5. Banking sector performance

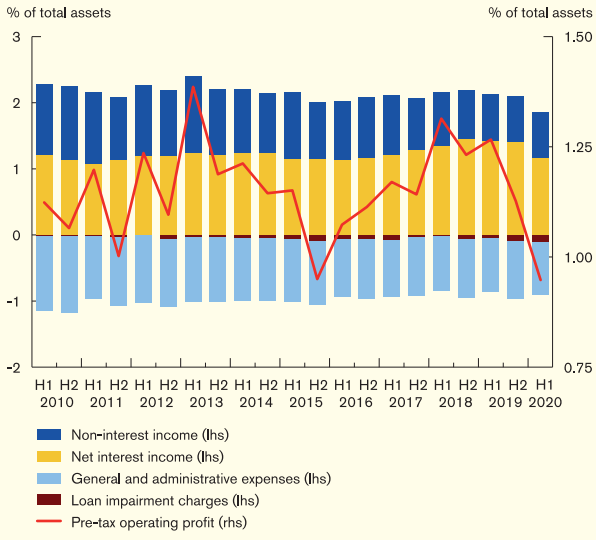
As the economic downturn deepened amid the global outbreak of COVID-19, retail banks in Hong Kong recorded thinner profits alongside a slight deterioration in asset quality in the first half of 2020. Nevertheless, the Hong Kong banking sector has remained resilient, underpinned by strong capital and liquidity positions by international standards. In response to the pandemic, the HKMA, together with the banking sector, has taken proactive measures to reduce cash-flow pressure on borrowers. These measures supported stable flows of credit to help the economy ride out this difficult period. Looking ahead, the Hong Kong banking sector will continue to be challenged by a number of downside risk factors, including uncertainties over the path of global and domestic economic recovery amid the COVID-19 pandemic and rising US-China tensions. As these risk factors may continue to linger, banks should carefully assess the longer-term impact on the asset quality of their loan portfolios, particularly as the recession may weaken corporates' and households' repayment ability.

5.1 Profitability and capitalisation

Profitability

Due to the deterioration in the global economic environment amid the COVID-19 pandemic, the banking sector recorded thinner profits in the first half of 2020. The aggregate pre-tax operating profit of retail banks[39] declined by 20.0% in the first half of 2020, compared with the same period in 2019. The reduction in profits was mainly driven by a decrease in net interest income and an increase in loan impairment charges, which more than offset the mild increase in non-interest income. As a result, the return on assets dropped to a recent low of 0.95% in the first half of 2020, compared with 1.27% in the same period in 2019 (Chart 5.1).

Chart 5.1
Profitability of retail banks



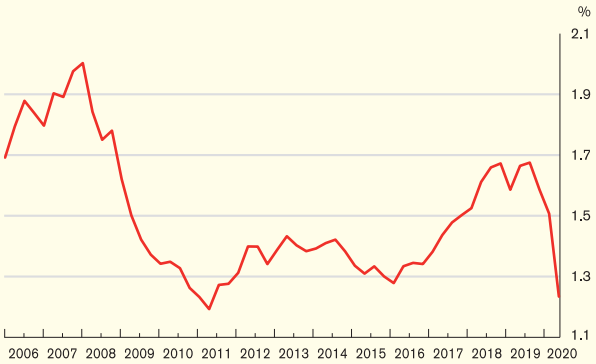
Note: Semi-annually annualised figures.
Source: HKMA.

The net interest margin (NIM) of retail banks narrowed by 26 basis points to 1.37% in the first half of 2020 from 1.62% in the same period of 2019 (Chart 5.2). This was partly contributed by a notable decrease in Hong Kong interbank offered rates (HIBORs) in the second quarter

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

(detailed below), which compressed banks' margin on HIBOR-based assets.[40]

Chart 5.2
NIM of retail banks

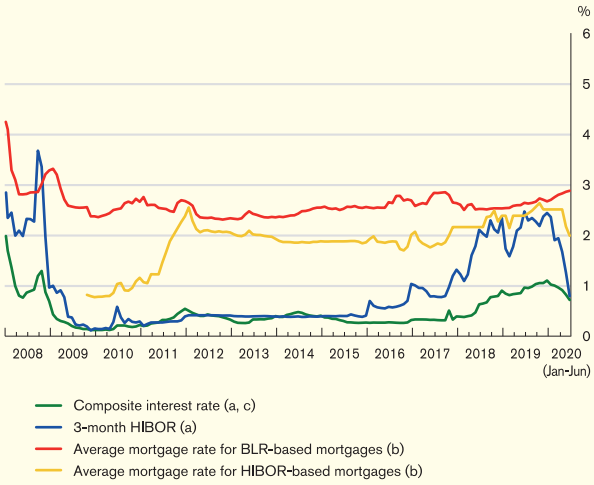


Note: Quarterly annualised figures.
Source: HKMA.

As the US Federal Reserves slashed the policy interest rate by a total of 150 basis points to near zero in March, in an attempt to cushion the adverse effect of the COVID-19 pandemic, Hong Kong interbank interest rates also saw a notable decline in the second quarter alongside significant capital inflows.[41] In particular, the three-month HIBOR saw a marked reduction of 115 basis points in the second quarter to 0.78% at the end of June 2020 after the decline of 50 basis points in the first quarter (blue line in Chart 5.3).

The composite interest rate (a measure of the average Hong Kong dollar funding costs for retail banks) also showed a similar development. After a decrease from 1.09% at the end of 2019 to 0.95% at the end of March 2020, it declined more notably to 0.71% at the end of June 2020 (green line in Chart 5.3), reflecting lower interbank funding cost and lower time deposit rates offered by some major retail banks.

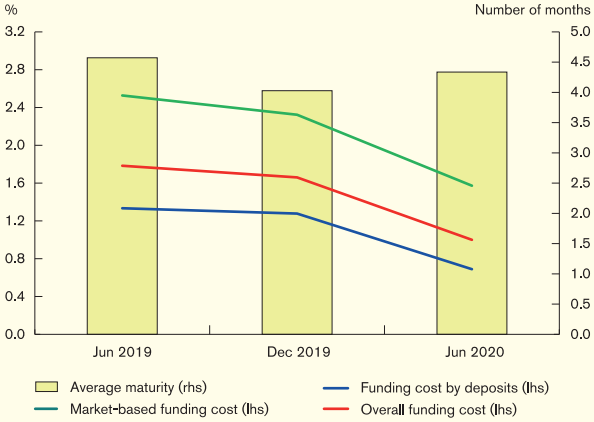
Chart 5.3
Interest rates



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

From a broader perspective, the overall Hong Kong dollar and US dollar funding cost for licensed banks in Hong Kong declined moderately by 66 basis points during the first half of 2020 (Chart 5.4).

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



Note: Since June 2019, licensed banks not exempted from the new local IRRBB framework report under the new framework, while exempted licensed banks 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.

[40] In response, some retail banks have raised mortgage rates and cut cash rebates since late-June, according to market information.

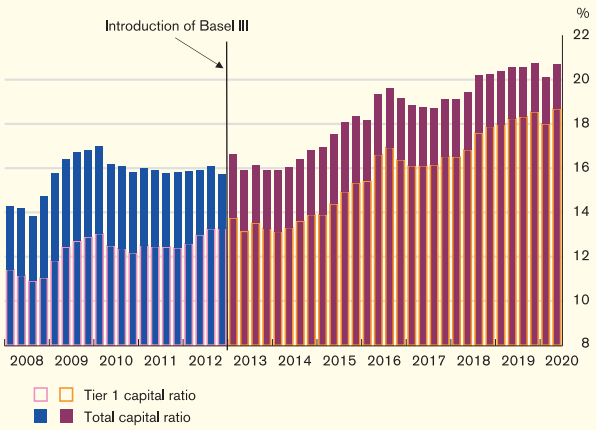
[41] The strong-side Convertibility Undertaking has been repeatedly triggered since late April this year. For details, please see Chapter 4.1.

In the near term, the outlook for banks' profitability may become more challenging as the low interest rate environment is likely to be prolonged, continuing to suppress banks' NIM. At the same time, a deterioration in asset quality will weigh on banks' profit given that various factors could deepen the economic downturn in Hong Kong, including new waves of the pandemic and the rising US-China tensions.

Capitalisation

Capitalisation of the Hong Kong banking sector continued to be strong and well above minimum international standards. The consolidated total capital ratio of locally incorporated authorized institutions (AIs) stayed largely unchanged at around 20.7% at the end of June 2020 compared with six months ago (Chart 5.5). The Tier 1 capital ratio edged up to 18.7%, with 16.6% being contributed by Common Equity Tier 1 (CET1) capital.

Chart 5.5
Capitalisation of locally incorporated AIs

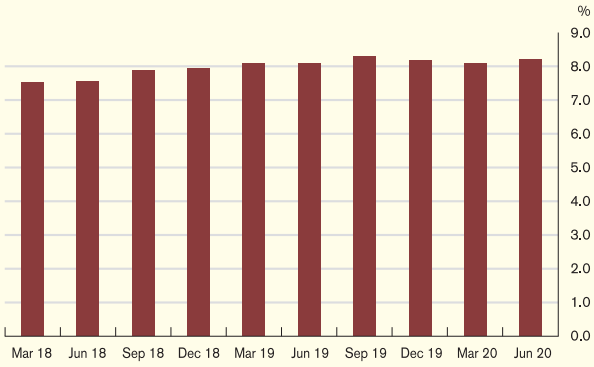


Notes:
1. Consolidated basis.
2. With effect from 1 January 2013, a revised capital adequacy framework (under Basel III) was introduced for locally incorporated AIs. The capital ratios from March 2013 onwards are therefore not directly comparable with those up to December 2012.

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.[42] The LR of locally incorporated AIs stood at a healthy level of 8.2% at the end of June 2020, exceeding the 3% statutory minimum (Chart 5.6).

Chart 5.6
Leverage Ratio of locally incorporated AIs



Note: Consolidated basis.
Source: HKMA.

5.2 *Liquidity and interest rate risks*

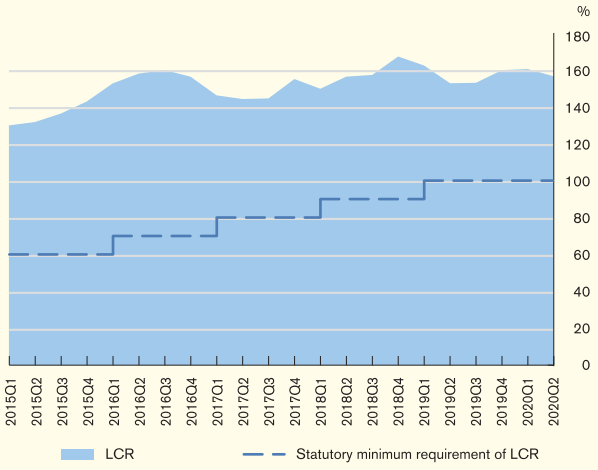
Liquidity and funding

The liquidity positions of the banking sector, as measured by the Basel III Liquidity Coverage Ratio (LCR)[43], remained sound during the review period. The average LCR of category 1 institutions hovered at a similar level of 156.5% in the second quarter of 2020 from 159.9% in the fourth quarter of 2019 (Chart 5.7), which were well above the statutory minimum requirement of 100%. The average Liquidity Maintenance Ratio (LMR) of category 2 institutions mildly increased to 57.2% in the second quarter of 2020 from 56.4% in the fourth quarter of 2019, also well above the statutory minimum requirement of 25%.

[42] 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).

[43] 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".

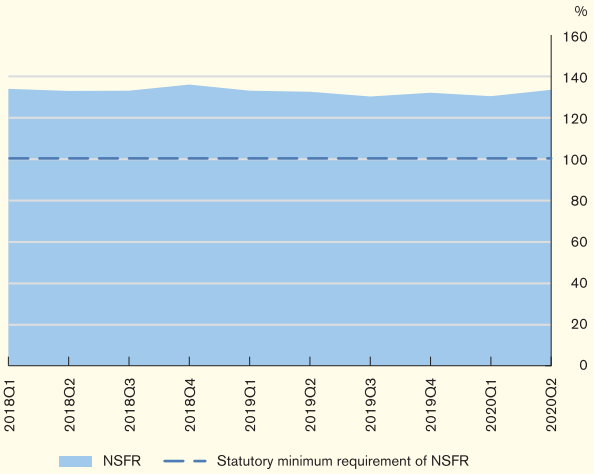
Chart 5.7
Liquidity Coverage Ratio



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

Source: HKMA.

Chart 5.8
Net Stable Funding Ratio



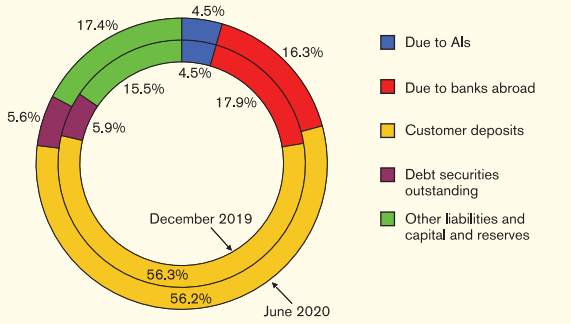
Note: Consolidated basis.

Source: HKMA.

The Net Stable Funding Ratio (NSFR)[44], 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 133.1% in the second quarter of 2020 (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 138.1%, exceeding the statutory minimum requirement of 75%. The strong liquidity and stable funding positions of AIs suggest the Hong Kong banking sector is well positioned to withstand liquidity shocks.

Customer deposits continued to be the primary funding source for AIs, underpinning a stable funding structure in the banking system. At the end of June 2020, the share of customer deposits to all AIs' total liabilities hovered around 56.2%, a level similar to six months ago (Chart 5.9).

Chart 5.9
The liability structure of all AIs



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

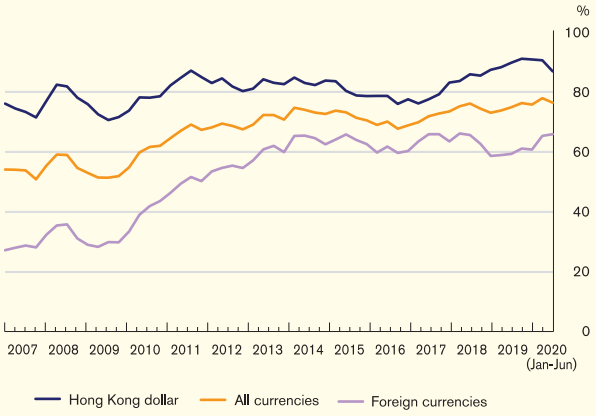
Source: HKMA.

[44] 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).

Reflecting an increase in Hong Kong dollar deposits and a slight decrease in loans and advances in the first half of 2020, the average Hong Kong dollar loan-to-deposit (LTD) ratio of all AIs declined to 86.4% at the end of June 2020 from 90.3% at the end of 2019 (Chart 5.10).[45]

By comparison, with strong demand for foreign currency loans (especially US dollar loans) since March, the average foreign currency LTD ratio increased to 65.5% from 60.4% during the same period. Overall, the average all-currency LTD ratio of all AIs edged up to 76.0% at the end of June 2020 from 75.3% six months ago.

Chart 5.10
Average LTD ratios of all AIs

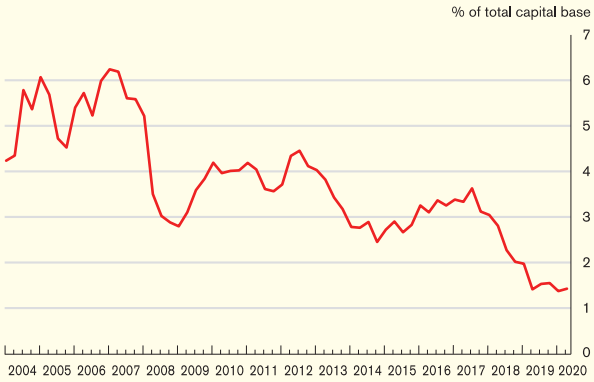


Note: Quarter-end figures.
Source: HKMA.

Interest rate risk

The interest rate risk exposure of locally incorporated licensed banks remained relatively low in the second quarter of 2020. 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 decline equivalent to 1.43% of their total capital base at the end of June 2020 (Chart 5.11).[46]

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 June 2020.
2. The impact of the interest rate shock refers to its impact on the economic value of the banking and trading book[47], 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 for June 2019 onwards are not strictly comparable with those of previous periods.

Source: HKMA.

5.3 Credit risk

Overview

Despite the deepening of the recession in Hong Kong, total loans and advances of the banking sector grew by 3.0% during the first half of 2020, after growing by 2.4% in the second half of 2019. (Chart 5.12). Loan growth was broad-based, with growth in loans for use outside Hong Kong accelerating to 4.2% in the same period from 2.2% in the preceding six months and growth in

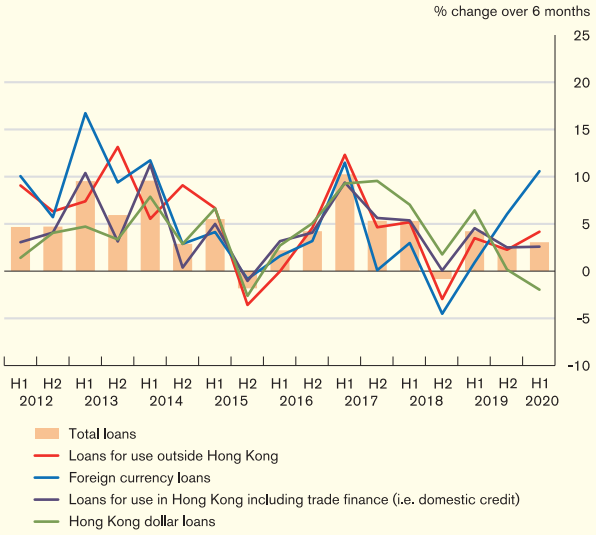
[45] The Hong Kong dollar LTD ratio has stayed at a relatively high level during recent quarters despite the latest easing. Nevertheless, the liquidity conditions of the banking system remained sound if one also takes into account AIs' own capital and reserves as a broader measure of funding liquidity. The adjusted Hong Kong dollar LTD (including customer deposits, capital and reserves, qualifying capital instruments and other capital-type instruments as the denominator) was around 73% at the end of June 2020.

[46] 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.

[47] 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.

domestic loans (comprising loans for use in Hong Kong and trade financing) being broadly stable at 2.6%.

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.

Analysed by currency, Hong Kong dollar loans contracted by 2.0% in the first half of 2020. In contrast, foreign currency loans grew sharply by 10.6%, driven partly by strong demand for US dollar loans, as COVID-19 triggered a sharp global US dollar liquidity stress around mid-March, causing corporates to secure their US dollar funding globally. Moreover, the interest differential between Hong Kong dollar and the US dollar in March and April also made borrowing in US dollar more attractive.

Banks' views of credit demand in the near term were diverse. According to the results of the HKMA Opinion Survey on Credit Condition Outlook in June 2020, the shares of surveyed AIs expecting loan demand to be lower and those expecting loan demand to be higher in the following three months were broadly similar at 24% and 21% respectively. (Table 5.A).

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

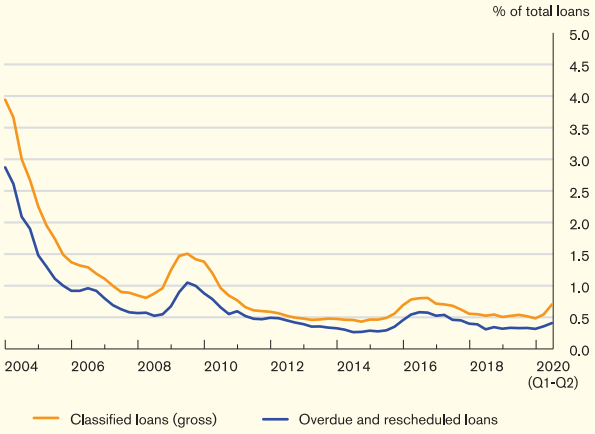
% of total respondents	Sep-19	Dec-19	Mar-20	Jun-20
Considerably higher	0	0	0	0
Somewhat higher	14	18	24	21
Same	41	68	36	55
Somewhat lower	45	14	40	24
Considerably lower	0	0	0	0
Total	100	100	100	100

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

The asset quality of banks' loan portfolios showed signs of persistent albeit modest deterioration in the first half amid the COVID-19 outbreak and widespread economic downturn. The gross classified loan ratio (CLR) of all AIs increased to 0.79% at the end of June 2020 from 0.57% at the end of 2019, while the ratio of overdue and rescheduled loans of all AIs also rose from 0.34% at the end of 2019 to 0.49% at the end of June 2020. For retail banks, the gross CLR and the ratio of overdue and rescheduled loans both increased to 0.71% and 0.41% respectively (Chart 5.13).

Due to the negative impact of COVID-19 on borrowers' repayment ability, it is likely the asset quality of banks may deteriorate in the coming quarters and hence a further increase in banks' loan-loss provisions. The HKMA has requested banks to uphold their loan classification standards to reflect any changes in asset quality in a timely manner and to set aside adequate provisions.

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 exposure[48]

The half-yearly growth in household debt slowed to 1.6% in the first half of 2020 from 5.7% in the second half of 2019, reflecting the decline in personal loans (both credit card advances and loans for other private purposes) and slower growth in residential mortgage loans (Table 5.B).

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

	2017		2018		2019		2020
(%)	H1	H2	H1	H2	H1	H2	H1
Residential mortgages	5.0	4.0	4.6	3.2	4.7	5.6	3.5
Personal loans	5.6	12.4	7.1	4.5	11.0	5.8	-2.3
of which:							
Credit card advances	-7.8	11.0	-5.0	10.6	-3.8	4.1	-9.0
Loans for other private purposes	9.9	12.7	10.3	3.2	14.7	6.2	-1.0
Total loans to households	5.2	6.5	5.4	3.6	6.8	5.7	1.6

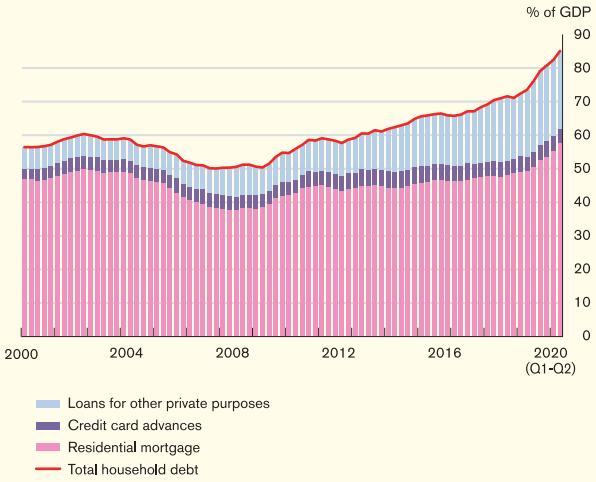
Notes:
1. Since December 2018, figures for loans to households have been restated to reflect AIs' reclassification of working capital loans. The half-yearly growth rates for the first half of 2019 and onwards are calculated based on the reclassified loan data, while the historical growth rates until the second half of 2018 are calculated based on the data without such reclassification.
2. The data series of loans to households from 2017 have been revised due to classification issues of the data submitted by AIs earlier.

Source: HKMA.

[48] 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 loans to private banking and wealth management customers secured by financial assets, credit card advances and unsecured personal loans. At the end of June 2020, the share of household lending in domestic lending was 31.6%.

Despite slower growth of household debt in the first half of 2020, the household debt-to-GDP ratio rose further to 85.1% in the first half of 2020 from 80.8% in the second half of 2019, as the nominal GDP declined amid the contraction of Hong Kong economy (Chart 5.14). Given the nature of the current downturn, economic activities contracted sharply at a much quicker pace than the paydown of outstanding household debt, boosting the household debt-to-GDP ratio. Indeed, the contraction in nominal GDP has contributed 3.0 of the 4.3 percentage points increase in the ratio from the second half of 2019. 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 trends of the ratio would depend on future economic development.

Chart 5.14
Household debt-to-GDP and its components

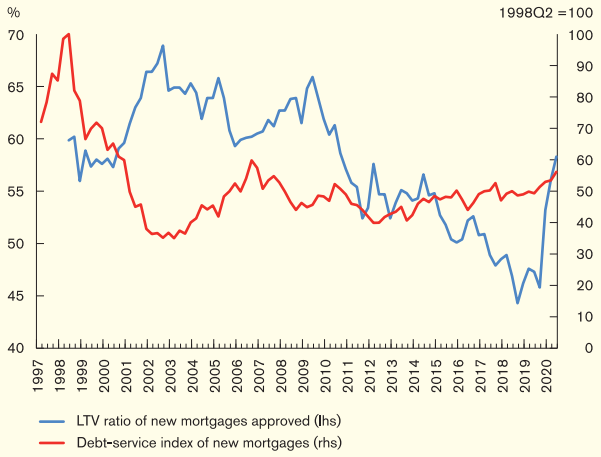


Notes:
1. Only borrowings from AIs are covered.
2. GDP refers to the annualised GDP, which is the sum of the quarterly GDP in the trailing four quarters.
3. Since December 2018, the figure for household debt has been restated to reflect AIs' reclassification of working capital loans.
4. The data series of loans to households from 2017 have been revised due to classification issues of the data submitted by AIs earlier.

Source: HKMA.

Within household debt, although residential mortgage loans continued to rise in the first half of 2020, they witnessed a slowdown in growth compared to last year. Banks' mortgage portfolios remained healthy, with the delinquency ratio hovering at a low level of 0.04% in the second quarter of 2020. The loan-to-value (LTV) ratio of new mortgage loans approved continued to trend up from 53.2% in December 2019 to 58.3% in June 2020 (Chart 5.15), partly reflecting that more mortgages were granted under the Mortgage Insurance Programme. Nonetheless, the figure was still well below the ratio of 64% in September 2009, before the HKMA's countercyclical macro-prudential measures were introduced. In addition, the average debt servicing ratio (DSR) of new mortgages approved also decreased to 36.2% in June 2020 from 41% in August 2010, when a cap on DSR was first applied.

Chart 5.15
LTV ratio and household debt-servicing burden for new mortgage loans



Notes:
1. The calculation of the debt-service index is based on the average interest rate for BLR-based mortgages.
2. The LTV ratio refers to the ratios of new mortgages approved during the last month of each quarter.
3. The data series of mortgage loans from January 2017 to April 2020 have been revised due to categorisation issues of the data submitted by AIs earlier. The historical values of the LTV ratio and debt-service index for the relevant periods have therefore been revised accordingly.

Sources: HKMA and staff estimates.

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 liabilities. In our 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). Also, the safe assets-to-liabilities ratio for Hong Kong's household sector stayed high at 3.04 times (US: 1 time; UK: 1 time; Singapore: 1 time, Japan: 3 times). 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.

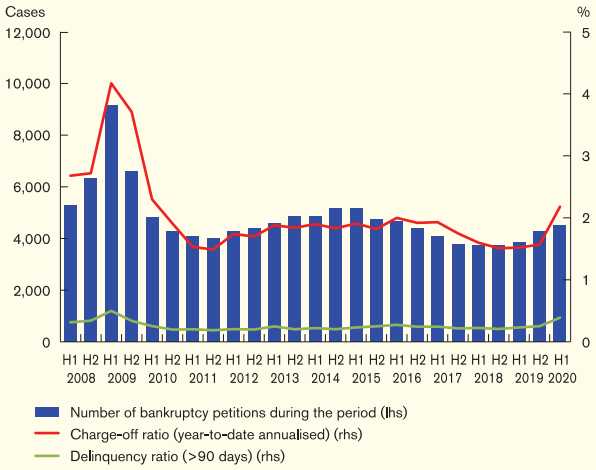
The lower domestic interest rates and the mortgage principal moratoria offered by some banks in Hong Kong may have alleviated household debt servicing burdens in the near term. However, as the unemployment rate has risen sharply amid the deepening economic recession, a decline in household income could offset the positive impact of the two factors mentioned above. In particular, the debt-service index of new mortgages[49], which is compiled based on various aggregate data including average household income, average amount of mortgage loans and mortgage rates, increased to 56.2 in the second quarter of 2020 from 53.0 in the last quarter of 2019 (the red line in Chart 5.15), reflecting partly a decline in average household income. A sensitivity test shows that the index could rise further to 62.4 if household income were to decrease further by 10%, other things being constant.[50] Therefore, banks should stay alert to the risks associated with a rising level of household debt-servicing burden.

[49] It is defined as the ratio of estimated average mortgage payments to median household income based on various aggregate data. A higher value of the debt-service index indicates there is either a drop in average 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 be associated with a deterioration in the asset quality of household debt. By construction, the level of the debt-service index may not be strictly comparable with that of the average DSR of new mortgages approved which is directly surveyed from AIs.

[50] The assumption of a 10% decrease in household incomes resembles what happened during the Asian financial crisis.

The number of bankruptcy petitions continued to rise (Chart 5.16) alongside the rising unemployment rate during the first half of 2020. The annualised credit card charge-off ratio rose to 2.18% in the second quarter of 2020 and the delinquency ratio increased to 0.39%, as the economic impact of the COVID-19 outbreak took hold.

Chart 5.16
Charge-off ratio and delinquency ratio for credit card lending and bankruptcy petitions

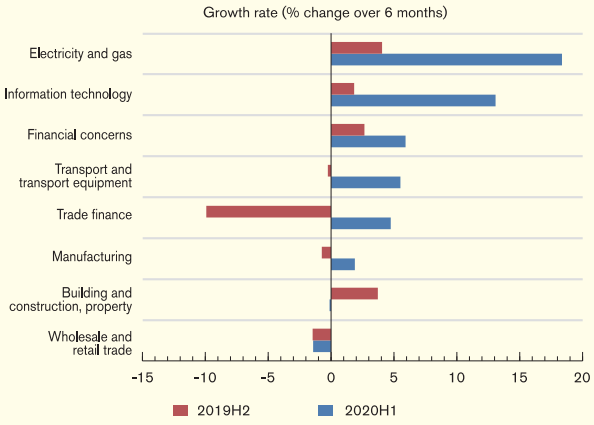


Sources: Official Receiver's Office and HKMA.

Corporate exposure[51]

To alleviate corporates' funding pressure amid the economic hardship, the HKMA and the banking sector have joined forces to introduce a host of measures to support corporates (particularly small-and-medium-sized enterprises (SMEs) in hard-hit sectors)[52]. Partly reflecting the effect of these measures, domestic corporate loans (including trade finance) grew by 3.0% in the first half of 2020, moderately faster than the 1.1% in the preceding six months. Indeed, loan growth for many economic sectors has accelerated. Loans extended to transportation, trade financing and manufacturing sectors, which have been hard hit by the pandemic, resumed positive growth during the first half of 2020, while loans for the wholesale and retail trade sector continued to decline (Chart 5.17).

Chart 5.17
Growth in domestic corporate loans by selected sectors



Source: HKMA.

The demand-side survey on SMEs' credit conditions for the second quarter of 2020 shows that 36% of the respondents perceived credit approval as "more difficult" relative to six months ago, up from 31% recorded in the first quarter (Chart 5.18). The increase in the percentage was mainly contributed by SMEs that did not apply for, or enquire about, new credit during the quarter. However, among those who did apply or made enquiries, the percentage of respondents perceiving a more difficult credit approval stance remained stable. Therefore, the perception of a more difficult credit approval stance may not necessarily reflect the actual difficulties faced by SMEs in obtaining bank credit, because the perception could be affected by a number of factors, such as media/news reports, business conditions and the opinions of relatives and friends. Despite the worsened perception of the credit approval stance of banks, SMEs' credit conditions showed signs of improvement. During the second quarter, 5% of the respondents with existing credit lines indicated a tighter stance by banks, notably

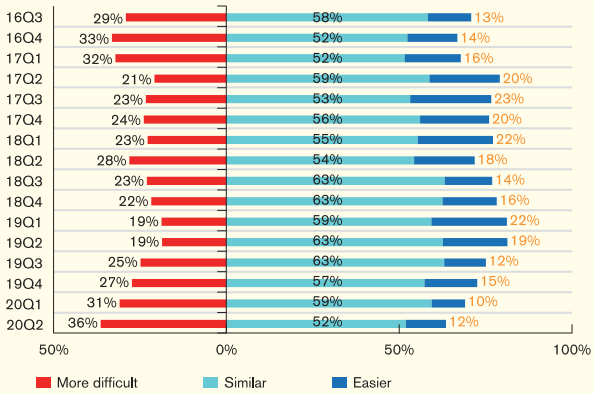
[51] Excluding interbank exposure. At the end of June 2020, the share of corporate loans in domestic lending was 68.3%.

[52] The HKMA has set up a dedicated webpage to facilitate public understanding of measures by the HKMA and the banking sector to support SMEs and individuals amid the COVID-19 outbreak. More information on these measures are available from this webpage (https://www.hkma.gov.hk/eng/key-functions/banking/banking-regulatory-and-supervisory-regime/riding-out-the-covid-19-challenge/).

down from 17% in the first quarter of 2020 and much lower than the high level of 32% registered in the third quarter of 2019 (Chart 5.19).

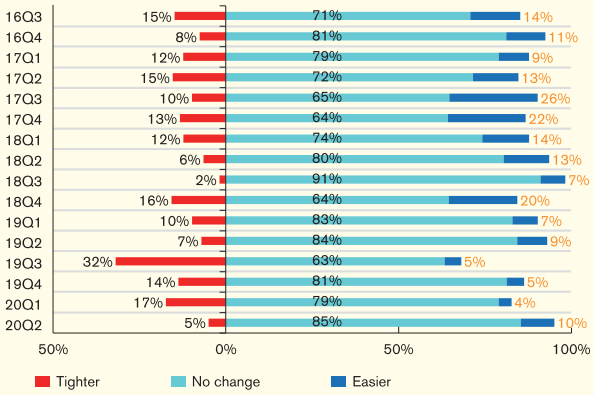
In response to the COVID-19 outbreak, a number of enhancements have been introduced under the SME Financing Guarantee Scheme to support SMEs. These include raising the maximum loan amount, extending the guarantee period, lowering the guarantee fee, and offering a principal moratorium under the 80% Guarantee Product. The new 90% Guarantee Product was also introduced in mid-December 2019 to provide additional support to SMEs and those with relatively less operating experience. To further enhance the cash-flow support to enterprises affected by the COVID-19 outbreak, the Special 100% Loan Guarantee was introduced in early 2020. This special guarantee differs from the 80% and 90% Guarantee Products, in that the funding is provided by the Hong Kong Mortgage Corporation Limited (HKMC) and not by the banks. With the solid backing from the HKMC, banks can focus on whether the applicant meets the scheme's criteria, without having to worry about commercial justifications or claims processing. This has significantly expedited the approval process and it is expected the relief measures will continue to help alleviate SMEs' cash-flow pressures and overcome the difficulties ahead.

Chart 5.18
SMEs' perception of banks' credit approval stance relative to six months ago



Note: Excluding respondents who answered "no idea / don't know".
Source: HKMA.

Chart 5.19
SMEs' reported change in banks' stance on existing credit lines

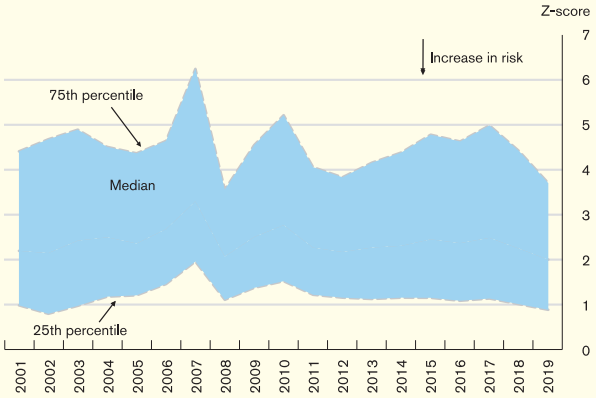


Note: Only cover respondents with existing credit lines.
Source: HKMA.

Apart from the HKMC's SME Financing Guarantee Scheme to support SMEs, the HKMA has been in parallel taking measures to alleviate cash-flow pressure of enterprises. For instance, the HKMA has launched the "Pre-approved Principal Payment Holiday Scheme" in April 2020, in which all loan principal payments of a wide range of corporate borrowers – those with an annual business turnover not higher than HK$800 million and without bank loans overdue for 30 days or more – falling due between 1 May and 31 October 2020 have been pre-approved for automatic deferment by six months (90 days for trade loans). Considering that the COVID-19 outbreak has yet to subside in many parts of the world, the HKMA announced in September 2020 that all loan principal payments falling due between 1 November 2020 and 30 April 2021 will be further extended by another six months (90 days for trade loans). Up to the end of July 2020, adding up the statistics on the Scheme and those on other corporate relief initiatives rolled out by banks, more than 43,000 cases of principal payment holidays or other forms of relief have been granted by banks, amounting to more than HK$530 billion.

Some indicators suggest that the credit risk of corporates has 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) decreased at the end of 2019, suggesting a deterioration in the financial health of these corporates (Chart 5.20). Their debt servicing ability, as indicated by the weighted average interest coverage ratio (ICR) (the green line in Chart 5.21), also deteriorated mildly.

Chart 5.20
Altman's Z-score of listed non-financial corporates in Hong Kong

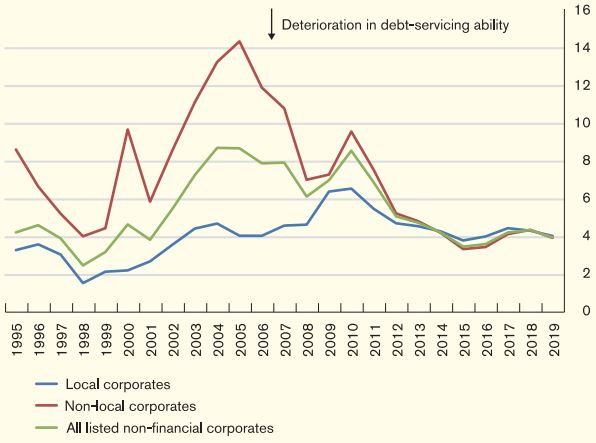


Notes:
1. All non-financial corporates listed on the Hong Kong Stock Exchange are selected.
2. Figures are calculated based on information up to end-August 2020.

Source: HKMA staff calculation based on estimates compiled by Bloomberg.

Nevertheless, corporate leverage continued to trend down. The weighted average debt-to-equity ratio, a common measure of corporate leverage, saw a modest decline driven mainly by non-local corporates (the red line in Chart 5.22).

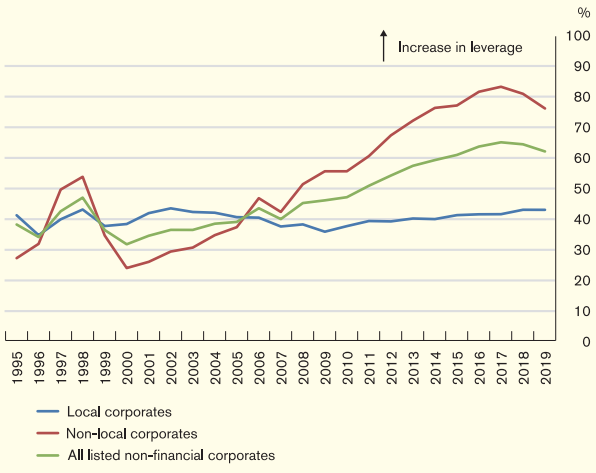
Chart 5.21
Interest coverage ratio of listed non-financial corporates in Hong Kong



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-August 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, 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 5.22
Leverage ratio of listed non-financial corporates in Hong Kong



Notes:
1. Weighted average figures.
2. The leverage ratio is defined as the ratio of debt to equity. A higher value indicates higher leverage.
3. All non-financial corporates listed on the Hong Kong Stock Exchange are selected. Local and non-local corporates refer to listed firms that are domiciled in and outside Hong Kong, respectively.
4. Figures are calculated based on information up to end-August 2020.
5. Under HKFRS 16, firms as lessees will also recognise their operating leases with terms more than 12 months on-balance sheet. Specifically, the operating leases will be reported under "lease liability" items. As such, for 2019 the adjusted debts for listed corporates are calculated as total borrowings minus total leases liabilities for the purpose of comparison with historical figures, whenever items for "leases liabilities" are reported.

Source: HKMA staff estimates based on data from Bloomberg.

It should be noted that due to the time lag for the availability of accounting data, the negative impact of the COVID-19 outbreak cannot be assessed in the above analysis. To shed light on this issue, Box 4 analyses corporates' funding and default risks under a recession scenario with a sharp decline in corporate revenue among economic sectors.

The analysis shows that while corporates in Hong Kong may see higher default risks due to declines in revenue and thus net cash buffers amid the pandemic, the severity of the impact would vary across sectors. The analysis also finds that how far firms can roll over their short-term debt under the revenue shock is a key determinant of the funding and default risks. This finding suggests that maintaining stable credit flows to support the real economy is particularly important in such a difficult situation. In this regard, the relief measures taken by the HKMA and the banking sector should help corporates, particularly SMEs to ride through this difficult period.

Mainland-related lending and non-bank exposures

The banking sector's total Mainland-related lending increased by 5.0% to HK$4,790 billion at the end of June 2020 (17.2% of total assets), from HK$4,564 billion (16.8% of total assets) at the end of 2019 (Table 5.C). Other non-bank exposures increased by 3.9% to HK$1,607 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK$ bn	Sep 2019	Dec 2019	Mar 2020	Jun 2020
Mainland-related loans	4,625	4,564	4,765	4,790
Mainland-related loans excluding trade finance	4,296	4,271	4,435	4,463
Trade finance	330	292	330	326
By type of AIs:				
Overseas incorporated AIs	1,923	1,880	1,973	1,985
Locally incorporated AIs*	1,983	1,959	2,060	2,087
Mainland banking subsidiaries of locally incorporated AIs	720	725	732	718
By type of borrowers:				
Mainland state-owned entities	1,906	1,836	1,993	2,036
Mainland private entities	1,286	1,288	1,313	1,288
Non-Mainland entities	1,433	1,440	1,460	1,466

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

Source: HKMA.

Table 5.D
Other non-bank exposures

HK$ bn	Sep 2019	Dec 2019	Mar 2020	Jun 2020
Negotiable debt instruments and other on-balance sheet exposures	1,102	1,125	1,184	1,202
Off-balance sheet exposures	452	421	408	404
Total	**1,554**	**1,547**	**1,592**	**1,607**

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

The asset quality of banks' Mainland-related lending showed some deterioration in the first half amid the COVID-19 outbreak. The gross CLR of Mainland-related lending of all AIs[53] increased to 0.94% at the end of June 2020 from 0.75% at the end of 2019.

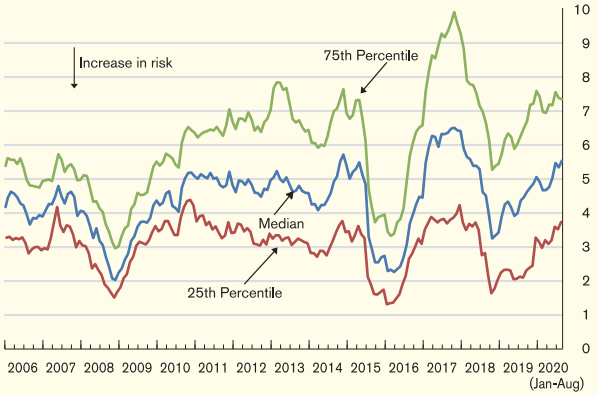
The distance-to-default (DTD) index[54], a forward-looking market-based indicator, showed that the default risk for the Mainland corporate sector has receded somewhat in recent months (Chart 5.23), mainly reflecting the improved market sentiment amid the aggressive policy stimulus. However, anecdotal evidence shows that the outlook of Mainland corporates may remain less optimistic.[55]

[53] Figures cover AIs' Hong Kong offices and Mainland branches and subsidiaries.

[54] 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.

[55] For instance, the fiscal year 2020 earnings per share consensus forecast of all Mainland listed firms at the end of June has been revised down by more than 10% compared with that of six months ago.

Chart 5.23
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.

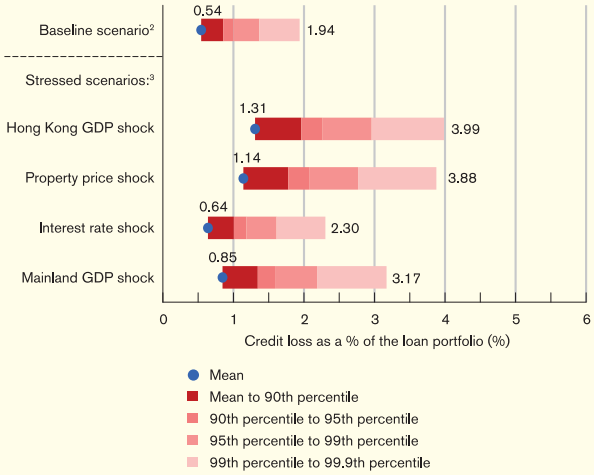
In view of the economic headwinds facing the Mainland economy arising from the uncertainties surrounding COVID-19, and the rising US-China tensions, banks should stay alert to the credit risk management of their Mainland-related exposures.

Macro stress testing of credit risk[56]

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 5.24 presents the simulated future credit loss rate of retail banks in the second quarter of 2022 under four specific macroeconomic shocks[57] using information up to the second quarter of 2020.

Taking into account tail risk, banks' credit losses (at the confidence level of 99.9%) under the stress scenarios range from 2.30% (Interest rate shock) to 3.99% (Hong Kong GDP shock, which are significant, but smaller than the estimated loan loss of 4.39% following the Asian financial crisis.

Chart 5.24
The mean and value-at-risk statistics of simulated credit loss distributions[1]



Notes:

1. The assessments assume the economic conditions in 2020 Q2 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
2. Baseline scenario: no shock throughout the two-year period.
3. Stressed scenarios:

   Hong Kong GDP shock: reductions in Hong Kong's real GDP by 2.7%, 2.4%, 1.7%, and 1.6% respectively in each of the four consecutive quarters starting from 2020 Q3 to 2021 Q2.

   Property price shock: Reductions in Hong Kong's real property prices by an average of 12% in each of the four consecutive quarters starting from 2020 Q3 to 2021 Q2.

   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. 2020 Q3), followed by no change in the second and third quarters and another rise of 300 basis points in the fourth quarter (i.e. 2021 Q2).

   Mainland GDP shock: An average year-on-year real GDP growth rate of 2% for the four consecutive quarters starting from 2020 Q3.

Source: HKMA staff estimates.

5.4 Systemic risk

The COVID-19 pandemic has severely disrupted economic activities and clouded the global economic outlook. This together with the uncertainty over the rising US-China tensions, will continue to pose challenges for the Hong Kong banking sector.

The global economy has taken a heavy blow as lockdowns and social distancing measures to contain the pandemic have brought real

56 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.

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

activities to a halt. Corporates, particularly SMEs have been under immense pressure to manage their cash-flows, as their revenue declined sharply. Proactive relief measures taken by the public sector and the banks in Hong Kong have so far helped corporates to mitigate their funding risks. These have helped contain the systemic risk of a sharp rise in corporate defaults, at least in the short term.

However, corporates may face greater challenges if the pandemic persists. In particular, in a scenario of a prolonged pandemic, more firms could see rising leverage with persistent lower revenue, putting their solvency under the test. This could pose challenges for banks in managing the credit risks to their corporate loan portfolios. It remains highly uncertain when the pandemic will finally recede, therefore banks should assess the potential impact of this possible scenario on credit risk management.

Apart from the direct impact through the real sector, the pandemic can also affect the global banking sector through the financial channel. A case in point was the global US dollar liquidity stress triggered by the COVID-19 outbreak during March, which caused the spread between the three-month US dollar London Interbank Offered Rate (LIBOR) and its corresponding overnight index swap (OIS) rate[58] to widen significantly to the post-crisis high of 138 basis points in late-March (Chart 5.25). Although the stress gradually receded by the unprecedented policy actions taken by central banks[59], any renewed virus outbreak could lead to an acute tightening of financial conditions globally. So, banks in Hong Kong should assess the potential risks of an inward spillover of funding stress. Nevertheless, the Hong Kong banking sector was largely unaffected by the recent round of US dollar funding stress, underpinned by the banks strong and stable liquidity positions and the US Dollar Liquidity Facility provided by the HKMA.

Chart 5.25
Three-month US dollar LIBOR-OIS spreads

Source: Bloomberg.

The increased geopolitical tensions, especially between the US and Mainland China, also remain a key risk factor for observation. If tensions heightened between the US and Mainland China, this could have a potential negative impact on Hong Kong's economy.

If these external risks materialise and coincide with a resurgence in COVID-19 infections in Hong Kong, it could lead to a deeper recession. As discussed in earlier sections, banks' asset quality will be tested in such an adverse scenario, particularly in view of the potential weakening in debt-servicing abilities for households and corporates. Given the uncertainties over the

[58] 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 and is commonly employed as indicator for assessing the systemic liquidity risks in the short-term dollar funding market.

[59] Worthy of special mention in the context of easing global US dollar funding shortage, is the Federal Reserve's USD liquidity facilities including cross-currency swap lines and the new repurchase agreement facility for foreign and international monetary authorities (FIMA repo facility).

extent to which these risk factors may persist, banks should carefully assess the potential longer-term impact on their asset quality.

However, the strong capital positions of the Hong Kong banking sector should provide strong buffers against asset quality deterioration.

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. This buffer can be deployed in times of a downturn, allowing banks to continue providing credit to support the real economy.

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)[60]. 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.[61]

As the domestic economy is now facing headwinds, the Monetary Authority has decided to deploy this buffer to enhance banks' capacity in providing credit to support the real economy.

By reducing the CCyB ratio twice to 1.0% as of 16 March 2020[62], these downward adjustments will allow banks to release approximately HK$700-800 billion in lending capacity.

For the latest situation, the indicative buffer guide, calculated based on the first quarter of 2020 data, signals a CCyB of 2.25% (after rounding down to the nearest multiple of 25 basis points)[63]. The projection based on all available data at the decision date suggests the indicative buffer guide would very likely signal a higher CCyB when all relevant data for the second quarter of 2020 become available.

Nevertheless, the information drawn from the series of Comprehensive Reference Indicators along with all relevant information available at the time of the decision in July 2020 suggest the economic environment in Hong Kong is still subject to a high level of uncertainty. Taking into account the timing and pace of economic recovery from COVID-19 remains uncertain, and many SMEs are still under stress, the Monetary Authority considered that it is more appropriate to keep the CCyB unchanged at 1.0% and continue to monitor the situation for the time being.

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.

[60] 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.

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

[62] Further details and the considerations underlying these decisions may be found in the Announcement of the CCyB to AIs on 14 October 2019 and on 16 March 2020 respectively (https://www.hkma.gov.hk/eng/key-functions/banking/banking-legislation-policies-and-standards-implementation/countercyclical-capital-buffer-ccyb/).

[63] 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 will signal an extant CCyB rate to increase or decrease in multiple of 25 basis points.

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

	29-Jan-20	16-Mar-20	07-Jul-20
Announced CCyB rate	2.0%	1.0%	1.0%
Date effective	29/01/2020	16/03/2020	07/07/2020
Indicative buffer guide	0.9%	1.9%	2.3%
Basel Common Reference Guide	2.5%	2.5%	2.5%
Property Buffer Guide	0.3%	1.2%	1.8%
Composite CCyB Guide	0.9%	1.9%	2.3%
Indicative CCyB Ceiling	None	None	None
Primary gap indicators			
Credit/GDP gap	19.4%	21.2%	36.4%
Property price/rent gap	2.9%	5.7%	7.7%
Primary stress indicators			
3-month HIBOR spread* (percentage points)	0.37%	0.38%	0.61%
Quarterly change in classified loan ratio (percentage points)	-0.02%	-0.03%	0.06%

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.

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

	Jun 2019	Mar 2020	Jun 2020
Interest rates			
1-month HIBOR fixing[2] (quarterly average)	2.04	1.82	1.02
3-month HIBOR fixing (quarterly average)	2.11	1.99	1.35
BLR[3] and 1-month HIBOR fixing spread (quarterly average)	3.09	3.18	3.98
BLR and 3-month HIBOR fixing spread (quarterly average)	3.02	3.01	3.65
Composite interest rate[4]	0.95	0.95	0.71
		All AIs	
Balance sheet developments[5]			
Total deposits	0.4	0.0	2.2
Hong Kong dollar	1.1	-0.1	2.7
Foreign currency	-0.4	0.2	1.8
Total loans	1.8	2.8	0.2
Domestic lending[6]	2.3	3.4	-0.8
Loans for use outside Hong Kong[7]	0.8	1.6	2.5
Negotiable instruments			
Negotiable certificates of deposit (NCDs) issued	1.1	6.7	-0.7
Negotiable debt instruments held (excluding NCDs)	1.1	-3.2	5.2
Asset quality			
As a percentage of total loans[8]			
Pass loans	98.12	97.79	97.53
Special mention loans	1.31	1.59	1.67
Classified loans[9] (gross)	0.57	0.62	0.79
Classified loans (net)[10]	0.26	0.31	0.43
Overdue > 3 months and rescheduled loans	0.39	0.43	0.49
Classified loan ratio (gross) of Mainland related lending[11]	0.70	0.73	0.94
Liquidity ratios (consolidated)			
Liquidity Coverage Ratio — applicable to category 1 institutions (quarterly average)	152.8	160.4	156.5
Liquidity Maintenance Ratio — applicable to category 2 institutions (quarterly average)	54.6	56.8	57.2
Net Stable Funding Ratio — applicable to category 1 institutions	132.2	130.0	133.1
Core Funding Ratio — applicable to category 2A institutions	135.8	135.1	138.1
		Retail banks	
Profitability			
Loan impairment charges as a percentage of average total assets (year-to-date annualised)	0.05	0.09	0.12
Net interest margin (year-to-date annualised)	1.62	1.51	1.37
Cost-to-income ratio (year-to-date)	38.0	39.7	41.9
		Surveyed institutions	
Asset quality			
Delinquency ratio of residential mortgage loans	0.02	0.03	0.04
Credit card lending			
Delinquency ratio	0.23	0.35	0.39
Charge-off ratio — quarterly annualised	1.58	1.69	2.82
— year-to-date annualised	1.52	1.69	2.18
		All locally incorporated AIs	
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	16.3	16.0	16.6
Tier 1 capital ratio	18.2	18.0	18.7
Total capital ratio	20.6	20.1	20.7
Leverage ratio	8.1	8.1	8.2

Notes:
1. Figures are related to Hong Kong offices only except where otherwise stated.
2. The Hong Kong Interbank Offered Rates are released by the Hong Kong Association of Banks.
3. With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
4. The composite interest rate is a weighted average interest rate of all Hong Kong dollar interest-rate-sensitive liabilities, which include deposits from customers, amounts due to banks, negotiable certificates of deposit and other debt instruments, and all other liabilities that do not involve any formal payment of interest but the values of which are sensitive to interest rate movements (such as Hong Kong dollar non-interest bearing demand deposits) on the books of banks. Further details can be found on the HKMA website.
5. Quarterly change.
6. Loans for use in Hong Kong plus trade finance.
7. Including "others" (i.e. unallocated).
8. Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' overseas branches and major overseas subsidiaries.
9. Classified loans are those loans graded as "substandard", "doubtful" or "loss".
10. Net of specific provisions/individual impairment allowances.
11. Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' Mainland branches and subsidiaries.

Box 4
Effect of COVID-19 on the funding and solvency risks of non-financial corporates in Hong Kong

Introduction

The threat of COVID-19 and the resulting social distancing measures have severely disrupted a wide range of economic activities, which have led to a deepening of the economic recession in Hong Kong.[64] The sharp reduction in economic activities has caused a plunge in corporate revenue, posing downward pressures on their cash-flows. As funding conditions of firms worsen, risks of corporate insolvency could be on the rise.

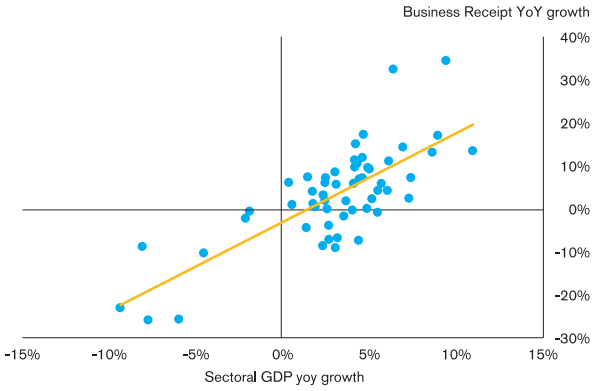
Against this background, this box aims to shed light on the following questions: (1) which sectors in Hong Kong will be more affected by the revenue shocks amid COVID-19; (2) to what extent the revenue shocks will affect the funding profile of firms; (3) how will the funding risk translate into a rise in default risk? (4) how relief programmes, such as the Pre-approved Principal Payment Holiday Scheme (PPPHS), can mitigate the rise in default risk; and what are the implications for banking sector resilience?

To answer these questions, we draw on the latest available balance sheet data of all local non-financial corporates (NFCs) listed in Hong Kong[65] to assess their funding and insolvency risks under a recession scenario where the real GDP of Hong Kong is assumed to drop hypothetically by 9% in 2020. Broadly speaking, the analysis comprises two parts. The first part estimates sector-specific revenue shocks based on historical relationships between GDP growth and firms' revenue. The second part assesses the impact of revenue shocks on the funding and insolvency risks of firms.

The severity of revenue shock across sectors under the scenario

In general, firms' business receipt (a close proxy of revenue) at the sectoral level is positively correlated with sectoral GDP growth (for instance, see Chart B4.1 for the transportation sector). Based on such historical relationships and our assumption on sectoral GDP growth[66] under the recession scenario, we can estimate the revenue shock for the individual sectors.[67]

Chart B4.1
Historical relationship between sectoral GDP and business receipt for the transportation sector



Source: C&SD.

Table B4.A summarises the estimation results. Based on the size of the estimated revenue shock, we classify sectors into two groups – hardest-hit sectors and others, and present their range estimates. Hardest-hit sectors include transportation, accommodation & food services, retail trade and wholesale & trade sectors. Under

[64] Hong Kong's real GDP contracted sharply by around 9% year on year in the first half of 2020.

[65] The sample includes 599 local NFCs listed in Hong Kong. To better represent, SMEs, listed firms with annual turnover greater than HK$800 million were excluded from the analysis. The results are qualitatively similar if these larger firms are included in the analysis.

[66] The sectoral GDP growth paths are estimated based on their historical relationship with overall GDP growth.

[67] A simple regression model is first employed that relates the quarterly year-on-year growth of business receipt index of a sector with the corresponding year-on-year growth in sectoral GDP contemporaneously. The revenue shock for the sector is then computed by applying the assumed path of the sectoral GDP growth rate to the model estimates under the recession scenario.

this recession scenario, it is estimated that their revenue in 2020 will drop by a range of between 24% and 77% year-on-year. For the remaining sectors, the decline in revenue would be significantly smaller in a range of between 4% and 14%.

Table B4.A
Estimated sectoral revenue shocks under the recession scenario

	Estimated yoy decline in revenue in 2020
Hardest-hit sectors	24% to 77%
Other sectors	4% to 14%

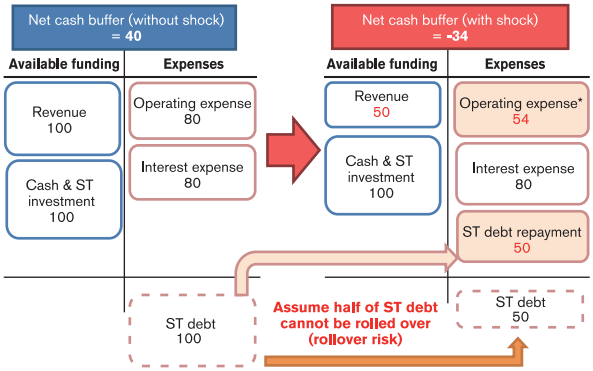
Note: Hardest-hit sectors include transportation, accommodation & food services, retail trade and wholesale & trade.
Source: HKMA staff estimates based on data from C&SD.

Impact of revenue shocks on corporates' funding and solvency risks

To assess how far firms' funding and solvency risks would be affected by the estimated revenue shock, we follow a similar approach adopted by the Bank of England and Banerjee et al. (2020) to examine firms' "net cash buffer" (NCB).[68] The NCB is defined as the sum of revenue and cash & short-term investment minus operating expenses, interest expenses and repayment of debt maturing within the year. By definition, a negative NCB indicates a higher funding risk, as firms are more likely to have insufficient funding to cover their expenses within a one-year horizon.

To illustrate how a firm's NCB is affected under the recession scenario, Chart B4.2 provides an example of a hypothetical firm with a 50% drop in revenue. The left hand side of the chart presents the financial position of the firm without the revenue shock, whereas the right hand side shows the financial position given the shock. In this example, with the $50 drop in the firm's revenue, the available funding (i.e. revenue plus cash & short-term investment) of the firm would drop from $200 to $150.

Chart B4.2
An illustrative example for the impact of a 50% revenue shock on a firm's net cash buffer



On the expenses side, two key assumptions are applied when estimating the NCB, which are related to (1) the extent of a fall in operating expenses; and (2) the ability of the firm to roll over its short-term debt:[69]

- For (1), firms are assumed to adjust their operating expenses in response to the revenue decline. But, due to rental and other fixed costs, their operating expenses cannot be adjusted to the same extent of the revenue drop in the short run. Indeed, empirical estimates based on all local NFCs listed in Hong Kong also suggest that corporates on average cut 0.65% of their operating expenses in response to a 1% fall in revenue. By applying the estimated cost-income elasticity of 0.65 to our example, the hypothetical firm's operating expenses would be lowered by 32.5% (i.e. 50% x 0.65) to $54. The sharper decline in revenue than that of operating expenses would result in a net operating loss, thereby posing cash-flow pressure on the firm.

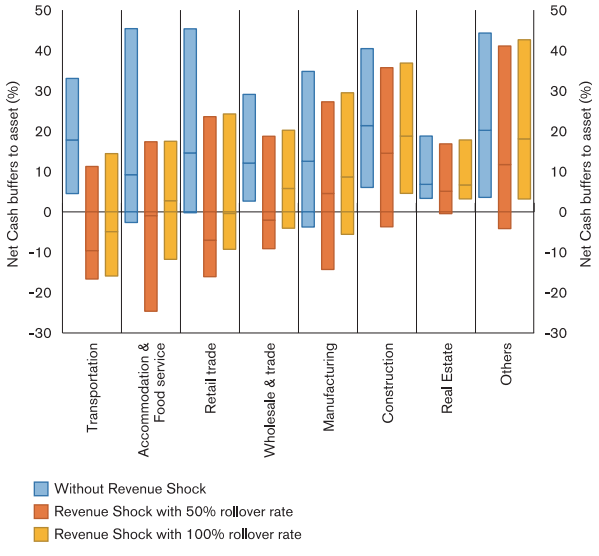
[68] For details, see Bank of England's Interim Financial Stability Report May 2020, and Banerjee et al. (2020), "Covid-19 and corporate sector liquidity", BIS Bulletins 10.

[69] Other assumptions are also made in computing the NCB ratio which include (1) keeping the amount of interest expenses unchanged at the level prior the shock; (2) cutting the firm's level of capital expenditures to a level equal to depreciation; (3) assuming firms would not pay out any dividend or conduct any share buybacks in order to preserve cash buffers; and (4) firms will not sell their assets to cover any funding shortage. These assumptions are largely based on historical relationships, which may not fully reflect potential impacts of various supportive measures in response to the pandemic.

- For (2), the ability of firms to roll over their short-term debt plays a key role in determining the funding risk of firms. This can be seen from the example. If the firm has difficulty in rolling over its debt maturing in 2020, such that it can only roll over half the debt and the remaining debt of $50 is required to be repaid, the NCB would drop below zero to -$34. By contrast, the NCB would have otherwise stayed positive at $16 if the firm can fully roll over its short-term debt.

Based on these assumptions, we then estimate the NCB (scaled by firm's asset) of the sampled NFCs with and without the revenue shocks. Chart B4.3 shows the distribution of firms' NCB-to-asset ratio across different sectors. Each bar presents the upper and lower quartiles and the median of firms' NCB ratio. The blue bars represent the case without revenue shock. The orange and yellow bars are those with revenue shocks. The orange bars show the case where firms face difficulties in rolling over their short-term debt (i.e. only half the debt maturing in 2020 can be rolled over); the yellow bars show the case where firms can fully roll over their short-term debt.

Chart B4.3
NFCs' net cash buffer after revenue shock



Source: HKMA staff estimates based on data from S&P capital IQ.

Three key findings are worth highlighting. First, the systemic risk of funding shortage among firms in Hong Kong was not alarming before the outbreak of COVID-19. This can be seen by noting that a large share of NFCs registers positive NCB ratios without the revenue shock (i.e. blue bars in general stay above zero).

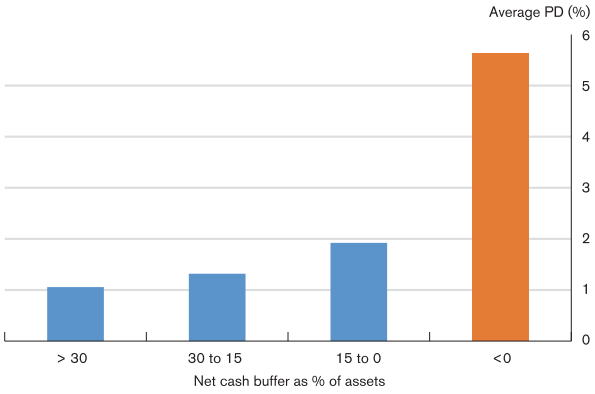
Second, firms in the four hardest-hit sectors are found to be particularly exposed to funding risks (i.e. negative NCB ratio) if firms face difficulty in rolling over their short-term debt and given the revenue shock. Specifically, the NCB ratio of the median firms in these sectors are found to be below zero, suggesting that it would be more common for firms in these sectors to face significant funding risks if they cannot fully roll over their debt.

Finally, the funding risk of firms stemming from the revenue shock could be mitigated notably if firms are able to fully roll over their short-term debt. In particular, the share of firms with negative NCB could reduce markedly by 11 percentage points to 29% if their short-term debt is assumed to be fully rolled over (i.e. yellow bars stay significantly higher than orange bars in the chart).

On the whole, the revenue shock arising from COVID-19 could adversely impact the funding profile of firms. This could further translate into higher default risks, especially for those with negative NCB. Chart B4.4 shows the historical nonlinear relationship between firms' market-based one-year ahead probability of default (PD)[70] and NCB ratio. In general, a lower net cash buffer ratio is associated with a higher default risk. Most notably, firms could see a significant jump in their PD should their NCB ratios drop from positive to negative.

[70] The one-year ahead PD is obtained from Bloomberg's DRSK module. The one-year ahead PD refers to the probability that a firm will default over a one-year horizon from now. According to Bloomberg, the PD is derived from first estimating the DTD based on the standard Merton model. The estimated DTD is then transformed into one-year ahead PD by applying a non-linear mapping with the actual default rates, which addresses the potential issue of underestimation of default likelihood from the standard Merton model.

Chart B4.4
Historical relationship between firms' net cash buffer and market-based one-year ahead probability of default



Note: Average probability of default for firms in each group is segmented by their net cash buffer ratios.
Source: HKMA staff estimates based on data from S&P capital IQ and Bloomberg.

Based on this empirical relationship[71] and the estimated NCB for firms under the revenue shock, it is found that firms in the four hardest-hit sectors would see a sharp rise in their PD by around 300–400 basis points on average if they can only roll over half of their short-term debt. Yet, the rise in default risks could be sharply reduced to around 50–270 bps if firms' short-term debt is assumed to be rolled over fully.

The impact of relief programmes and implications for the banking sector

The rise in default risk caused by the COVID-19 revenue shocks can be significantly mitigated by an increase in the rollover rate of firms' short-term debt in the NCB model. Such an increase in the rollover rate can be achieved through various policy measures that sustain bank credit to firms, particularly SMEs.

The most notable examples of these measures are the PPPHS and the Special 100% Loan Guarantee under the SME Financing Guarantee Scheme (SFGS). The PPPHS was first announced in May 2020 by the HKMA and allows all corporate borrowers with annual turnover of HK$800 million or below, and without loans overdue for more than 30 days, to be granted a six-month principal payment holiday without need for borrowers to apply. The six-month holiday may be viewed as having guaranteed a 50% rollover rate on bank loans. In part based on the estimation results from the NCB model, the PPPHS will be extended for a further six months in November, resulting in a full year's principal payment holiday for eligible borrowers or, equivalently, a 100% rollover rate for their bank loans. With more than HK$530 billion of principal deferred under the PPPHS and other relief programme[72], the model estimates that the amount of job loss prevented by this six-month extension could be substantial. At the same time, the Special 100% Loan Guarantee under SFGS has provided more than HK$24 billion of government-guaranteed financing to SMEs since April 2020, which will also likely help ameliorate the rise in default rates of some corporates.

In arriving at the decision to extend the PPPHS, the HKMA has conducted thorough scenario analyses to quantify and assess the impact on banks under different deferment options. Our results show that even in extremely adverse scenarios, banks' prevailing capital and liquidity positions are still ample to support principal deferment programmes that total a full year.

[71] To empirically map the impact of a change in firm's net cash buffer ratio onto its PD, a panel regression model is employed. The model takes into account the non-linear rise in PD when NCB ratios drop from positive to negative. It also accounts other important factors, including firm size, leverage, industry- and year-fixed effects.

[72] For detail, please see below webpage. https://www.hkma.gov.hk/eng/key-functions/banking/banking-regulatory-and-supervisory-regime/riding-out-the-covid-19-challenge/.

Conclusion

There are two key implications from the analysis. Firstly, while corporates in Hong Kong will see higher default risks due to a worsening in their net cash buffers amid COVID-19, the severity of the impact will vary across sectors. Therefore, the potential increase in the credit risks of corporate loan portfolios will be different across banks, depending on their exposures to different sectors.

Secondly, our analysis shows that the roll over of firms' short-term debt plays a key role in determining their funding and default risks. This highlights the importance of relief measures and other funding supports by banks and the public sector. In response to the pandemic, the HKMA has been closely co-ordinating with the banking sector to ease the cash-flow pressure of firms, particularly SMEs. A host of measures, including the PPPHS and the 100% SFGS, have been launched and are well supported by the banking sector's strong capital and liquidity positions. These measures, together with the reduction in the regulatory reserve requirement on locally incorporated banks by 50% and the release of the CCyB by a total of 1.5%, should help Hong Kong's economy ride through this difficult period.