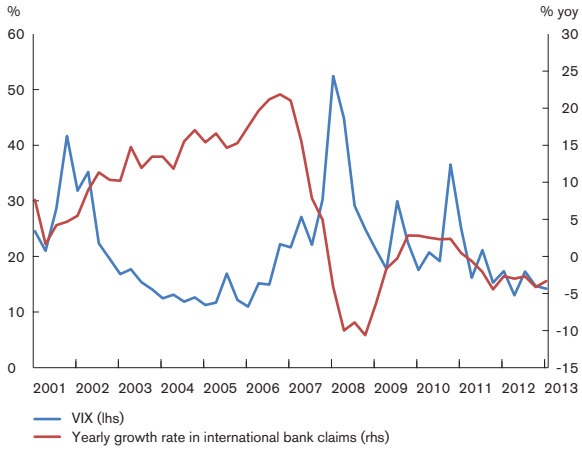
[62] See Wong et.al (2005), "Determinants of the Capital Level of Banks in Hong Kong," HKMA Research Memorandums, 13/2005.

[63] See Chart 5.5 of Chapter 5.

The empirical model and estimation results

Using a panel dataset of annual frequency between 1998 and 2012, the model is tested empirically for 19 major locally incorporated banks in Hong Kong, of which 13 are foreign bank subsidiaries and 6 are domestic banks.[64] A number of studies have found that the Chicago Board Options Exchange Market Volatility (VIX) is inversely correlated with various proxies of global liquidity, such as the yearly growth rate of international bank claims (Chart B5.3).[65] This box follows previous studies and uses VIX as an indicator of global liquidity conditions in the estimations, where a lower than historical average value of VIX indicates more abundant global liquidity conditions, and vice versa.[66] An asset-to-equity ratio is used as the measure of banks' leverage in the econometric analysis.[67&68]

Chart B5.3: Year-on-year rate of growth in international bank claims and VIX

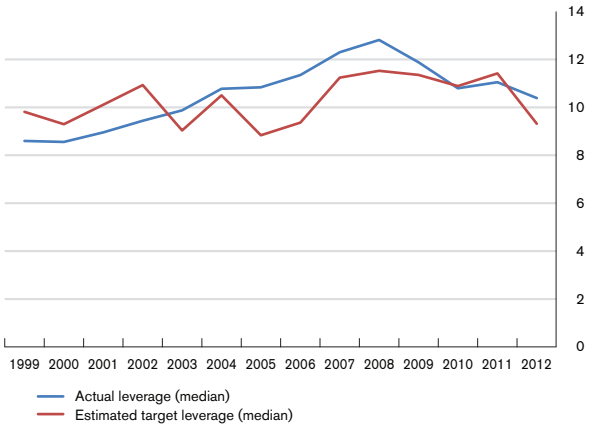


Note: Includes all BIS reporting banks' cross-border credit and local credit in foreign currency.

Sources: Bloomberg and BIS.

The results show evidence of mean-reversion of leverage for banks in Hong Kong as advocated by the trade-off theory, but that the leverage dynamics could at times be unduly affected by global liquidity conditions. To illustrate this, Chart B5.4 presents the actual and the estimated target leverage levels for the median bank in our sample. Theoretically, mean reversion of banks' leverage implies that a bank would reduce its leverage when its leverage is high relative to the target, and vice versa. However, it is observed that the bank's leverage continued to increase between 2006 and 2008 despite it being above the target, which could be largely due to the additional effect of more favourable global liquidity conditions during the period.

Chart B5.4: Comparison between estimated median target leverage and actual median leverage



Source: HKMA staff calculation.

64 The start and end point of our sample is determined by the data available from Bankscope.

65 VIX has been selected by the BIS as one of the key indicators for monitoring global liquidity, and it is updated and published regularly on the BIS website (http://www.bis.org/statistics/gli.htm). For academic studies that use VIX to proxy global liquidity, see footnote 60 of this box.

66 The empirical results are robust to alternative proxies of global liquidity conditions. For details of the empirical specification and results, see Ho et al. (2015), "Capital management and leverage of foreign bank subsidiaries in a host country: A case in Hong Kong," HKIMR working paper, No. 03/2015.

67 While the Tier 1 capital leverage can better reflect how the riskiness of banks' assets may evolve with the change in market conditions, there is a problem of data comparability as the definition of risk-weighted assets has been refined significantly since the adoption of Basel II.

68 Asset-to-equity ratio has the advantage of a sufficiently long enough time series for the econometric analysis.

The net impact of the mean-reverting force and global liquidity conditions on banks' leverage depends on how far leverage deviates from its target and the abundance of global liquidity. Table B5.1 provides a simulation analysis of how the gap between actual and target leverage is affected by its initial value and global liquidity conditions. In the row shaded in yellow, VIX is fixed to its historical mean level to illustrate the mean-reverting phenomenon of leverage, in which an over-leveraged bank is estimated to experience a decline in leverage and vice versa. However, there are instances where the mean-reverting force would be more than offset by favourable global liquidity conditions. For example, in one simulation, it is estimated that when the initial state of the bank is over-leveraged by 0.5 and there is abundant global liquidity (indicated by a ten percentage points below the historical mean of VIX), bank leverage increases by 0.33. This leads to a further widening of the deviation from target leverage, instead of a narrowing of the gap as predicted by the mean-reverting factor alone.[69]

Table B5.1: Net impact of global liquidity conditions on bank leverage

		Over-leverage (target – leverage) <0		Deviation	Under-leverage (target – leverage) >0	
		-1	-0.5	0	0.5	1
	-10	0.14	0.33	0.53	0.73	0.93
	-8	0.03	0.23	0.43	0.62	0.82
improved liquidity condition	-6	(0.08)	0.12	0.32	0.52	0.72
	-4	(0.18)	0.01	0.21	0.41	0.61
	-2	(0.29)	(0.09)	0.11	0.30	0.50
VIX-historical mean	0	(0.40)	(0.20)	0.00	0.20	0.40
	2	(0.50)	(0.30)	(0.11)	0.09	0.29
	4	(0.61)	(0.41)	(0.21)	(0.01)	0.18
worsened liquidity condition	6	(0.72)	(0.52)	(0.32)	(0.12)	0.08
	8	(0.82)	(0.62)	(0.43)	(0.23)	(0.03)
	10	(0.93)	(0.73)	(0.53)	(0.33)	(0.14)

Notes:
1. Numbers in the table refer to the estimated net change in leverage.
2. Numbers in brackets denote negative values.

Source: HKMA staff calculation.

Conclusion

This box finds empirical evidence of mean-reversion for banks' leverage, as advocated by the trade-off theory, and that global liquidity conditions also play an important role in the dynamics of banks' leverage. With the eventual exit from unconventional monetary policies by the US Fed, the findings in this box suggest that the associated tightening of global liquidity could have significant implications for bank leverage adjustment.[70] Specifically, banks that are initially above their target leverage would accelerate the deleveraging process further. Conversely, the tightening global liquidity conditions would impede under-leveraged banks in reverting back to their target leverage levels swiftly. The impact on banks' leverage could potentially affect banks' lending capacities and therefore merits closer attention.

[69] One caveat of the analysis is that the estimation is based on balance sheet information which suffers a certain degree of time lag. As such, it cannot examine whether banks in Hong Kong are over-leveraged or under-leveraged in real time.

[70] While the aggressive easing measures pursued by the Bank of Japan and the European Central Bank may partly offset the contractionary effect on global liquidity due to the exit from the Fed's unconventional monetary policy, the net effect on global liquidity conditions is crucially dependent on whether the normalisation of liquidity in the US would lead to serious financial market disruption. For details, see Box 6 of the September 2014 issue of this Report.