

5. Banking sector performance

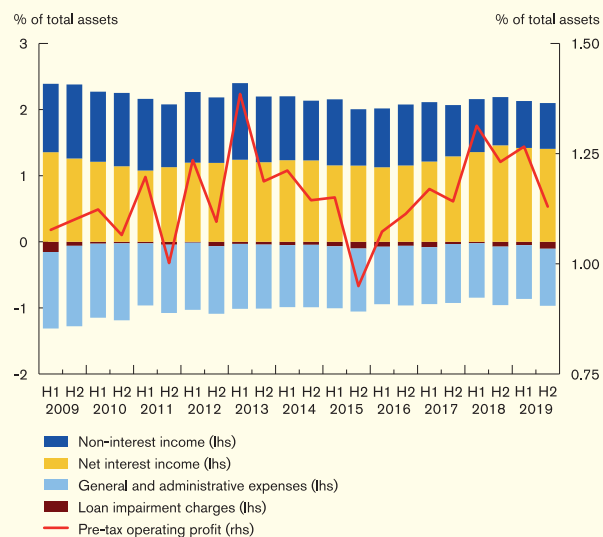
With rising uncertainties in both the global and domestic economic environments, retail banks in Hong Kong registered a slight decrease in their profits in the second half of 2019. That said, capital and liquidity positions of the Hong Kong banking sector remained strong and robust by international standards. Asset quality stayed healthy by historical standards. While loan growth decelerated in the second half of the year, it continued to outpace deposit growth during the review period. As a result, both the average all-currency and Hong Kong dollar loan-to-deposit ratios of all authorized institutions picked up. Nevertheless, the liquidity conditions of the banking system remained sound, underpinned by the stable Aggregate Balance and the broadly stable level of deposits. Looking ahead, the Hong Kong banking sector will continue to be challenged by a number of downside risk factors arising from uncertainties over the extent of the coronavirus outbreak, future US-China trade relations, geopolitical tensions and domestic social incidents. Banks should carefully assess how the possible intensification of these risk factors could impact the asset quality of their loan portfolios particularly when the levels of corporate leverage and household debt-servicing burdens have been rising.

5.1 Profitability and capitalisation

Profitability

The aggregate pre-tax operating profit of retail banks⁵⁹ fell moderately by 1.5% in the second half of 2019, compared with the same period in 2018. As a result, the return on assets (ROA) declined slightly to 1.13% in the second half of 2019, compared with 1.23% in the same period in 2018 (Chart 5.1). While the net interest margin (NIM) of retail banks slightly narrowed to 1.63% in the second half compared with 1.67% for the same period in 2018 (Chart 5.2), retail banks continued to register a mild increase in their net interest income during the review period. Nevertheless, profits were constrained by increases in loan impairment charges and operating expenses.

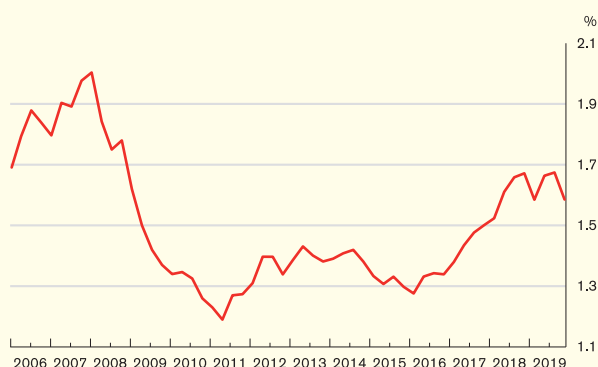
Chart 5.1
Profitability of retail banks



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

⁵⁹ Throughout this chapter, figures for the banking sector relate to Hong Kong offices only unless otherwise stated.

Chart 5.2
NIM of retail banks



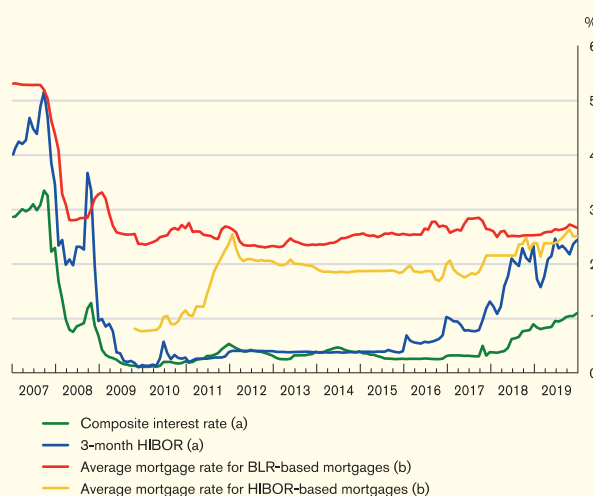
Note: Quarterly annualised figures.
Source: HKMA.

Despite three 25-basis-point cuts in the US Federal Funds Target Rate (FFTR) during the second half of 2019, the Hong Kong dollar wholesale funding market has not seen significant downward pressures so far. Rather, short-term Hong Kong dollar interbank interest rates (HIBOR) have witnessed an upward trend since the start of the fourth quarter of 2019, driven by various domestic factors including seasonal funding needs, heightened liquidity demand for large initial public offerings (IPOs) and tighter interbank liquidity conditions. Longer term HIBORs have remained steady during the review period, with the three-month HIBOR staying at 2.43% at the end of 2019, similar to the level six months ago (blue line in Chart 5.3).

On the retail front, with Hong Kong dollar savings deposit rates still close to zero level, retail banks have limited scope to cut them following US policy rate cuts.⁶⁰ On the other hand, banks continued to compete for long-term stable deposit funding during the review period amid

tighter Hong Kong dollar liquidity in the banking system⁶¹. Reflecting the increase in the weighted Hong Kong dollar deposit cost, the composite interest rate (a measure of the average Hong Kong dollar funding costs for retail banks) increased gradually to 1.09% at the end of 2019 from 0.95% six months ago. Nevertheless, it remained relatively low by historical standards (green line in Chart 5.3).⁶²

Chart 5.3
Interest rates



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

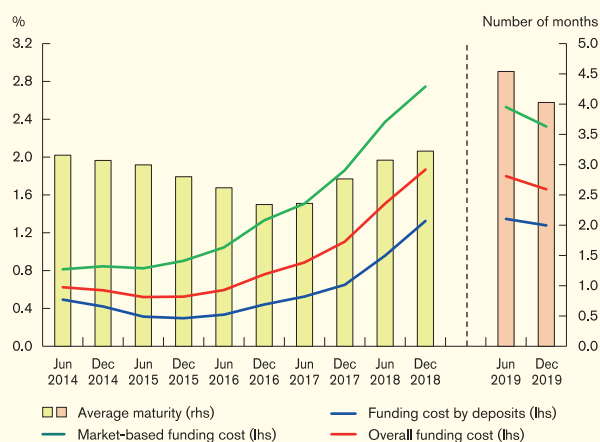
From a broader perspective, with the decrease in the US dollar funding cost among licensed banks more than offsetting the slight rise in its Hong Kong dollar counterpart, the overall Hong Kong dollar and US dollar funding cost for licensed banks in Hong Kong declined slightly by 14 basis point during the second half of 2019 (Chart 5.4). The mild decline in banks' overall funding costs along with relatively high levels of HIBORs, which contributed to the rise in net interest income, have been the supporting factors for banks' profitability during the review period.

⁶⁰ Historically, retail banks in Hong Kong usually adjusted their savings deposits rates and the corresponding best lending rate (BLR) around the timing of US FFTR rate changes. After the global financial crisis, savings deposit rates had hit an historically low level, nearing the zero bound. Amid nine US rate hikes between late 2015 and 2018, retail banks had only raised the savings deposit rates with BLR once in late-September 2018. Indeed, several retail banks cut their savings deposit rates again after the US rate cut in late-October 2019.

⁶¹ This can be seen from the rising trend of the Hong Kong dollar loan-to-deposit ratio (see Chart 5.10).

⁶² Since June 2019, the composite interest rate has been calculated based on the new local "Interest rate risk in the banking book" (IRRBB) framework. As such, the figures from June 2019 onwards are not strictly comparable with those of previous months.

Chart 5.4
Hong Kong dollar and US dollar funding cost and maturity of licensed banks



1. Since June 2019, licensed banks not exempted from the new local IRRBB framework would report under the new framework, while exempted licensed banks would continue to report under the existing interest rate risk exposure framework. The overall funding cost and the maturity have been calculated as the weighted averages of the respective figures for these two groups of licensed banks. As such, figures from June 2019 onwards are not directly comparable with those of previous periods.

Source: HKMA.

In the period ahead, multiple downside risk factors in both external and domestic environments continue to cloud the outlook for banks' profitability. These factors include uncertainties over the extent of the coronavirus outbreak, future US-China trade relations and heightened geopolitical tensions. An intensification of these risk factors could dampen the already sluggish global growth momentum and reduce demand for bank credit. The low global interest rate environment is also likely to persist in view of a broad-based adoption of accommodative monetary policy stances by major central banks, which could pose downward pressures on banks' NIM going forward.⁶³

On the domestic side, the social incidents since mid-2019 have dampened business investments and market confidence. If such incidents persist further in the future or intensify amid the already weakening economic environment, this will worsen the credit demand outlook and asset quality of banks.

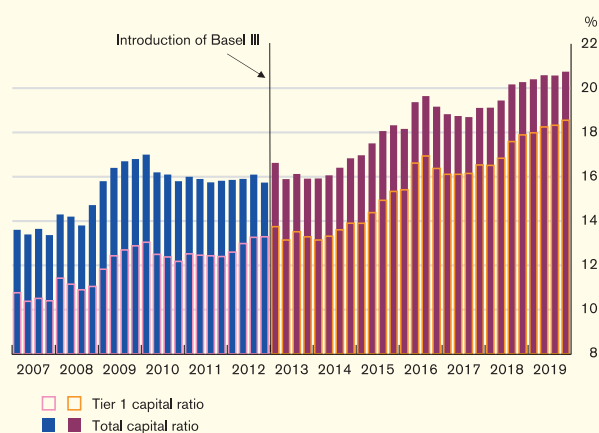
⁶³ Some major central banks (including the US Federal Reserve and the Bank of England) have cut policy rates and announced supportive measures in March amid the ongoing coronavirus outbreak and heightened volatility in financial markets.

On the overall development of the market, the Hong Kong banking sector is witnessing the launch of virtual banks following the granting of eight licences by the HKMA. To gain market share, these new players may attract customers by offering more convenient products and attractive deposit rates. This could pose upward pressure on the funding costs of incumbent banks. While the short-term impact is likely to be mild in view of the limited business scale of virtual banks, the longer-term impact may depend on how far incumbent banks seek to accelerate their adoption of financial technologies (fintech) in order to stay competitive. As suggested by the results in Box 5, a bank with a higher level of fintech adoption is statistically associated with larger improvements in its cost efficiency and its profitability.

Capitalisation

Capitalisation of the Hong Kong banking sector continued to be strong and well above the minimum international standards. The consolidated total capital ratio of locally incorporated authorized institutions (AIs) further picked up to 20.7% at the end of 2019 (Chart 5.5). The Tier 1 capital ratio also edged up to 18.5%, with 16.5% being contributed by Common Equity Tier 1 (CET1) capital.

Chart 5.5
Capitalisation of locally incorporated AIs



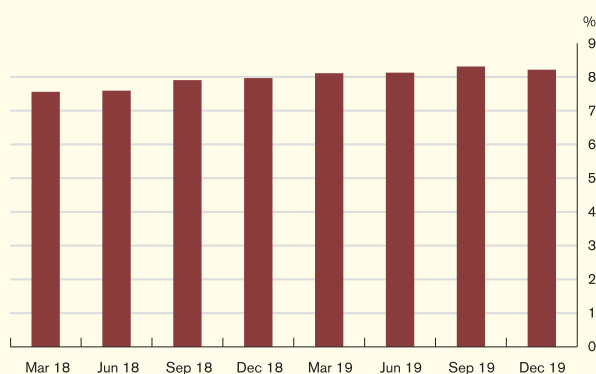
Notes:

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

Source: HKMA.

Alongside the risk-based capital adequacy ratio, there is a Basel III non-risk-based Leverage Ratio (LR) requirement acting as a “back-stop” to restrict the build-up of excessive leverage in the banking sector.⁶⁴ The LR of locally incorporated AIs stood at a healthy level of 8.2% at the end of 2019, exceeding the 3% statutory minimum (Chart 5.6).

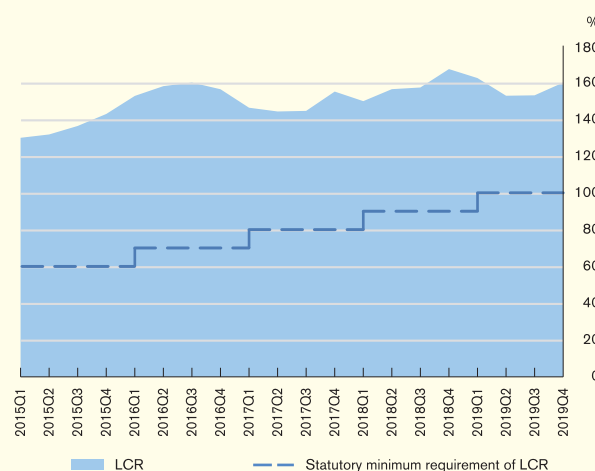
Chart 5.6
Leverage Ratio of locally incorporated AIs



Note: Consolidated basis.
Source: HKMA.

category 2 institutions also mildly increased to 56.3% in the fourth quarter of 2019 from 54.6% in the second quarter of 2019, also well above the statutory minimum requirement of 25%.

Chart 5.7
Liquidity Coverage Ratio



Notes:
1. Consolidated basis.
2. Quarterly average figures.
Source: HKMA.

5.2 Liquidity and interest rate risks

Liquidity and funding

The liquidity positions of the banking sector, as measured by the Basel III Liquidity Coverage Ratio (LCR)⁶⁵, remained sound during the review period. The average LCR of category 1 institutions rose to 159.9% in the fourth quarter of 2019 from 152.8% in the second quarter of 2019 (Chart 5.7), which were well above the statutory minimum requirement of 100%. The average Liquidity Maintenance Ratio (LMR) of

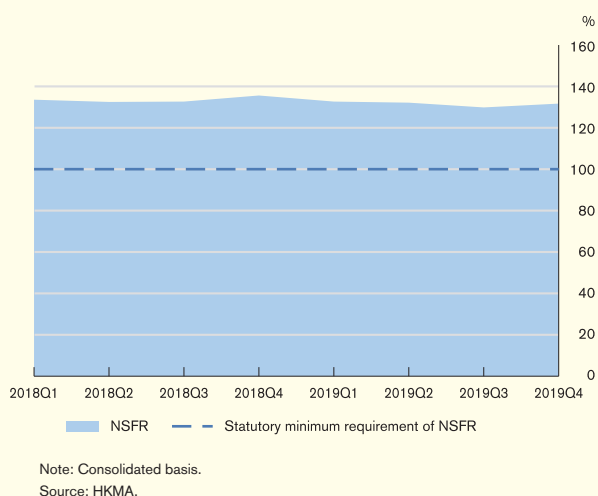
The Net Stable Funding Ratio (NSFR)⁶⁶, as part of the Basel III liquidity requirements, indicates a stable funding position of AIs. The average NSFR of category 1 institutions remained at a high level of 131.7% in the fourth quarter of 2019 (Chart 5.8), well above the statutory minimum requirement of 100%. The average Core Funding Ratio (CFR) of category 2A institutions stood at a high level of 134.5%, which also exceeded the statutory minimum requirement of 75% applicable in 2019. The strong liquidity and stable funding positions of AIs suggest the Hong Kong banking sector is well positioned to withstand a variety of liquidity shocks.

⁶⁴ LR is calculated as the ratio of Tier 1 capital to an exposure measure, where the exposure measure includes both on-balance sheet and off-balance sheet exposures. For details, please refer to the Basel III leverage ratio framework published by the Basel Committee on Banking Supervision (https://www.bis.org/basel_framework/standard/LEV.htm).

⁶⁵ The Basel III LCR requirement 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”.

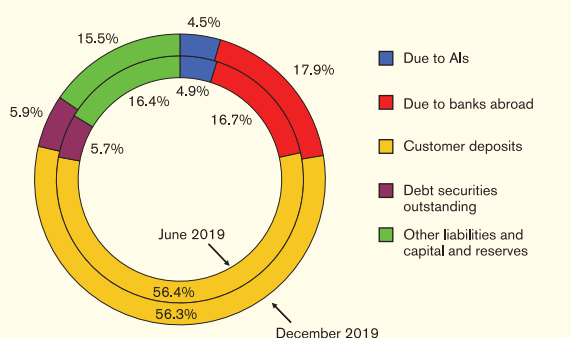
⁶⁶ In Hong Kong, category 1 institutions are required to comply with the NSFR; while category 2 institutions designated as category 2A institutions must comply with the requirements relating to the local CFR. According to the Banking (Liquidity) Rules, a category 1 institution must at all times maintain an NSFR of not less than 100%. A category 2A institution must maintain a CFR of not less than 75% on average in each calendar month since and after January 2019. For details, see Banking (Liquidity) Rules (Cap. 155Q).

Chart 5.8
Net Stable Funding Ratio



Customer deposits continued to be the primary funding source for AIs, underpinning a stable funding structure in the banking system. At the end of 2019, the share of customer deposits to all AIs' total liabilities remained largely unchanged at 56.3% from 56.4% six months ago (Chart 5.9).

Chart 5.9
The liability structure of all AIs

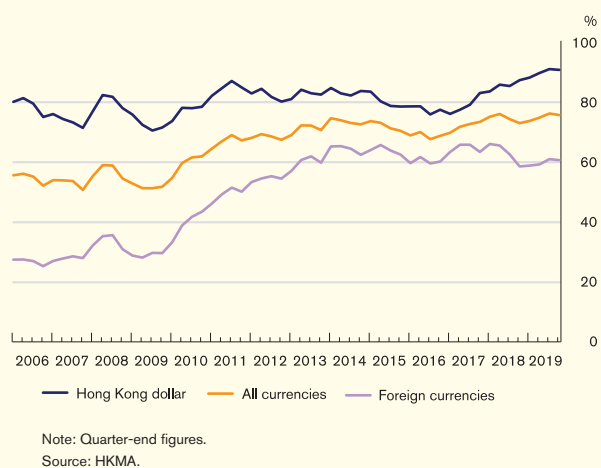


The average Hong Kong dollar loan-to-deposit (LTD) ratio of all AIs increased to 90.3% at the end of 2019 from 89.3% at the end of June 2019 (Chart 5.10), driven by a stable level of Hong Kong dollar loans and advances and a slight

decline in deposits during the review period.⁶⁷ As foreign currency-denominated loans grew faster than deposits, the average foreign currency LTD ratio also increased to 60.4% from 58.9% during the same period. Overall, the average all-currency LTD ratio of all AIs rose to 75.4% at the end of 2019 from 74.5% six months ago.

As is evident from the stable Aggregate Balance since April 2019 and the broadly stable level of deposits, no significant outflow of funds from the Hong Kong dollar or from the banking system was observed during the review period.

Chart 5.10
Average LTD ratios of all AIs



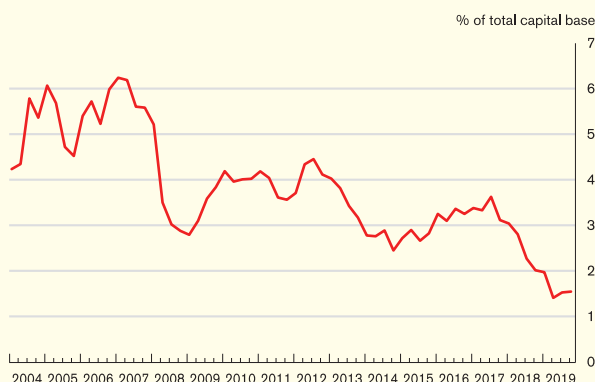
Interest rate risk

The interest rate risk exposure of locally incorporated licensed banks remained relatively low in the fourth quarter of 2019. It is estimated that under a hypothetical shock of an across-the-board 200-basis-point increase in Hong Kong dollar and US dollar interest rates, the economic value of locally incorporated licensed banks' interest rate positions could be subject to a

⁶⁷ While the Hong Kong dollar LTD ratio has reached a post-crisis high, the liquidity conditions of the banking system remained sound if one also takes into account AIs' own capital and reserves as a broader measure of funding liquidity. The adjusted Hong Kong dollar LTD (including customer deposits, capital and reserves, qualifying capital instruments and other capital-type instruments as the denominator) was 76.3% as of the end of 2019.

decline equivalent to 1.56% of their total capital base at the end of 2019 (Chart 5.11).⁶⁸

Chart 5.11
Impact of a Hong Kong dollar and US dollar interest rate shock on locally incorporated licensed banks



Notes:

1. Interest rate shock refers to a 200-basis-point parallel increase in both Hong Kong dollar and US dollar yield curves to institutions' interest rate risk exposure. The two currencies accounted for a majority of interest-rate-sensitive assets, liabilities and off-balance-sheet positions for locally incorporated licensed banks' at the end of 2019.
2. The impact of the interest rate shock refers to its impact on the economic value of the banking and trading book⁶⁹, expressed as a percentage of the total capital base of banks.
3. Since June 2019, the interest rate risk exposure has been calculated based on the new local IRRBB framework. As such, the figures from June 2019 and onwards are not strictly comparable with those of previous periods.

Source: HKMA.

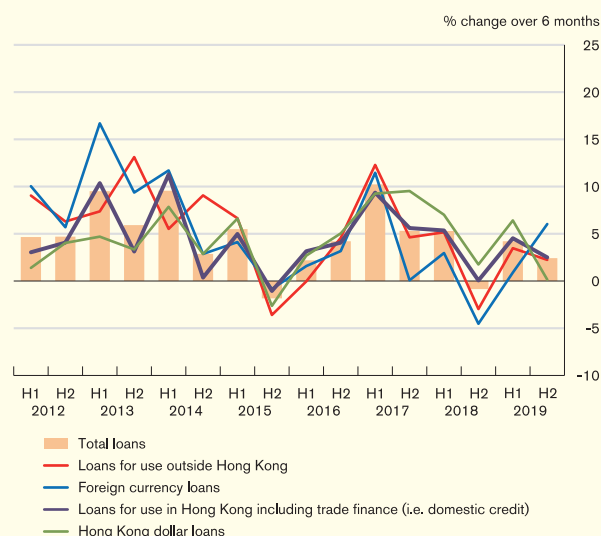
5.3 Credit risk

Overview

After a moderate rebound in the first half of 2019, growth in bank credits receded again in the second half against the backdrop of the lingering US-China trade tensions, the global economic slowdown and the prolonged domestic social incidents.

On a half-yearly basis, the loan growth (as measured by the change in total loans and advances of all AIs) decelerated to 2.4% in the second half of 2019, after increasing moderately by 4.2% in the first half (Chart 5.12). The slower loan growth was driven by lower growth in both domestic loans (comprising loans for use in Hong Kong and trade financing) and loans for use outside Hong Kong during the review period. Growth in domestic loans and loans for use outside Hong Kong decelerated to 2.5% and 2.2% in the second half of 2019, compared with 4.5% and 3.5%, respectively in the preceding six months. Nonetheless, total loan growth for 2019 as a whole still increased moderately to 6.7% compared with 4.4% in 2018.

Chart 5.12
Loan growth



Note: Since December 2018, figures for loans for use in/outside Hong Kong have been restated to reflect AIs' reclassification of working capital loans. The reported % changes over six months for 2019 and onwards are calculated based on the reclassified loan data, while the historical % changes until the second half of 2018 are calculated based on the data without such reclassification.

Source: HKMA.

Banks' expectation on the outlook for credit demand in the near term becomes more diverse given the increased uncertainties in their operating environments. According to the results of the HKMA Opinion Survey on Credit Condition Outlook in December 2019, the shares of surveyed AIs expecting loan demand to be higher and those expecting loan demand to be lower in the next three months had both

⁶⁸ This estimation does not take into account the effect of any mitigating action by banks in response to the shock. The impact will be smaller if mitigating action is taken.

⁶⁹ 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.

increased to 18% and 14% respectively, from the same 5% in June 2019, while only 68% of the AIs were still expecting loan demand to remain the same (Table 5.A).

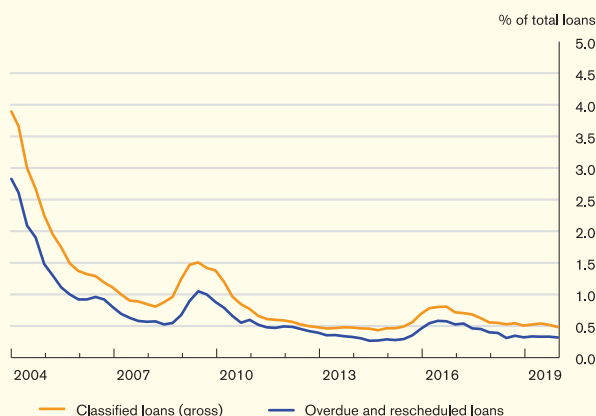
Table 5.A
Expectation of loan demand in the next three months

% of total respondents	Mar-19	Jun-19	Sep-19	Dec-19
Considerably higher	0	0	0	0
Somewhat higher	9	5	14	18
Same	86	91	41	68
Somewhat lower	5	5	45	14
Considerably lower	0	0	0	0
Total	100	100	100	100

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

The asset quality of banks' loan portfolios remained healthy in the second half of 2019. The gross classified loan ratio (CLR) of all AIs stayed unchanged at 0.57% at the end of 2019 comparing with six months ago, while the ratio of overdue and rescheduled loans of all AIs edged down to 0.35% at the end of 2019 from 0.39% at the end of June 2019. For retail banks, the gross CLR and the ratio of overdue and rescheduled loans both edged down to 0.48% and 0.32% respectively (Chart 5.13). Both ratios remained low by historical standards.

Chart 5.13
Asset quality of retail banks



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.

Household exposure⁷⁰

The half-yearly growth in household debt decelerated moderately to 5.6% in the second half of 2019 from 6.7% in the first half. Within household debt, growth in personal loans slowed notably, more than offsetting the slightly faster growth in mortgage loans (Table 5.B).

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

(%)	2017		2018		2019	
	H1	H2	H1	H2	H1	H2
Residential mortgages	4.1	3.8	4.2	4.5	4.7	5.3
Personal loans	7.2	12.4	7.5	2.6	11.0	6.1
of which:						
Credit card advances	-7.8	11.0	-5.0	10.6	-3.8	4.1
Loans for other private purposes	11.9	12.7	10.7	0.9	14.5	6.6
Total loans to households	5.0	6.5	5.3	3.9	6.7	5.6

Note: Since December 2018, figures for loans to households have been restated to reflect AIs' reclassification of working capital loans. The half-yearly growth rates for the first half of 2019 and onwards are calculated based on the reclassified loan data, while the historical growth rates until the second half of 2018 are calculated based on the data without such reclassification.

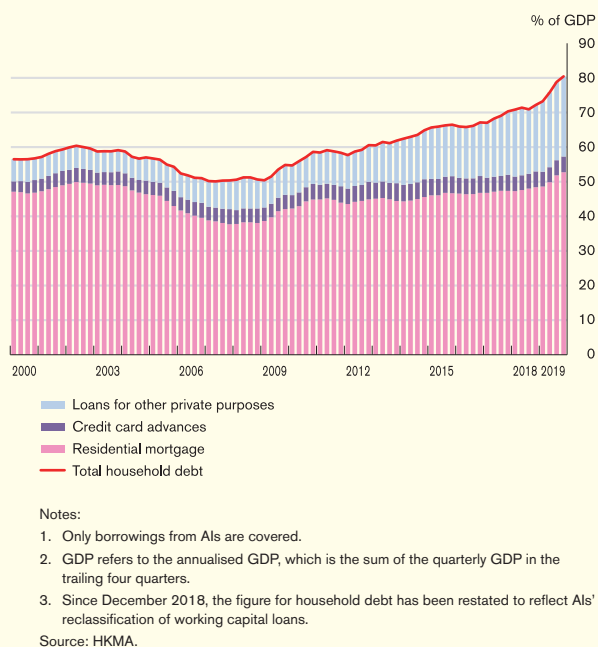
Source: HKMA.

Despite slower growth of household debt in the second half, the household debt-to-GDP ratio rose further to 80.4% in the final quarter of 2019 from 75.8% in the second quarter, as the nominal GDP declined amid the significant contraction of Hong Kong economy in the third quarter (Chart 5.14). It is worth noting that while economic activities could slow down sharply during recessions, it may not be necessary for households to repay their debt within a short period of time. As such, the adjustment of household debt is usually slower than that of GDP during an economic downturn. Thus, a high level of household debt-to-GDP ratio will likely remain in the near term. The future trends of the ratio would depend on future economic development, as well as the corresponding repayment arrangements between banks and households.

⁷⁰ 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 2019, the share of household lending in domestic lending was 31.8%.

In recent years, loans for other private purposes have been one of the drivers of the rise in household debt, although they witnessed a slowdown in growth during the second half of 2019. A substantial portion of loans for other private purposes was loans granted to private banking and wealth management customers which were mainly secured by financial assets (including stocks, investment funds and bonds). Through day-to-day supervision, the HKMA noticed that banks have implemented prudent risk management measures on such loans, including imposing a cap on loan-to-value ratios for financial assets pledged as collateral, prompt margin call and forced liquidation mechanisms. The HKMA considered the credit risk of these loans as manageable. That said, the HKMA will continue to closely monitor the credit risk associated with these exposures through supervisory efforts including on-site examinations of AIs' activities.

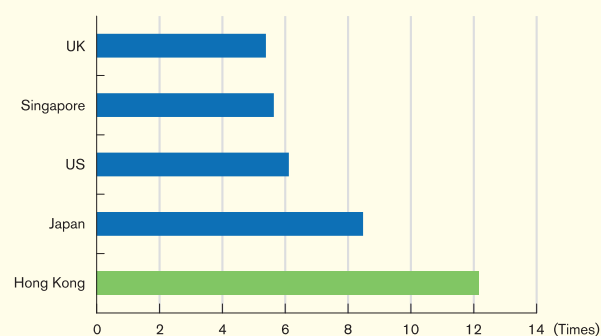
Chart 5.14
Household debt-to-GDP and its components



Besides, although the household debt-to-GDP ratio has been a widely-used indicator in evaluating household financial position, a full assessment requires the additional consideration of the entirety of the household balance sheet,

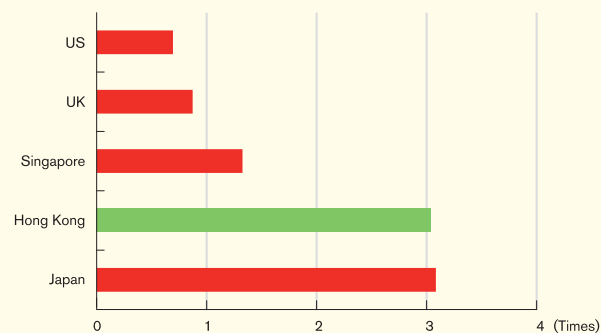
including the level of assets and the composition of assets and liability. In our latest assessment, we find that in Hong Kong, the household net worth-to-liabilities ratio stood at 12.2 times in 2018 (UK: 5 times, Singapore: 6 times, US: 6 times, Japan: 8 times) (Chart 5.15). Also, the safe assets-to-liabilities ratio for Hong Kong's household sector stayed high at 3.04 times in 2018 (US: 1 time; UK: 1 time; Singapore: 1 time, Japan: 3 times) (Chart 5.16). Both ratios are at high levels and also higher than most other developed economies, suggesting that Hong Kong's households, on aggregate, are financially sound and have a strong buffer to cushion potential financial and economic shocks.

Chart 5.15
Household net worth-to-liabilities ratio for selected economies



Note: Japan figures refer to those at end-2017, while other figures refer to those at end-2018.
Sources: Statistical agencies or central banks of selected economies and HKMA staff estimates.

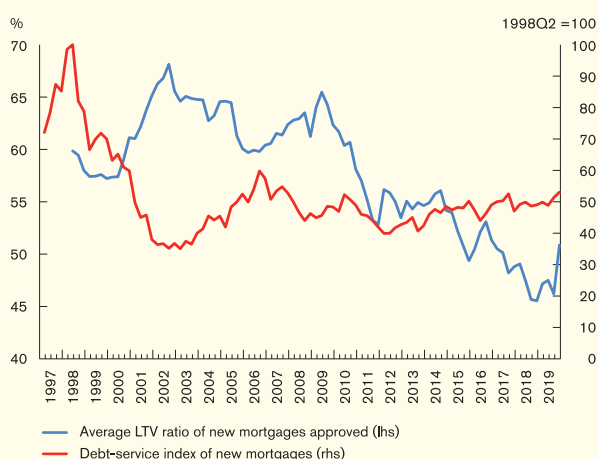
Chart 5.16
Safe assets-to-liabilities ratio for selected economies



Note: Safe assets comprise deposits, as well as currency if data are available. In the case of Hong Kong, deposits only. Japan figures refer to those at end-2017, while all other reported figures refer to those at end-2018.
Sources: Statistical agencies or central banks of selected economies and HKMA staff estimates.

Banks' mortgage portfolios remained healthy, with the delinquency ratio hovering at a low level of 0.03% in the fourth quarter of 2019. The average loan-to-value (LTV) ratio of new mortgage loans approved first decreased to 46.2% in the third quarter from 47.5% in the second quarter, before it reverted and increased to 50.9% in the last quarter of 2019 (Chart 5.17). The moderate rise in the ratio partly reflected the effect of raising the cap on the value of the properties under the Mortgage Insurance Programme announced in late-October. Nonetheless, the figure was still well below the ratio of 64% in September 2009, just before the implementation of the first round of the HKMA's countercyclical macro-prudential measures.

Chart 5.17
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.

Meanwhile, the debt-service index of new mortgages⁷¹ picked up further to 53.1 in the fourth quarter of 2019 compared with 48.9 in the second quarter (the red line in Chart 5.17).

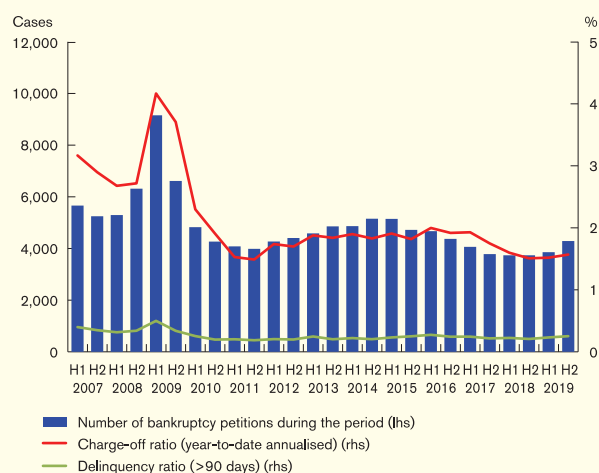
Despite the three US policy rate cuts during the second half of 2019, the impact on the household debt burden has been limited at the

current juncture as domestic interest rates (particularly HIBORs) so far have not followed the trends of their US counterparts due to various domestic factors discussed in the earlier section.

Meanwhile, should Hong Kong's economic conditions deteriorate further along with notable rises in future unemployment rates (see Box (3)), the household debt servicing ability could be significantly weakened through a decline in household income. In particular, a sensitivity test suggests the debt-service index could rise notably to 59.0 from the current level of 53.1 if household income were to decrease by 10%, other things being constant.⁷² Therefore, banks should remain alert to the risks associated with a rising level of household debt-servicing burden.

Against the backdrop of a weakening domestic economy, the number of bankruptcy petitions showed signs of increasing, albeit remaining relatively low by historical standards. Nevertheless, the credit risk of unsecured household exposure remained contained during the review period. The annualised credit card charge-off ratio edged up to 1.57% in the second half of 2019 and the delinquency ratio slightly increased to 0.25% at the end of 2019 (Chart 5.18).

Chart 5.18
Charge-off ratio and delinquency ratio for credit card lending and bankruptcy petitions



Sources: Official Receiver's Office and HKMA.

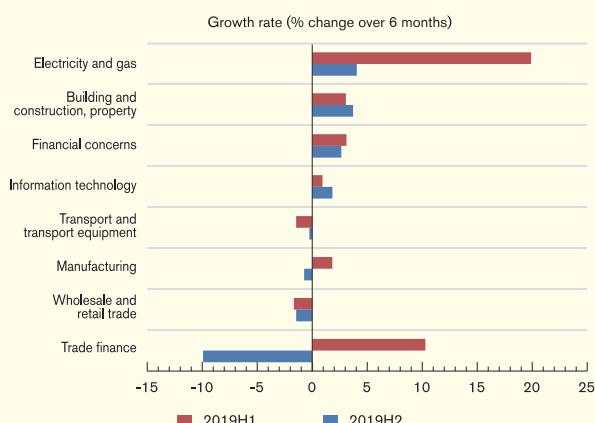
⁷¹ A higher value of the debt-service index indicates there is either a drop in household income, or an increase in interest rates, or an increase in the average mortgage loan amount drawn by households. Historical movements in the index suggest that a sharp rise in the index may lead to a deterioration in the asset quality of household debt.

⁷² The assumption of a 10% decrease in household income resembles what happened during the Asian financial crisis.

Corporate exposure⁷³

Growth in domestic corporate loans (including trade finance) decelerated to 1.1% in the second half of 2019, partly reflecting the subdued credit demand amid the lacklustre external and domestic business environment. Analysed by economic sectors, loan growth for major economic sectors either decelerated notably or remained subdued. Partly reflecting the re-escalation of trade tensions since May last year, trade financing declined again in the second half of 2019 after a strong rebound in the first half (Chart 5.19).

Chart 5.19
Growth in domestic corporate loans by selected sectors



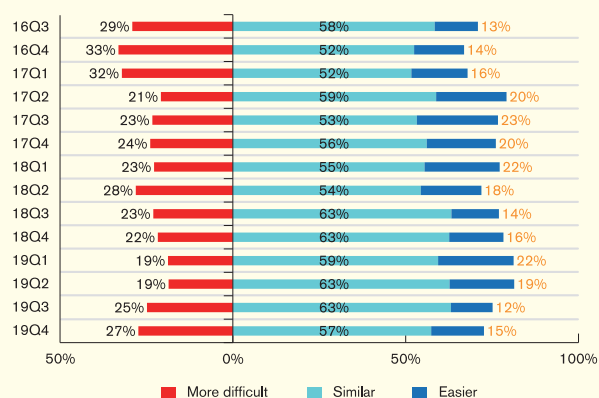
Source: HKMA.

The demand-side survey on small and medium-sized enterprises (SMEs)' credit conditions for the fourth quarter of 2019 shows that SMEs' perception of banks' credit approval stance relative to six months ago continued to worsen slightly compared with previous surveys in 2019 (Chart 5.20). Specifically, 27% of the respondents perceived credit approval as "more difficult" relative to six months ago, up from 25% recorded in the third quarter and further up from 19% recorded in the second quarter. However, this proportion is still lower than the high levels recorded in the second half of 2016 and early 2017. Despite the worsened perception of banks' credit approval stance, fewer respondents reported

a tighter stance by banks on their existing credit lines. During the fourth quarter, 14% of the respondents with existing credit lines indicated tighter banks' stance, lower than the 32% recorded in the third quarter (Chart 5.21).

Various relief measures have been introduced to support SMEs and the broader economy. The Hong Kong Mortgage Corporation introduced new relief measures for the 80% Guarantee Product, the 90% Guarantee Product and special 100% Loan Guarantee under the SME Financing Guarantee Scheme in September 2019, December 2019 and February 2020 respectively, to provide additional support to the financing needs of SMEs. The Countercyclical Capital Buffer (CCyB) ratio of banks in Hong Kong was also reduced from 2.5% to 2.0% in mid-October 2019 and lowered further to 1.0% in mid-March 2020, which allows banks to be more supportive to the domestic economy and help mitigate the impact of the economic cycle. Indeed, many banks have also rolled out relief measures to assist SMEs in various sectors in overcoming the impact of the coronavirus outbreak.⁷⁴

Chart 5.20
SMEs' perception of banks' credit approval stance relative to six months ago

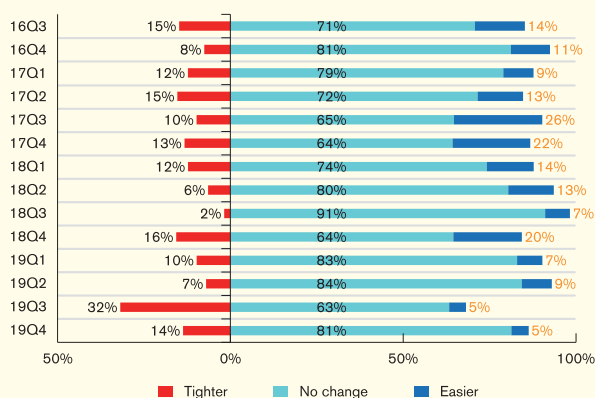


Source: HKMA.

⁷⁴ For the import and export sector, banks have extended the repayment period of trade financing facilities to align with the prolonged trade cycle as a result of the outbreak and allowed customers to convert trade financing lines into temporary overdraft facilities so that SMEs can manage their cash flow more flexibly. For the transportation sector, banks have offered repayment holidays or principal moratoriums to some affected customers, including taxi and minibus operators, to help them overcome this difficult period.

⁷³ Excluding interbank exposure. At the end of 2019, the share of corporate loans in domestic lending was 68.1%.

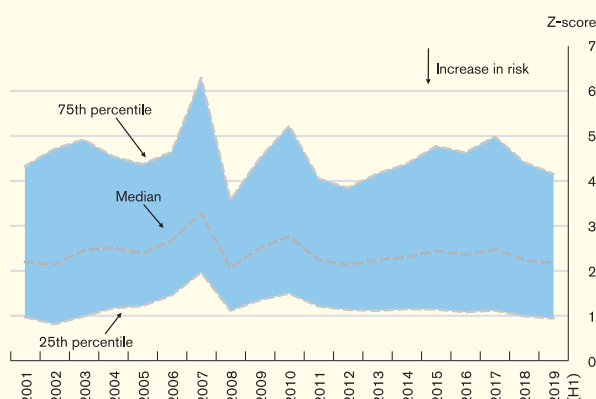
Chart 5.21
SMEs' reported change in banks' stance on existing credit lines



Note: Only cover respondents with existing credit lines.
Source: HKMA.

Some indicators suggest that the credit risk of banks' corporate exposures have deteriorated slightly amid the weakened global and domestic economic environment. Based on accounting data for all non-financial corporates listed in Hong Kong, the Altman's Z-score (a default risk measure for non-financial corporates) edged down further for both the median and 75th percentile in the first half of 2019, implying a modest deterioration in the financial health of these corporates (Chart 5.22).

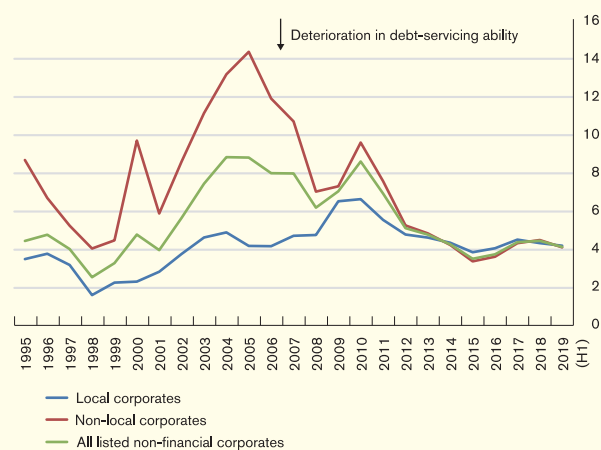
Chart 5.22
Altman's Z-score of listed non-financial corporates in Hong Kong



Notes:
1. All non-financial corporates listed on the Hong Kong Stock Exchange are selected.
2. Figures are calculated based on information up to end-February 2020.
Source: HKMA staff calculation based on estimates compiled by Bloomberg.

The slight rise in the default risk for the non-financial corporates listed in Hong Kong is partly due to a mild deterioration in their debt servicing ability, as indicated by a slight decline in the weighted average interest coverage ratio (ICR) (the green line in Chart 5.23). While both local and non-local corporates saw a decline in their ICRs, the drop in the aggregate ICR was mainly driven by non-local corporates (the red line). The weighted average debt-to-equity ratio, a common measure of corporate leverage, remained broadly stable at high levels in the first half of 2019 compared with six months ago (the green line in Chart 5.24).

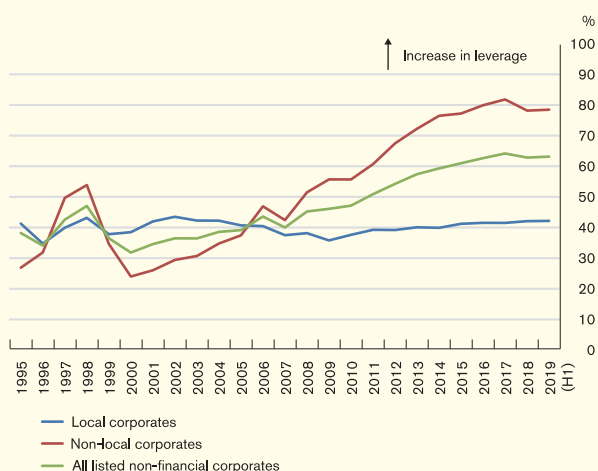
Chart 5.23
Interest coverage ratio of listed non-financial corporates in Hong Kong



Notes:
1. Weighted average figures.
2. The ICR is calculated by the earnings before interest and tax (EBIT) divided by the total interest expenses. A lower value indicates deterioration of debt-servicing ability.
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-February 2020.
5. Hong Kong Financial Reporting Standard (HKFRS) 16, which became effective in January 2019, requires that firms as lessees to report their original rental expenses under depreciation of right-of-use asset and interest expense on lease liabilities. As such, for 2019 H1, the adjusted EBITs and the total interest expenses will respectively be calculated as EBITs minus interest expense on lease liabilities, and total interest expenses minus interest expense on lease liabilities, for the purpose of comparison with historical figures.

Source: HKMA staff estimates based on data from Bloomberg.

Chart 5.24
Leverage ratio of listed non-financial corporates in Hong Kong



Looking ahead, although market sentiment and business confidence have tentatively improved following the signing of the "Phase One" trade agreement between the US and Mainland China and a broad-based adoption of accommodative monetary policy among major central banks, the economic outlook is subject to various downside risk factors including the extent of the coronavirus outbreak, the elusive prospect over future US-China trade negotiations, rising geopolitical tensions and domestic social incidents. Should these risks intensify and trigger an abrupt shift in market sentiment, this may lead to an economic downturn and a sharp tightening in financial conditions. This would put the debt servicing ability of corporates to the test, particularly those non-local corporates with high leverage. Therefore, banks are reminded to uphold prudent credit risk management regarding their corporate exposures.

Mainland-related lending and non-bank exposures

The banking sector's total Mainland-related lending decreased slightly by 0.1% to HK\$4,564 billion at the end of 2019 (16.8% of total assets), from HK\$4,568 billion (17.1% of total assets) at the end of June 2019 (Table 5.C). Trade finance loans declined notably by 14.3% at the end of 2019, compared with six months earlier. Other non-bank exposures increased by 2.6% to HK\$1,547 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK\$ bn	Mar 2019	Jun 2019	Sep 2019	Dec 2019
Mainland-related loans	4,415	4,568	4,625	4,564
Mainland-related loans excluding trade finance	4,103	4,227	4,296	4,271
Trade finance	312	341	330	292
By type of Als:				
Overseas incorporated Als	1,873	1,897	1,923	1,880
Locally incorporated Als*	1,896	1,920	1,983	1,959
Mainland banking subsidiaries of locally incorporated Als	646	750	720	725
By type of borrowers:				
Mainland state-owned entities	1,811	1,858	1,906	1,836
Mainland private entities	1,230	1,276	1,286	1,288
Non-Mainland entities	1,375	1,433	1,433	1,440

Notes:

1. *Including loans booked in Mainland branches of locally incorporated Als.
2. Figures may not add up to total due to rounding.

Source: HKMA.

Table 5.D
Other non-bank exposures

HK\$ bn	Mar 2019	Jun 2019	Sep 2019	Dec 2019
Negotiable debt instruments and other on-balance sheet exposures	1,039	1,069	1,102	1,125
Off-balance sheet exposures	409	439	452	421
Total	1,448	1,508	1,554	1,547

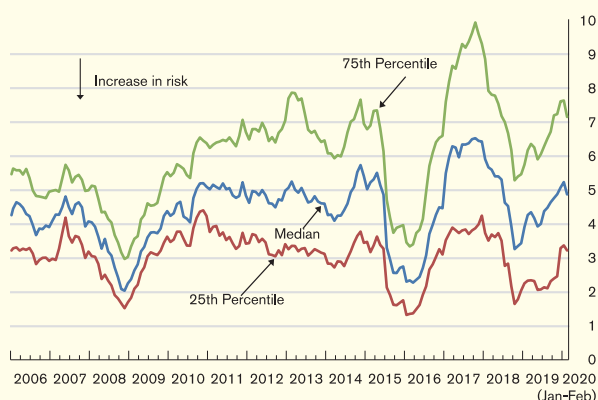
Note: Figures may not add up to total due to rounding.
Source: HKMA.

The gross CLR of Mainland-related lending of all Als⁷⁵ increased mildly to 0.75% at the end of 2019 from 0.70% at the end of June 2019. Despite the modest deterioration in asset quality, the associated credit risk should be contained as the ratio remained lower than the recent high of 0.89% in March 2016.

⁷⁵ Figures cover Als' Hong Kong offices and Mainland branches and subsidiaries.

However, during the review period, a forward-looking market-based indicator showed a further improvement in the default risk for the Mainland corporate sector. The distance-to-default (DTD) index⁷⁶ continued to improve in the second half of 2019 (Chart 5.25), mainly reflecting improved sentiment in the Mainland stock markets as a result of the expectation of reaching the US-China “Phase One” trade deal. However, there have been tentative signs of deterioration in the index since February 2020 due to increased market participants’ concerns about the extents of the coronavirus outbreak and its associated negative impact on the financial market and the economy.

Chart 5.25
Distance-to-default index for the Mainland corporate sector



Note: DTD 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.

In view of the downside risk to the Mainland economy arising from the uncertainties surrounding the next phase of the US-China trade negotiations and the effects of the recent outbreak, banks should stay alert to the credit risk management of their Mainland-related exposures.

Macro stress testing of credit risk⁷⁷

Results of the latest macro stress testing on retail banks’ credit exposure suggest 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 5.26 presents the simulated future credit loss rate of retail banks in the fourth quarter of 2021 under four specific macroeconomic shocks⁷⁸ using information up to the fourth quarter of 2019.

Taking into account tail risk, banks’ credit losses (at the confidence level of 99.9%) under the stress scenarios range from 1.37% (Interest rate shock) to 3.17% (Hong Kong GDP shock, which are significant, but smaller than the estimated loan loss of 4.39% following the Asian financial crisis.

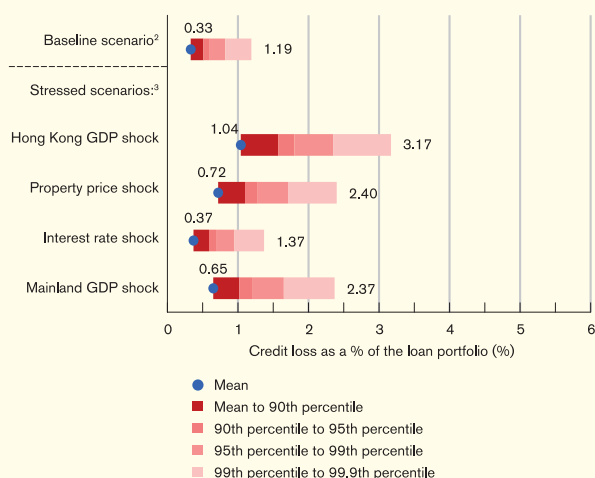
By incorporating the scenario of a potential coronavirus outbreak in Hong Kong into the stress test, real GDP is assumed to contract further with a similar degree of impact on the economy as experienced during the Severe Acute Respiratory Syndrome (SARS) period. Under this scenario, the stressed credit losses would range from the mean of 1.30% to 3.95% at the confidence level of 99.9%. This implies that through its impact on Hong Kong’s GDP growth, the coronavirus outbreak would not significantly increase banks’ credit losses.

⁷⁶ The DTD 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.

⁷⁷ 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.

⁷⁸ These shocks are calibrated to be similar to those that occurred during the Asian financial crisis, except the Mainland GDP shock.

Chart 5.26
The mean and value-at-risk statistics of simulated credit loss distributions¹



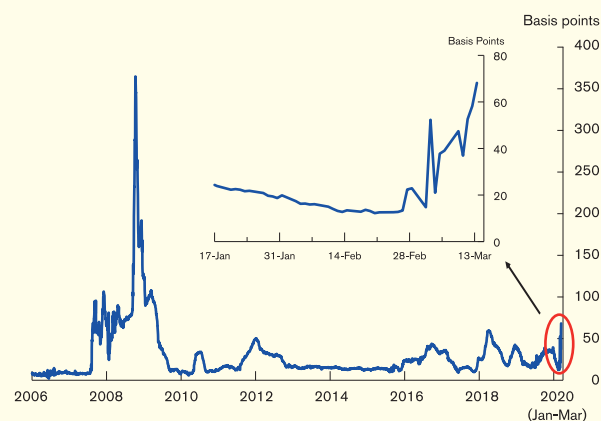
Notes:

- The assessments assume the economic conditions in 2019 Q4 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
- Baseline scenario: no shock throughout the two-year period.
- Stressed scenarios:
 - Hong Kong GDP shock:** reductions in Hong Kong's real GDP by 2.7%, 2.4%, 1.7%, and 1.6% respectively in each of the four consecutive quarters starting from 2020 Q1 to 2020 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 2020 Q1 to 2020 Q4.
 - Interest rate shock:** A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2020 Q1), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2020 Q4).
 - Mainland GDP shock:** Slowdown in the year-on-year annual real GDP growth rate to 4% in one year.

Source: HKMA staff estimates.

The outbreak of coronavirus has heightened the uncertainty over the global economic outlook given its depressing effect on economic activity in the affected economies as well as their trading partners through the global supply chain. In fact, the recent concerns about the rising global cases of the coronavirus infection have triggered a reassessment of global growth prospect by investors that led to a marked deterioration in risk appetite and a surge in risk premia. The risk-off sentiment in financial markets has also caused some tightening in the short-term dollar funding market, with the spread between the three-month US dollar LIBOR and its corresponding overnight index swap (OIS) rate⁷⁹ (a common indicator of systemic liquidity risks in the short-term dollar funding market) widening notably since early March 2020 (Chart 5.27). If the global growth prospect turns out to be more severely eroded by the coronavirus outbreak, this could further intensify financial market volatility and result in an acute tightening in financial conditions.

Chart 5.27
Three-month US dollar LIBOR-OIS spreads



Source: Bloomberg.

5.4 Systemic risk

Despite signs of stabilisation in the global economic growth at the beginning of this year following the US-China “Phase One” trade deal and pre-emptive monetary policy easing by major central banks, the global outlook is still subject to various downside risk factors including the uncertainties over the extent of the coronavirus outbreak, the future US-China trade relations, and rising geopolitical tensions. With the highly uncertainties external environment alongside prolonged domestic social incidents, the Hong Kong banking sector will face challenges on various fronts.

⁷⁹ 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.

Meanwhile, future trade relations between the US and Mainland China remains another key risk factor to watch for. Although the trade tensions softened following the US-China “Phase One” trade agreement, future trade relations between the two economies are highly uncertain as it remains to be seen whether both parties can deliver on the promises and how future deals are negotiated. If the trade dispute between the two economies re-escalates, it would further weigh on the already weakened economic conditions and severely affect corporates’ financial conditions, particularly for those that have significant exposures to the two economies.

If these external risks materialise and coincide with intensified social incidents and a wider spread of the coronavirus in Hong Kong, it could lead to a full-blown economic recession in Hong Kong. It would pose more significant challenges to banks’ asset quality in view of the rising leverage for both households and corporates in Hong Kong. While the macro stress test results suggest that the banking sector is able to withstand an extreme economic shock, banks are advised to carefully assess the potential impact on their asset quality under this severe adverse scenario.

The geopolitical risk related to Brexit also merits close monitoring. While the UK parliament passed legislation implementing the Withdrawal Agreement Bill, the risk of a no-deal Brexit has not been completely eliminated as the new trade deal concerning the free movement of people, services, and capital between the UK and the EU is yet to be negotiated. It remains uncertain whether the trade negotiations between the UK and European Union (EU) can be completed by the end of the 11-month transition period (i.e. end of 2020). If the negotiations turn sour, it could have a significant implication for global financial stability in view of the unmatched role of the UK banking system in distributing international banking flows. Any abrupt shift in banking flows from the UK banking system could have a spillover effect to Hong Kong as the direct

exposure of the Hong Kong banking sector to banks in the UK and the broader euro area is not immaterial.

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 has been implementing the CCyB in line with the Basel III implementation schedule through the phased-in arrangements, which were completed on 1 January 2019.⁸⁰

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 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)⁸¹. The setting of the CCyB for Hong Kong is however not a mechanical exercise and the Monetary Authority will always consider a broad range of reference indicators (“Comprehensive Reference Indicators”) in addition to the indicative buffer guide.⁸²

⁸⁰ 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 reached 2.5% on 1 January 2019.

⁸¹ The credit-to-GDP gap is the gap between the ratio of credit to GDP and its long-term trend, while the property price-to-rent gap is the gap between the ratio of residential property prices to rentals and its long-term trend.

⁸² These included measures of bank, corporate and household leverage; debt servicing capacity; profitability and funding conditions within the banking sector and macroeconomic imbalances.

In light of the worsening economic environment in Hong Kong in the second half of 2019, the Monetary Authority announced on 14 October 2019 a reduction of the CCyB to 2.0% from 2.5% to allow banks to be more supportive to the domestic economy.

For the latest situation, the indicative buffer guide, calculated based on the fourth quarter of 2019 data, signals a CCyB of 1.75% (after rounding down to the nearest multiple of 25 basis points)⁸³. The projection based on all available data at the decision date however suggests that the indicative buffer guide would very likely signal a lower CCyB when all relevant data for the first quarter of 2020 become available. In addition, the information drawn from the series of Comprehensive Reference Indicators along with all relevant information available at the time of the decision in March 2020 suggest that the economic environment in Hong Kong has deteriorated further since the novel coronavirus outbreak. Given the latest developments in relation to the spread of novel coronavirus and the expected negative impact on global economic activities, the Monetary Authority considered that it is appropriate to reduce the CCyB further from 2.0% to 1.0% to allow banks to be more supportive to the domestic economy, in particular those sectors and individuals that are expected to experience additional stress due to the outbreak.⁸⁴

The Monetary Authority will continue to closely monitor credit and economic conditions in Hong Kong and the CCyB ratio will be reviewed on a quarterly basis or more frequently.

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

	09-Jul-19	14-Oct-19	29-Jan-20	16-Mar-20
Announced CCyB rate	2.5%	2.0%	2.0%	1.0%
Date effective	09/07/2019	14/10/2019	29/01/2020	16/03/2020
Indicative buffer guide	2.0%	2.5%	0.9%	1.9%
Basel Common Reference Guide	2.2%	2.5%	2.5%	2.5%
Property Buffer Guide	1.5%	2.0%	0.3%	1.2%
Composite CCyB Guide	2.0%	2.5%	0.9%	1.9%
Indicative CCyB Ceiling	None	None	None	None
<i>Primary gap indicators</i>				
Credit/GDP gap	9.1%	11.2%	19.4%	21.2%
Property price/rent gap	6.7%	8.4%	2.9%	5.7%
<i>Primary stress indicators</i>				
3-month HIBOR spread* (percentage points)	0.22%	0.27%	0.37%	0.38%
Quarterly change in classified loan ratio (percentage points)	0.02%	0.02%	-0.02%	-0.03%

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 the 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.F.

⁸³ According to section 3.2.5 of the HKMA's SPM CA-B-1, the CCyB rate will be expressed in multiples of 25 basis points (without rounding up). Thus the indicative buffer guide would signal an extant CCyB rate to increase or decrease in multiple of 25 basis points.

⁸⁴ Further details and the considerations underlying this decision may be found in the Announcement of the CCyB to Als on 16 March 2020 (https://www.hkma.gov.hk/media/eng/doc/key-functions/banking-stability/ccyb/CCyB_announcement_200316.pdf).

Table 5.F
Key performance indicators of the banking sector¹ (%)

	Dec 2018	Sep 2019	Dec 2019
Interest rates			
1-month HIBOR fixing ² (quarterly average)	1.63	2.03	2.16
3-month HIBOR fixing (quarterly average)	2.16	2.32	2.30
BLR ³ and 1-month HIBOR fixing spread (quarterly average)	3.50	3.10	2.88
BLR and 3-month HIBOR fixing spread (quarterly average)	2.97	2.81	2.74
Composite interest rate ^{4,5}	0.89	1.02	1.09
All AIs			
Balance sheet developments⁶			
Total deposits	2.1	-0.1	1.3
Hong Kong dollar	-0.7	-1.0	0.0
Foreign currency	5.2	0.8	2.7
Total loans	0.3	1.7	0.7
Domestic lending ⁷	1.3	1.9	0.6
Loans for use outside Hong Kong ⁸	-2.1	1.4	0.8
Negotiable instruments			
Negotiable certificates of deposit (NCDs) issued	-6.2	-5.7	7.8
Negotiable debt instruments held (excluding NCDs)	4.2	1.2	-0.4
Asset quality			
As a percentage of total loans ⁹			
Pass loans	98.13	98.13	98.10
Special mention loans	1.32	1.32	1.33
Classified loans ¹⁰ (gross)	0.55	0.56	0.57
Classified loans (net) ¹¹	0.26	0.25	0.28
Overdue > 3 months and rescheduled loans	0.36	0.40	0.35
Classified loan ratio (gross) of Mainland related lending ¹²	0.55	0.71	0.75
Liquidity ratios (consolidated)			
Liquidity Coverage Ratio — applicable to category 1 institutions (quarterly average)	167.3	153.0	159.9
Liquidity Maintenance Ratio — applicable to category 2 institutions (quarterly average)	54.3	54.5	56.3
Net Stable Funding Ratio — applicable to category 1 institutions	135.6	129.9	131.7
Core Funding Ratio — applicable to category 2A institutions	134.3	132.9	134.5
Retail banks			
Profitability			
Loan impairment charges as a percentage of average total assets (year-to-date annualised)	0.05	0.06	0.08
Net interest margin (year-to-date annualised)	1.62	1.64	1.63
Cost-to-income ratio (year-to-date)	38.7	38.0	39.5
Surveyed institutions			
Asset quality			
Delinquency ratio of residential mortgage loans	0.02	0.02	0.03
Credit card lending			
Delinquency ratio	0.21	0.23	0.25
Charge-off ratio — quarterly annualised	1.53	1.76	1.64
— year-to-date annualised	1.51	1.58	1.57
All locally incorporated AIs			
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	16.0	16.3	16.5
Tier 1 capital ratio	17.9	18.3	18.5
Total capital ratio	20.3	20.6	20.7
Leverage ratio	8.0	8.3	8.2

Notes:

- Figures are related to Hong Kong offices only except where otherwise stated.
- The Hong Kong Interbank Offered Rates are released by the Hong Kong Association of Banks.
- With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
- 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.
- Since June 2019, the composite interest rate has been calculated based on the new local IRRBB framework. As such, the figures since June 2019 are not strictly comparable with those of previous months.
- Quarterly change.
- Loans for use in Hong Kong plus trade finance.
- Including "others" (i.e. unallocated).
- Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' overseas branches and major overseas subsidiaries.
- Classified loans are those loans graded as "substandard", "doubtful" or "loss".
- Net of specific provisions/individual impairment allowances.
- Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' Mainland branches and subsidiaries.

Box 5

The effect of fintech adoption on banks' performance – A preliminary assessment

Introduction

With rapid advancements in financial technologies (fintech⁸⁵) in recent years, financial sectors across the globe have been characterised by an increasing degree of digitalisation and the emergence of various new technological applications and solutions. The Hong Kong banking sector is also vigorously embracing fintech as found in a recent study⁸⁶ by the HKMA, with most surveyed incumbent banks taking a pragmatic approach, and making tangible efforts to adopt fintech innovations in their business operations.⁸⁷ In addition, the development of virtual banks is expected to promote financial innovation and facilitate financial inclusion in Hong Kong.

Given the vast interest in and growing adoption of fintech by banks, the impact is being increasingly felt across various financial services. However, as banks are still engaged in various forms of digitalisation transformation in different business domains, most surveyed banks consider it premature to evaluate whether their prime objectives for adopting fintech have been met at this stage, albeit there are already early signs of benefits brought by fintech.

This box attempts to gauge the effects of fintech adoption on banks' performance by cross-checking their balance sheet data with their survey responses in relation to their fintech adoption. The aim is to understand whether incumbent banks have so far benefited from adopting fintech innovations in their institutions.

Gauging the impact of fintech adoption on banks' performance

Intuitively, the adoption of fintech and digitalisation transformation should enable banks to improve efficiency, expand the customer base and enhance business opportunity. If so, it should generally be expected that banks which adopt fintech to a greater extent in their business operations will generate a better performance in their operational efficiency and profitability, other things being equal.

As the degree of fintech adoption by banks is difficult to measure from conventional balance sheet data, the responses to the HKMA survey study are used to measure banks' fintech adoption status.⁸⁸ Specifically, it is calculated by the share of financial services and operations of a bank that has already applied fintech innovations. By construction, a value of 100% in this indicator for a bank means that it has adopted fintech applications across all of its financial services and operations.

⁸⁵ Following Financial Stability Board's practice, fintech is defined as "technologically enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on financial markets and institutions and the provision of financial services".

⁸⁶ A survey entitled "Study of the Impact of Fintech Innovations on the Hong Kong Banking Industry" was conducted in July 2019 to collect sector-wide qualitative information from market participants and gather insights into important trends and evolution of fintech development in the Hong Kong banking sector. For details, see Wong and Ho (2020), "The Impact of Fintech Innovations on the Hong Kong Banking Industry", *HKIMR working paper*, forthcoming.

⁸⁷ The survey results indicate that incumbent banks are embracing fintech and are progressively applying fintech innovations in virtually all types of financial services, with most respondents (ranging from 70% to 100% of them) either having applied or planning to apply fintech innovations in the various lines of businesses in their institutions.

⁸⁸ In total, 45 AIs participated in the survey. A sample of 37 incumbent banks is constructed to cover a broad representation of market players, related to types of banks and business activities. Of the total, 18 are retail banks and the remaining 19 are major foreign bank branches whose parents are either globally systemic important institutions or Mainland banks. The 37 incumbent banks together account for around three quarters of total assets and over 80% of total customer deposits in the Hong Kong banking sector at the end of June 2019. In addition, eight virtual banks, which have recently obtained banking licences are covered by the survey.

To gauge the effects of banks' fintech adoption, the relationships between banks' fintech adoption status and two metrics of bank performance, namely cumulative changes in banks' cost-to-income ratio and ROA over the period from the first quarter of 2017 to the second quarter of 2019 are examined.⁸⁹ The former metric is a commonly used indicator to proxy the cost efficiency of banks, while the latter measures banks' profitability. The two indicators are constructed based on the HKMA regulatory database which reflect their Hong Kong office positions.

Charts B5.1 and B5.2 present the scatter plots between banks' fintech adoption status and changes in their cost efficiency and profitability, respectively. Each dot in the charts represents the observation of a specific bank. As virtual banks have not yet commenced full operation and therefore do not have any balance sheet data, they are not included in the analysis. As can be seen in the charts, banks that have already adopted fintech for a wider range of their businesses and operations, generally registered a larger cumulative reduction in their cost-to-income ratio and a bigger rise in ROA.

Chart B5.1
Relationship between banks' cost efficiency and its fintech adoption status

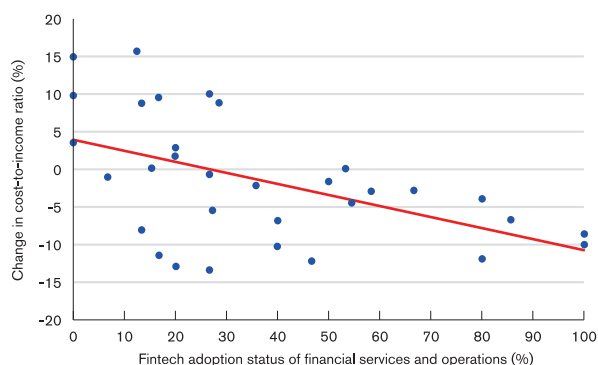
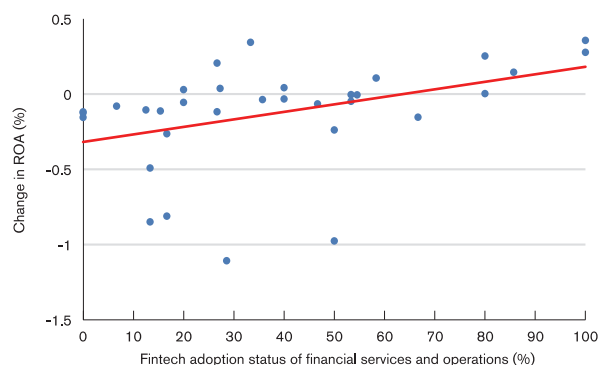


Chart B5.2
Relationship between banks' profitability and its fintech adoption status



In addition, a simple ordinary least squares model is employed by regressing the two performance indicators on banks' fintech adoption status.⁹⁰ In this exercise, any impacts that may arise from differences in banks' size (proxied by log assets), business characteristics (proxied by banks' loans-to-assets ratio and deposits-to-assets ratio) and bank group (proxied by a dummy variable which takes a value of one if a bank is a retail bank and zero otherwise) are controlled and separated. The estimation results are reported in Table B5.A.

Table B5.A
Estimated effects of fintech adoption on banks' performance

	(1)	(2)
Dependent variables	Δ Cost-to-income ratio	Δ ROA
Fintech adoption status	-0.167*** (0.002)	0.005** (0.030)
Log assets	2.652** (0.044)	0.029 (0.553)
Deposits-to-assets ratio	-0.218* (0.052)	-0.005 (0.374)
Loans-to-assets ratio	0.110 (0.418)	0.005 (0.419)
Dummy variable for retail bank	5.475 (0.146)	0.113 (0.645)
Constant	-5.095 (0.481)	-0.476 (0.103)
Observations	33	33
R ²	0.498	0.199

Note: ***, **, * denote the estimated coefficients being significant at 1%, 5% and 10% levels respectively. Robust standard errors are used.

⁸⁹ Cumulative changes are used as the fuller effect of fintech adoption would likely take time to be reflected. Same analyses with alternative time periods have been conducted and the results are qualitatively similar.

⁹⁰ To ensure the estimation results are not driven by outliers, the dependent variable is trimmed at the 5th and 95th percentile.

Estimation results show that changes in banks' cost-to-income ratio and ROA are statistically correlated with their fintech adoption status. Specifically, a bank with a higher level of fintech adoption by 10 percentage points is associated with a larger cumulative decline in its cost-to-income ratio by 1.67 percentage points as well as a larger cumulative rise in its ROA by 0.05 percentage point, other things being equal.⁹¹ The magnitude of the effect is also considered to be economically significant given that the mean value of the cumulative change in the cost-to-income ratio and ROA over the sample period are -1.56 and -0.13 percentage points respectively.⁹²

Conclusion

While it remains difficult to ascertain the full impact of fintech at this stage, this analysis finds that the adoption of fintech by banks is positively associated with banks' performance in terms of cost efficiency and profitability.⁹³ As such, banks may be able to stay competitive by proactively leverage fintech innovations in their business, especially with the weakening global economic growth and low-for-longer interest rate environment.

With the continuing process of fintech adoption by banks, new challenges and risks are likely to arise amid the rapidly-evolving development of new technologies. As such, the future operation of virtual banks and fintech firms may bring new changes to the provision of financial services, which may lead to profound changes to banks' business models. Therefore, further researches and closer attention to these issues are highly warranted.

⁹¹ Caution should be exercised when interpreting the estimated effects as the actual full impact may differ significantly across banks which crucially depends on the specific fintech strategy adopted by individual banks as well as the type of fintech innovations being deployed.

⁹² As a reference, the median value of the cumulative change in the cost-to-income ratio and ROA over the sample period are -2.2 and -0.06 percentage points respectively.

⁹³ UBS (2016), "Global banks: Is Fintech a threat or an opportunity?", also finds a similar conclusion based on a simulation analysis.