HONG KONG MONETARY AUTHORITY
香港金融管理局

HALF-YEARLY MONETARY AND FINANCIAL STABILITY REPORT

September 2022

This Report reviews statistical information between the end of February 2022 and the end of August 2022.

Half-Yearly Monetary and Financial Stability Report
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1. Summary and overview

The global economy is on a course of slowing growth and high inflation. Global inflationary pressures continued to build and became more broad-based. As central banks around the world further tightened monetary policy to keep inflation expectations anchored, this is weighing on the global growth outlook, while downside risks to global financial stability have intensified. At the same time, lingering threats of the COVID-19 pandemic and elevated geopolitical risks will continue to cloud the global economic outlook.

The Hong Kong dollar softened during the review period, while continuing to trade in a smooth and orderly manner, and the local monetary environment remained accommodative. With total deposits increasing modestly in the first seven months of 2022, there was no notable sign of outflows from the Hong Kong banking system. Meanwhile, bank credit also recorded modest growth. The residential property market softened recently as market sentiment turned cautious amid rising interest rates.

Looking ahead, heightened economic uncertainties arising from the pace and magnitude of subsequent US interest rate rises, the evolving local epidemic situation and geopolitical risks, could pose challenges to banks' credit risk management. In particular, as the debt repayment abilities of some households and corporates have been weakened since the fifth wave outbreak, banks should carefully assess the potential impacts of sharp rises in interest rates on their loan portfolios.

The external environment

During the review period, global inflationary pressures continued to build and became more broad-based, driven by higher food and energy prices, persistent supply chain bottlenecks and rising wage costs amid tight labour markets. In response, global central banks tightened monetary policy further in a bid to keep inflation expectations anchored, but the rapid tightening of global financial conditions triggered notable financial market corrections and is expected to weigh on the global growth outlook. Accordingly, the International Monetary Fund revised downward its 2022 global growth forecast by 0.4 percentage points to 3.2% in July, compared with 6.1% in 2021. Looking ahead, rising interest rates and slowing growth will likely pose challenges to global debt sustainability and to emerging market economies (EMEs) with weaker fundamentals, heightening downside risks to financial stability.

In emerging Asia, economic recovery continued at a moderated pace in the first half of 2022 amid weakened export growth. Inflationary pressures have also intensified in most economies due to the surge in commodity prices and persistent supply bottlenecks. Many central banks in the

region have tightened their monetary policy accordingly to combat the rising inflationary pressures, but the relatively benign rate hike paths of the region implied narrowing interest rate differentials vis-à-vis the US. This has led to intense bond fund outflows and foreign exchange depreciation in the region, which could, in turn, add debt-servicing difficulties to the heavily indebted firms. Box 1 discusses how US dollar bond funding of emerging Asian corporates would be affected by substantial outflows from open-ended funds in times of tighter financial conditions and the implications for the asset quality of banks' corporate loan portfolios. The possible economic slowdown in Mainland China also clouded the region's economic outlook, especially for those with more reliance on Mainland China for production, exports and final demand.

Amid outbreaks of the Omicron variant, a downturn in property markets and increased global uncertainties, Mainland China's real GDP growth decelerated notably in the second quarter of 2022 following an acceleration in the first quarter. In response, the authorities stepped up policy support to the economy, including through boosting infrastructure investment. While the economy is expected to recover gradually in the second half of the year, there are still strong headwinds from the continuing property market downturn. To facilitate the monitoring of Mainland's economic performance, Box 2 introduces a GDP nowcasting model using both quarterly and monthly macroeconomic indicators. Amid intensified liquidity stress and Omicron outbreaks, defaults by Mainland property developers in the onshore bond market continued to increase in the first half of 2022, although the overall onshore bond default rate still remained low and the risk to the Mainland banking sector remained manageable.

The domestic economy

The Hong Kong economy saw some sequential improvement during the first half of the year, but overall economic activities remained weak compared to a year ago. On a quarter-on-quarter basis, real gross domestic product (GDP) picked up by 1.0% in the second quarter following a broad-based contraction of 2.9% in the first quarter amid the fifth wave of the local epidemic. As the situation stabilised, private consumption and overall investment spending bounced back in the second quarter, driven by improving labour market conditions, recovering business sentiment and various policy support measures. Externally, Hong Kong's merchandise trade performance deteriorated in the first half of the year, due in part to slowing global economic growth, while trade in services continued to stabilise. On a year-on-year comparison, however, real GDP declined by 3.9% in the first quarter, and another 1.3% in the second quarter, mainly reflecting external headwinds.

Looking ahead, Hong Kong's economic outlook will still face considerable challenges. While an improving labour market and the disbursement of Phase II consumption vouchers will support private consumption and hence overall economic recovery, tighter financial conditions could dampen growth. In addition, the worsened global growth prospects may continue to drag on Hong Kong's export performance. Given the worse-than-expected economic performance in the first half of the year, the Government and private-sector analysts have revised downwards their 2022 growth forecasts to -0.5% to 0.5% and 0% respectively. This economic outlook is subject to other risks and uncertainties, including those stemming from the pandemic, the pace of monetary policy normalisation of major central banks and geopolitical concerns (see discussion above).

Following a deterioration in early 2022, the labour market improved in recent months, partly supported by the gradual relaxation of social distancing measures and various policy initiatives, including the 2022 Employment Support Scheme. The seasonally adjusted unemployment rate declined from a recent high of 5.4% in April to 4.1% in August. Total employment and the labour force participation rate have also picked up since June, though still below their pre-pandemic levels. In the near term, pressures on the labour market are likely to ease further alongside a pick-up in local economic activities.

Local inflationary pressures remained moderate, albeit edging up recently. The year-on-year underlying inflation rate was 1.6% and 1.7% in the first and second quarters respectively, and 1.8% in August.[1] Inflation momentum, as measured by the annualised three-month-on-three-month underlying inflation rate, also picked up, but remained mild due in part to soft housing rentals. While external price pressures are expected to remain elevated in the near term, local inflation should stay mild due to soft domestic cost pressures. The Government projections for underlying and headline inflation rates for 2022 are maintained at 2.0% and 2.1% respectively, while the latest market consensus forecast is that the headline inflation rate for the year will hit 2.1%.

Monetary conditions and capital flows

The Hong Kong dollar softened during the review period, driven by increased interest rate carry trade activities amid the widening of the negative HIBOR-LIBOR spreads in the first half of 2022 and the lacklustre performance of the local stock market. The weak-side Convertibility Undertaking (CU) was triggered 31 times from May to August, and the HKMA has purchased a total of HK$213.1 billion (at the end of August) at the request of banks in accordance with the design of the Linked Exchange Rate System. As a result of these purchases, the Aggregate Balance of the banking system declined from HK$337.6 billion at end-February to HK$125.0 billion at end-August.

Despite the triggering of the weak-side CU and increase in HIBORs, Hong Kong's monetary environment remained accommodative during the review period. The average lending rate for new mortgages increased from 1.56% in January 2022 to 2.31% in July 2022, mainly reflecting the increase in HIBOR. After the US Federal Reserve (Fed) hiked its policy rate in September, some banks raised their Best Lending Rates by 12.5 basis points, marking the first increase since 2018. Some banks also increased the cap on HIBOR-based mortgage rates of newly approved mortgage loans in recent months.

Hong Kong's offshore renminbi (CNH) liquidity pool consolidated during the review period, with the total outstanding amount of renminbi customer deposits and certificates of deposit decreasing to RMB919.9 billion at the end of July 2022. On the other hand, other aspects of the offshore renminbi banking business continued to grow. Both the outstanding amount of renminbi loans and renminbi trade settlement continued to expand steadily in the first seven months of 2022. The average daily turnover of the renminbi Real Time Gross Settlement system stayed high at RMB1,669.5 billion during the same period.

Going forward, the enhanced Currency Swap Agreement with the People's Bank of China, as well as the enhancement to the HKMA's renminbi liquidity facility, will further support and deepen Hong Kong's renminbi liquidity pool. The continuous enhancement to the mutual market access schemes with the Mainland (including the recently announced Swap Connect and the two-way Stock, Bond, and

[1] Inclusive of the effects of the Government's relevant one-off relief measures, the year-on-year headline inflation rate was 1.9% in August and 1.5% in both the first and second quarters of 2022.

Cross-boundary Wealth Management Connects), as well as the planned modernisation of the Central Moneymarkets Unit (CMU) into a major international central securities depository (ICSD) in Asia, will provide a convenient and secure channel for overseas investors to trade renminbi assets through a connection between infrastructure institutions in both Hong Kong and the Mainland. With these initiatives, Hong Kong stands ready to capture opportunities brought by the ongoing liberalisation of Mainland's capital account as well as deepening regional economic and financial co-operation under the Belt and Road and the Guangdong-Hong Kong-Macao Greater Bay Area initiatives.

Asset market

Along with the decline in global equity markets, the Hong Kong equity market dropped to a six-year low in March 2022. Major and local equity markets remained volatile throughout the review period amid lingering threats of the pandemic, front-loaded monetary tightening in the US, and impacts of the Russia-Ukraine conflict on the global economy. Overall, the Hang Sang Index dropped by 12.1% from the end of February to the end of August 2022. Despite the heightened volatility in the Hong Kong equity market, buying interest through the southbound Stock Connects stayed relatively stable.

The Hong Kong dollar debt market grew mildly in the first half of 2022. In tandem with the movements in the US 10-year Treasury yield, the yield of the Hong Kong dollar 10-year Government Bond rose to an all-time high in June and remained volatile afterwards. Driven by a surge in the CNH certificate of deposits issuance, the new issuance of CNH debt securities increased by 16.4% year on year in the first half of 2022. At the end of June, total outstanding CNH debt securities in Hong Kong increased by 29.4% compared with a year ago.

Looking ahead, both the local equity and debt markets will remain susceptible to headwinds in the external environment, including lingering geopolitical tensions, concerns over global economic growth slowdown and inflationary pressure, as well as the tightening monetary policies of major central banks. On the other hand, monetary and fiscal policy support to the Mainland economy may help lift market sentiment. To foster the development of Hong Kong's bond market, policy initiatives were introduced during the review period, including the HKMA's three-year enhancement programme plan to develop the CMU into a major international central securities depository in Asia and the expansion of green bond products in Hong Kong.

In the housing market, as the fifth wave of the local epidemic receded, transaction volume picked up in the second quarter on pent-up demand. Flat prices also edged up by 0.2% in the second quarter, after a 3.2% decline in the first quarter. However, the residential property market softened recently as market sentiment turned cautious amid rising interest rates. Housing rentals moderated in the seven months through April, but zigzagged upwards during May–August.

With an uptick in the one-month HIBOR, local mortgage interest rates have picked up since June, and some banks also raised the cap on their HIBOR-based mortgage rates in recent months and their Best Lending Rates in September. However, the public should carefully assess and manage the relevant risks when buying property, arranging mortgages or making other relevant decisions.[2] That said, the macroprudential measures implemented by the HKMA since 2009 have helped contain household leverage and

[2] The HKMA has reminded homebuyers to be aware of property price or interest rate adjustment risks when buying first-hand, incomplete flats via stage payment schemes. In particular, when these buyers arrange mortgage later on, they may face more conservative property valuations or may not pass the stress test amid rising interest rates.

strengthen banks' risk management for mortgage loans, thereby improving their resilience to interest rate and property market shocks. Box 3 explores the use of machine learning techniques to predict credit deterioration in residential mortgage loans (RMLs) in view of the upward pressures on mortgage rates.

The residential property market outlook is subject to a number of uncertainties and risks as discussed previously. In particular, a prolonged local epidemic, coupled with higher mortgage interest rates, could suppress housing demand, while concerns about the global economic prospects and the uncertainty over the pace of US rate hikes will continue to cloud housing market sentiment. Over the longer term, the outlook for the housing market will depend on the supply-demand gap. The Government projects that private housing supply will remain high in the coming years.

The non-residential property market consolidated in the first half of the year, partly reflecting a challenging business environment. Along with reduced transactions, the prices of commercial and industrial properties either declined or zigzagged sideways, while rentals were also generally soft. The outlook for the non-residential property market remains challenging in the near term. For example, while the disbursement of the government's consumption vouchers should stimulate local consumption and thereby provide some support to the retail segment, subdued inbound tourism continues to be a drag. The rental and capital values of office spaces may remain under pressure due to the high vacancy rate and more new supply in upcoming years.

Banking sector performance

Against the backdrop of the fifth wave of the local epidemic in the first half of 2022, retail banks' profits declined due to lower non-interest incomes and rises in loan impairment charges. The aggregate pre-tax operating profits of retail banks fell by 19.5% in the first half of 2022, compared with the same period in 2021. Accordingly, the return on assets fell to 0.54% in the first half of 2022 compared with 0.69% in the same period of 2021. Classified loan ratios also slightly increased during the same review period, but remained at a healthy level by both historical and international standards.

Reflecting upward pressure on the Hong Kong dollar interbank interest rates amid the US interest rate hikes, the Hong Kong dollar funding costs of retail banks increased, albeit still staying at an accommodative level.

Nevertheless, the Hong Kong banking sector remained resilient, as underpinned by the robust capital and liquidity positions. The consolidated total capital ratio of locally incorporated authorized institutions (AIs) was high at 19.8% at the end of June 2022, well above the minimum international standard. The average Liquidity Coverage Ratio of category 1 institutions and the average Liquidity Maintenance Ratio of category 2 institutions were 154.9% and 58.4% respectively in the second quarter of 2022, well above their statutory minimum requirements. Meanwhile, the latest Net Stable Funding Ratio of banks also stayed at levels well exceeding their statutory minimum requirements.

Partly reflecting the adverse impacts of the fifth wave of local infections and the global supply chain disruptions, bank credit growth was sluggish during the first half of 2022. On a half-yearly basis, total loans and advances of all AIs increased by 0.8%, following a mild decline of 0.6% (excluding initial public offering (IPO) loans straddling the end of June 2021) in the second half of 2021. The sluggish growth was due to a moderate decline in loans for use outside Hong Kong during the first half of 2022, which partially offset a modest growth in domestic credit (comprising loans for use in Hong Kong and trade financing) in the same period.

Since the outbreak of COVID-19, the HKMA, together with the banking sector, has introduced various support measures with the aim of maintaining a stable flow of bank credits to support corporates (especially small and medium-sized enterprises (SMEs)) and individuals in need. Box 4 analyses whether, and to what extent, bank lending in Hong Kong has been supported by these measures, with a particular focus on the two major measures: (i) the release of the Countercyclical Capital Buffer (CCyB) and (ii) the SME Financing Guarantee Scheme (SFGS). The findings suggest that not only are these measures effective in supporting lending in times of stress, the complementary roles between measures that are broad-based (e.g. CCyB release) and targeted (e.g. SFGS) can also enhance the overall effectiveness of policy measures.

Looking ahead, heightened economic uncertainties arising from the pace and magnitude of subsequent US interest rate rises, the evolving local epidemic, and geopolitical risks, could pose challenges to banks' credit risk management. Particularly, as the debt repayment abilities of some households and corporates have been weakened since the fifth wave outbreak, banks should carefully assess the potential impacts of sharp rises in interest rates on their loan portfolios.

The Half-yearly Report on Monetary and Financial Stability is prepared by the staff of the Research Department of the Hong Kong Monetary Authority

2. Global setting and outlook

Global inflationary pressures continued to build and increasingly broadened beyond food and energy prices, compelling global central banks to press ahead with monetary tightening to keep inflation expectations anchored even as growth decelerates. With global interest rates rising in the midst of a slowdown in growth, downside risks to global financial stability have intensified during the review period.

In emerging Asia, the pace of monetary policy normalisation in the region is expected to be slower than that in the US, with the narrowing interest rate differentials vis-à-vis the US risking further bond fund outflows and interest rate snapbacks, which may hurt indebted firms. Meanwhile, the slowdown in the Mainland economy would likely risk dragging the region through the trade and supply chain channel if the Mainland economy were to experience renewed lockdowns.

In Mainland China, real gross domestic product (GDP) growth decelerated notably in the second quarter of 2022 amid Omicron outbreaks, a downturn in the property markets and increased global uncertainties. While the economy is expected to recover in the second half of 2022 on the back of various policy supportive measures, including a push on infrastructure investment, headwinds facing the economy remained strong especially given the persistent weakness in the property markets.

2.1 External environment

During the review period, global price pressures continued to build and increasingly broadened to a wide range of goods and services. On top of the higher food and energy prices following the Russia-Ukraine conflict, persistent global supply chain bottlenecks have kept manufacturing input costs elevated, while strong wage growth amid tight labour markets and rising housing rentals (such as in the US) fuelled services inflation. Against this background, inflation rates in the US, the Euro Area and some Asian economies rose to their highest levels in decades (Chart 2.1).

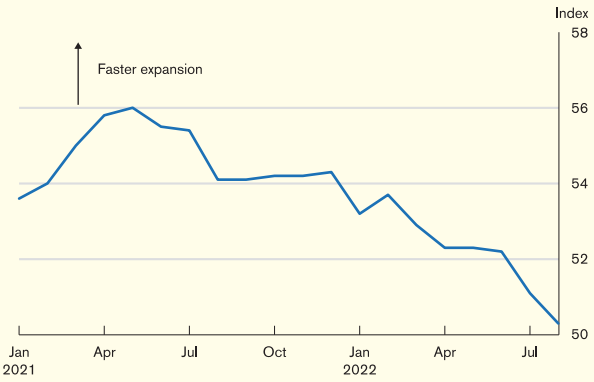
Chart 2.1
Headline consumer price index (CPI) inflation rates in selected economies

	Latest (%yoy)	Rank in history (percentile; 1=highest)	History (2001 - Latest)
US	8.26	0.98	
Euro Area	9.10	1.00	
New Zealand	7.30	1.00	
Singapore	7.05	0.99	
Australia	6.10	0.99	
South Korea	5.71	0.99	
Japan	2.61	0.97	
Hong Kong	1.90	0.46	
Thailand	7.86	0.99	
Philippines	6.31	0.89	
Indonesia	4.69	0.44	
Malaysia	4.41	0.95	
Mainland China	2.50	0.63	

Note: Latest observation is Q2 2022 for Australia and New Zealand; July 2022 for Hong Kong, Japan, Malaysia and Singapore; August 2022 for others. Rank percentile > 0.75 is highlighted in red.
Source: CEIC.

Major central banks responded by tightening monetary policy further to keep inflation expectations anchored. In particular, the Fed hiked its policy rate by a total of 300 basis points (bps) since March, a pace notably faster than the previous rate hike cycle, while the European Central Bank (ECB) increased its policy rates by 125 bps in the third quarter, kickstarting the first rate hike cycle in more than a decade. The resulting tightening in global financial conditions, coupled with the negative impact of inflation on private consumption and the ripple effect of Mainland China's recent COVID-19 containment measures on global supply chains, weighed on global manufacturing production (Chart 2.2). In view of the front-loaded global monetary tightening and the likely persistence of supply chain headwinds, the International Monetary Fund in July downgraded its global growth forecast for 2022 by 0.4 percentage points to 3.2%, representing a notable growth deceleration from 6.1% in 2021.

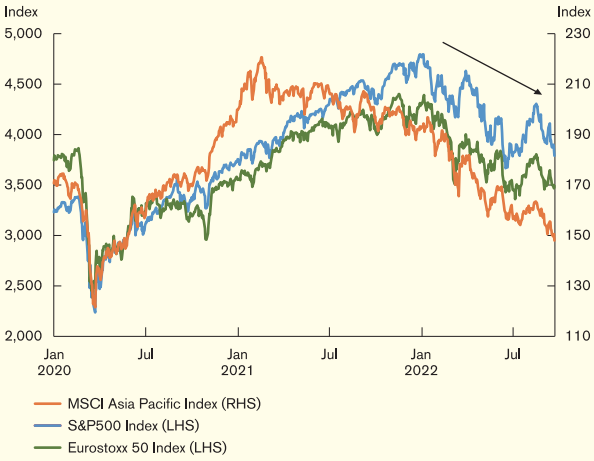
Chart 2.2
S&P's Global Manufacturing Purchasing Managers' Index (PMI)



Source: CEIC.

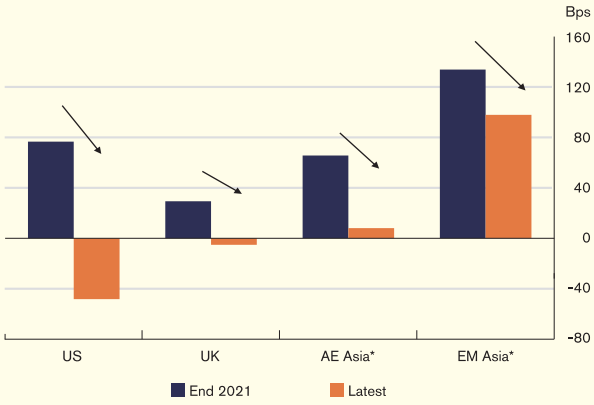
As global growth momentum slowed while inflation continued to climb, financial markets experienced notable corrections amid stagflation concerns, with major stock indices erasing much of their gains since the pandemic recovery (Chart 2.3). Meanwhile, the sovereign yield curves in many economies have flattened considerably or even inverted since late 2021, partly reflecting pessimism over the near-term growth outlook (Chart 2.4).

Chart 2.3
Selected major stock indices



Source: Bloomberg.

Chart 2.4
Spread between 10-year and 2-year sovereign yields in selected economies



Note: (*) Simple average of spreads in constituent economies. "AE Asia" includes Australia, Hong Kong, Japan, New Zealand, Singapore and South Korea. "EM Asia" includes Mainland China, Indonesia, Malaysia, the Philippines and Thailand. 3-year benchmark yields are used for Indonesia and Malaysia as 2-year yields are not available. Latest data as of 21 September 2022.

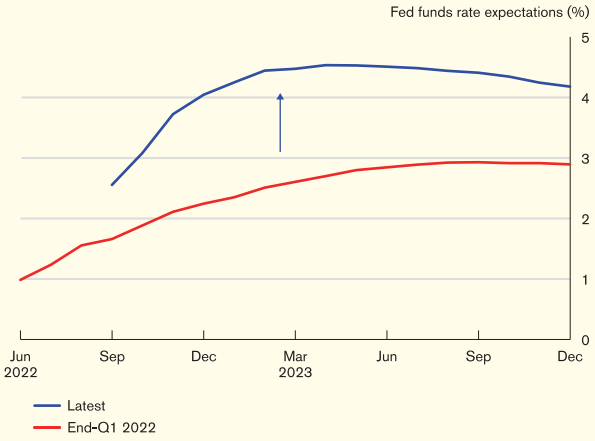
Source: Datastream.

Looking ahead, risks to the global growth outlook remain tilted to the downside as many headwinds confronting the global economy will likely continue to prevail. For one, services inflation tends to display greater inertia while cost pressures due to supply chain bottlenecks are less amenable to monetary tightening. These will increase the risks that major central banks will have to raise interest rates to highly

restrictive levels in order to keep inflation expectations anchored, albeit at the expense of significantly curtailing growth and employment.

As a case in point, markets are now expecting a front-loaded path of US monetary policy tightening (Chart 2.5), with the effective Fed funds rate reaching 4.5% by the second quarter of 2023, significantly above the Fed's assumed neutral rate of 2.5%[3]. While the strong labour market conditions, a generally low degree of leverage in the domestic banking system, improved private-sector balance sheets since the pandemic and the absence of major macrofinancial imbalances likely suggest that a US recession, if any, should be relatively shallow, global spillovers from a US growth deceleration could still be significant.

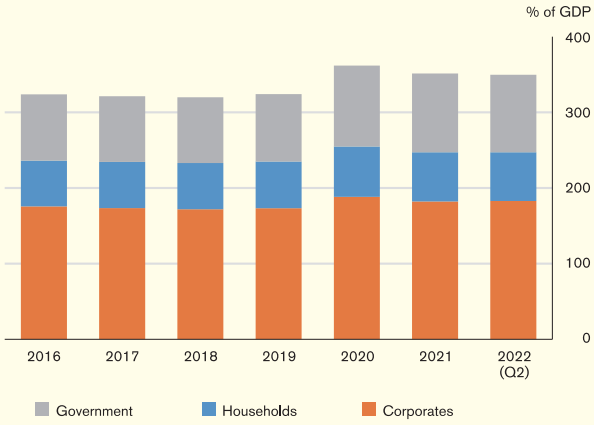
Chart 2.5
Futures-implied Fed funds rate path



Note: Latest expectations as of 21 September.
Source: Datastream.

The rapid tightening of global financial conditions might also act on vulnerabilities accumulated during the low-interest-rate era, potentially triggering systemic disruptions. In the Euro Area, for instance, sovereign spreads of several heavily-indebted peripheral member countries (e.g. Italy and Greece) have been widening since early 2022 as the ECB shifted towards a more hawkish policy stance, prompting the central bank to establish an "anti-fragmentation" instrument (Transmission Protection Instrument), subject to conditionality, to contain undue increases in sovereign spreads. Globally, rising borrowing costs could pose a challenge to debtors' repayment ability, and the anticipated global growth slowdown may risk denting, or even reversing, the recent downtrend in global debt-to-GDP ratios (Chart 2.6).

Chart 2.6
Global debt-to-GDP ratio by sector

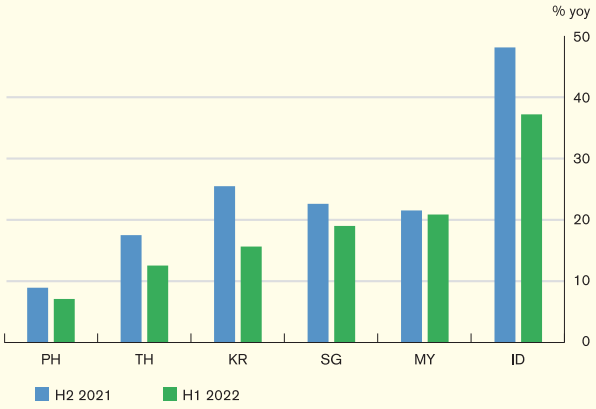


Source: Institute of International Finance.

In emerging Asia, economic recovery continued at a moderated pace in the first half of 2022 amid weakened export growth (Chart 2.7). Meanwhile, inflationary pressures have also intensified in most economies due to the surge in commodity prices and persistent supply bottlenecks. While many central banks in the region have tightened monetary policy to combat the rising inflationary pressures, the rate hike path in the region was relatively more benign than that of the Fed (Chart 2.8), with the narrowing interest rate differentials vis-à-vis that of the US leading to intense bond fund outflows from the region and foreign exchange depreciation (Chart 2.9). Box 1 discusses how US dollar bond funding of emerging Asian corporates would be affected by huge outflows from open-ended funds in times of tighter financial conditions and the implications for the asset quality of banks' corporate loan portfolios.

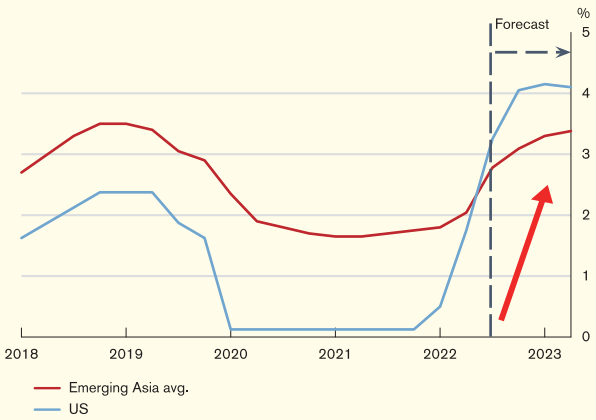
[3] Refers to the Fed's median projection of longer-run Fed funds rate as reported in the September 2022 Federal Open Market Committee Projections materials.

Chart 2.7
Emerging Asia: Export growth



Source: CEIC.

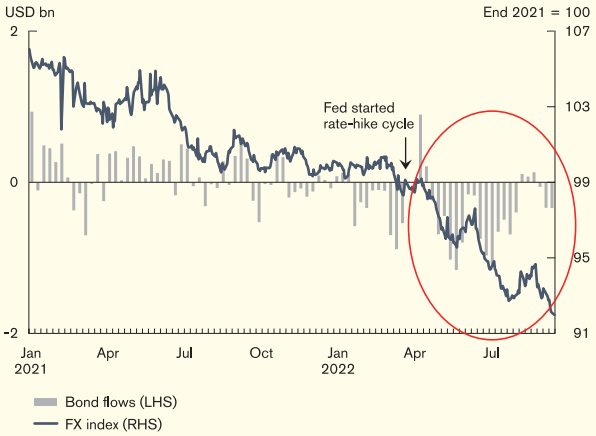
Chart 2.8
Policy rate path of emerging Asia and the US



Note: Data on the actual policy rate is taken from the Bank for International Settlements central banks' policy interest rate dataset. The forecasts are taken from the Bloomberg consensus. The time series for emerging Asia is the simple average of the individual economies.

Sources: BIS and Bloomberg.

Chart 2.9
Emerging Asia: Bond flows and FX index

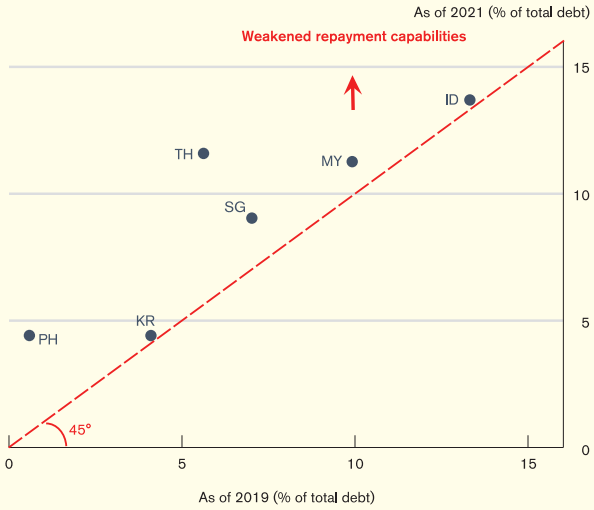


Note: The FX index is the simple average of LCY/USD index of the individual economies' currencies. Smaller index value means weaker LCY vis-à-vis USD.

Sources: Bloomberg, EPFR and HKMA staff calculation.

Apart from risking some corrections in the regional housing markets where property prices have increased markedly since the pandemic outbreak, the financial tightening headwinds together with the squeeze in profit margin due to the rising production cost associated with high inflation may pose challenges to the repayment capabilities of indebted firms in the region. In this regard, it is worthy to note that the share of debts owed by firms with weak interest coverage ratio (i.e. less than 1) has increased since the pandemic (Chart 2.10), and the tightening global financial conditions would pose strong headwinds to these firms down the road.

Chart 2.10
Emerging Asia: Debts owed by non-financial listed firms with interest coverage ratio less than 1

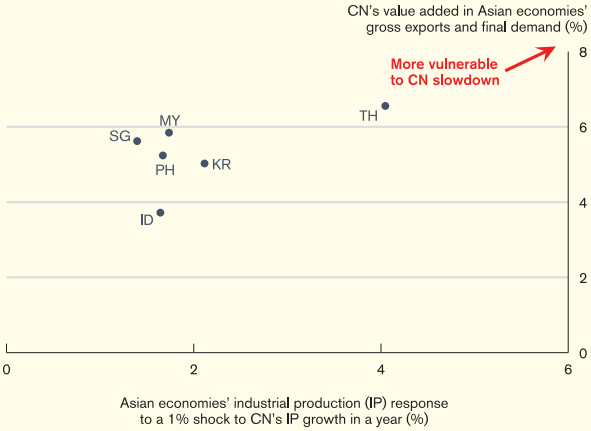


Source: S&P Capital IQ.

The possible slowdown in Mainland China would add further headwinds to the region through multiple channels. First, as a major destination of the region's exports (exports to Mainland China account for about one-fifth of total exports from emerging Asian economies in 2021), weaker demand from Mainland China would weigh on the region's export growth. Second, as Mainland China is a key production hub, any renewed COVID-19 outbreaks and lockdowns would risk intensifying global and regional supply bottlenecks. All these would hit, Asian economies, especially for those where

(i) industrial production was more sensitive to Mainland's production (x-axis in Chart 2.11); and, (ii) domestic final demand and gross exports were more reliant on Mainland China's value added (y-axis in 2.11).

Chart 2.11
Exposures to slowdown in Mainland China



Note: Industrial production response is the accumulated impulse response to a 1% shock to Mainland China's industrial production growth (%yoy) in four quarters. The impulse response of each economy is based on a VAR model with the economy's year-on-year change in industrial production and its lags; and the year-on-year change in industrial production of Mainland China, US, the weighted sum of nine other Asia Pacific economies and the rest of the world, and their corresponding lags. The trade in value added data are as of 2018.

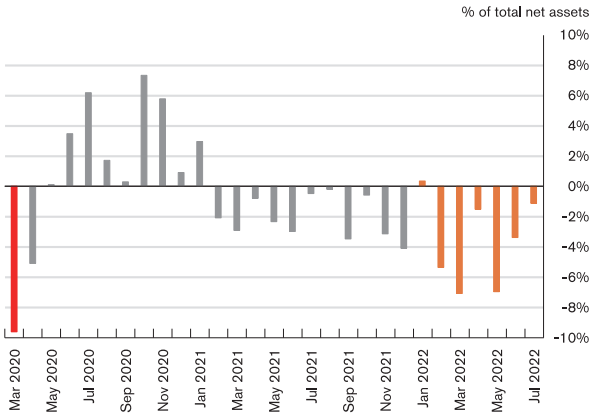
Sources: OECD TiVA database (2021 version) and HKMA staff estimates.

Box 1
An assessment of vulnerabilities of emerging Asian dollar corporate bond market: A perspective of open-ended funds

Introduction

Alongside tightening monetary policy across major advanced economies and weakening global economic outlook, open-ended funds (OEFs) have witnessed accelerated outflows from emerging Asian economies[4] in the first half of 2022, after moderate outflows for 2021 as a whole (Chart B1.1). These sizable outflows have raised concerns on financial stability risks over these emerging Asian economies and the repercussions across the world.

Chart B1.1
Monthly flows of OEFs from emerging Asian economies since March 2020



Note: A positive (negative) value denotes inflows (outflows)
Source: EPFR.

Such reversals in capital flows from OEFs could be particularly painful for some emerging Asian corporates if they had built up substantial leverage through dollar bond issuance when there were large inflows to the bond markets from OEFs amid ample global liquidity in the past few years. When large capital flows move out abruptly such as the episode in March 2020, this could push up corporates' dollar funding costs and dampen their ability to refinance. Furthermore, this shock could spill over to the banking sector if corporates struggle for bond refinancing and have to seek bank credits. That said, significant data gaps in OEFs' dollar bond holdings have obscured a closer examination of such systemic risks (Bank for International Settlements, 2020).

Against this backdrop, this box sheds light on these systemic implications by using our novel dataset. Learning from the March 2020 episode, we assess how emerging Asian corporates and their bank lenders were affected by sizable OEF outflows. Based on the assessment, we draw policy implications for emerging Asian economies to safeguard financial stability in the face of further tightening of global monetary conditions.

How exposed are emerging Asian dollar corporate bonds to OEFs' investment?

Using our novel dataset that covers 11,395 dollar-denominated non-equity OEFs and their holdings of dollar bonds issued by 11,123 non-financial listed corporates headquartered in the emerging Asian economies[5], we find OEFs are a significant holder of emerging Asian dollar corporate bonds. At the end of March 2021, OEFs held about 15% of the total outstanding amount of these dollar bonds.[6]

In addition, we find that dollar bonds issued by corporates with higher debt burdens were more

[4] These include Mainland China, India, Indonesia, Malaysia, the Philippines, Thailand and Vietnam.

[5] The OEF sample is retrieved from Morningstar Direct and represents 72% of non-equity open-ended mutual funds and exchange-traded funds in the world. Morningstar's data providers do not guarantee the accuracy, completeness or timeliness of any information provided by them and shall have no liability for their use.

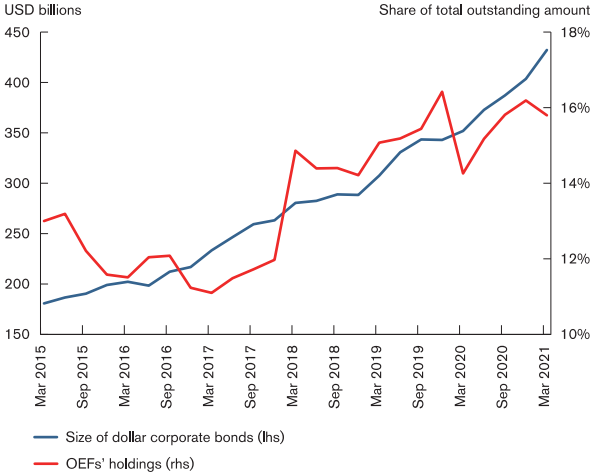
[6] The share of OEFs' investment in dollar corporate bonds also grew notably in developed Asia, reaching 9% of the total outstanding amount. In other regions, their shares of investment, while remaining at relatively higher levels, have been on a slight downward trend in recent years (e.g. North America: 45% and Europe: 22%).

exposed to OEFs' investment.[7] At the end of March 2021, about 18% of dollar bonds issued by corporates with higher debt burdens were held by OEFs. This was higher than the 11% of their counterparts with smaller debt burdens. This implies that the financing conditions of corporates with higher debt burdens could be hit harder in times of reversals in OEFs' investment.

Did corporates amass leverage amid inflows to dollar bond markets from OEFs?

As OEFs increasingly invested in dollar bonds in the past few years, emerging Asian corporates could benefit from greater bond demands and lower cost of funding. This in turn increased their incentives in new bond issuance, thus adding to its leverage over time. Our dataset shows supporting evidence that emerging Asian dollar corporate bonds increased more than twofold from the first quarter of 2015 to the first quarter of 2021 (blue line, Chart B1.2), as OEFs took up an increasing share of bonds (red line, Chart B1.2).

Chart B1.2
Size of emerging Asian dollar corporate bonds and their exposure to OEFs' investment



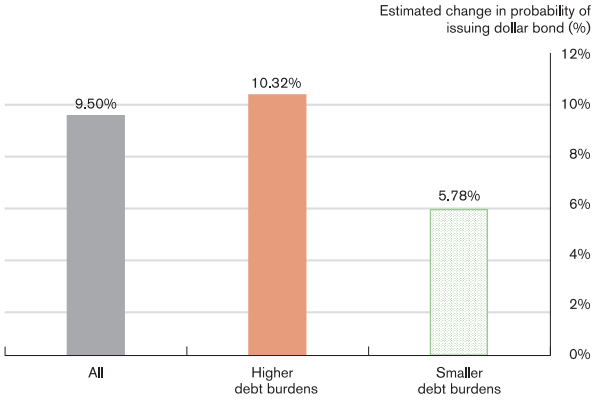
Note: This line chart depicts the outstanding amount of emerging Asian dollar corporate bonds (blue) and their exposure to OEFs as a percentage of their total outstanding amount (red).

Sources: Morningstar Direct, Bloomberg, Refinitiv, Dealogic and HKMA staff estimates.

[7] We classify a corporate as "with higher debt burdens" if its liability-to-asset ratio exceeds the sample median; otherwise as "with smaller debt burdens". Results remain robust if other indicators, such as interest coverage ratio and whether any dollar liabilities are due in 12 months, are used for classification.

Furthermore, our empirical analysis shows increases in OEFs' investment in these outstanding dollar bonds could raise the probability of new bond issuance among emerging Asian corporates, especially for those with higher debt burdens. For illustration, take the average quarterly increase of 8.27% in OEFs' investment in 2019. Given such an increase, corporates are estimated to be 9.50% more likely to issue new dollar bonds in the next quarter (grey bar, Chart B1.3). For those with higher debt burdens, the likelihood to issue new bonds will rise even more notably by 10.32% (orange bar, Chart B1.3).

Chart B1.3
Estimated change in corporates' probability in issuing new dollar bonds in response to an average quarterly increase in OEFs' investment in 2019



Notes:
(1) This bar chart depicts the effects of an average quarterly increase in OEFs' investment in 2019 on the probability of issuing new dollar bonds by all corporates (grey), corporates with higher debt burdens (orange) and corporates with smaller debt burdens (green); and
(2) The solid bars denote 10% level of statistical significance.

Source: HKMA staff estimates.

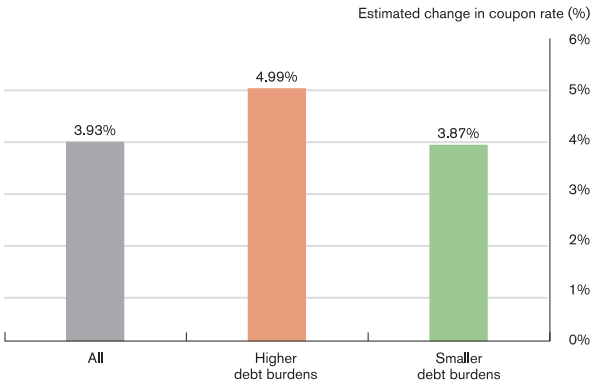
Did OEFs' liquidation add to dollar funding stress in emerging Asian corporates?

Having provided emerging Asian corporates with more funding opportunities in normal periods, OEFs' investment could reverse abruptly in times of stress, thereby exposing these corporates to a significant funding stress. In the first quarter of 2020, OEFs liquidated about 14% of their holdings of emerging Asian dollar corporate bonds. By using this scale of liquidation, we could gauge the impacts of fund reversals on the

funding costs and the probability of these corporates issung new bonds in the March 2020 episode.

First, OEFs' liquidation could lead to a surge in emerging Asian corporates' dollar funding costs. Specifically, our results show that the liquidation realised in the first quarter of 2020 pushed up the coupon rate for dollar corporate bond issuance contemporaneously by 3.93 ppts (grey bar, Chart B1.4), equivalent to a rise of 58% from the average level seen in the fourth quarter of 2019. The surge was even more notable for corporates with higher debt burdens, which saw a jump of 4.99 ppts in their coupon rates during this stress period (orange bar, Chart B1.4).

Chart B1.4
Estimated change in coupon rates in response to OEFs' liquidation in the first quarter of 2020



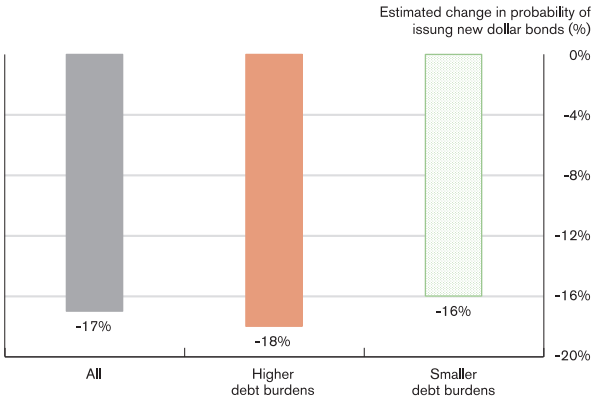
Notes:
(1) This bar chart depicts the effects of OEFs' liquidation on the coupon rates of dollar bonds issued by all corporates (grey), corporates with higher debt burdens (orange) and corporates with smaller debt burdens (green) in the first quarter of 2020; and
(2) The solid bars denote 10% level of statistical significance.
Source: HKMA staff estimates.

Second, OEFs' liquidation could also lead to contraction in new issuance activities. Our results show OEFs' liquidation in the first quarter of 2020 reduced the likelihood for all corporates to issue new dollar bonds in the second quarter of 2020 by 17% (grey bar, Chart B1.5).[8] Likewise, the effect is slightly stronger for corporates with higher debt burdens, with their probability to issue new bonds being reduced by 18% (orange bar, Chart B1.5).

[8] This is in line with a year-on-year decrease of 25% in their new dollar bonds issued in the second quarter of 2020.

Taken together, OEFs' liquidation could pose a bigger challenge in refinancing for corporates with higher debt burdens, considering (i) their higher exposure to OEFs' investment before the market stress and (ii) the larger estimated impacts of OEFs' liquidation on their funding costs and ability to issue new bonds. In response to the short-fall in dollar bond issuance activities, these corporates might have to seek alternative funding sources, possibly creating adverse spillover to the broader financial system, such as the bank lenders.

Chart B1.5
Estimated change in corporates' probability of issuing new dollar bonds in response to OEFs' liquidation in the first quarter of 2020



Notes:
(1) This bar chart depicts the estimated effects of OEFs' liquidation in the first quarter of 2020 on the probability of issuing new dollar bonds by all corporates (grey), corporates with higher debt burdens (orange) and corporates with smaller debt burdens (green) in the second quarter of 2020; and
(2) The solid bars denote 10% level of statistical significance.
Source: HKMA staff estimates.

Did OEFs' liquidation pose negative spillover to the banking sector?

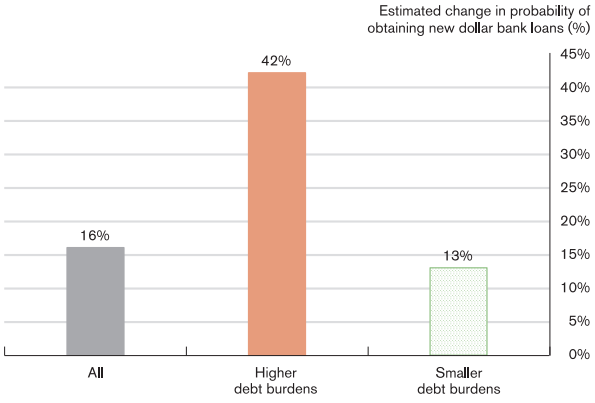
For emerging Asian corporates, bank loans are another key source of dollar funding comparable to bond issuance in scale.[9] If the corporates decided to make up the short-fall in bond issuance with bank credits, the banking sector could also be indirectly affected by OEFs' liquidation. In particular, the shift could expose their bank lenders to higher credit risks, considering those corporates with higher debt

[9] Our dataset shows that 54% of emerging Asian corporates' dollar borrowing was from bank loans as of the fourth quarter of 2019, while the rest was from bond issuance.

burdens may have more pressing needs to seek bank credit given their higher difficulty in securing bond refinancing.

Specifically, our empirical results show that the corporates would be 16% more likely to seek dollar bank loans in the second quarter of 2020 after OEFs' liquidation in the first quarter of 2020 (grey bar, Chart B1.6).[10] Furthermore, this impact is more notable for corporates with higher debt burdens, which were 42% more likely to seek dollar bank loans under the same circumstances (orange bar, Chart B1.6).

Chart B1.6
Estimated change in corporates' probability of obtaining new dollar bank loans in response to OEFs' liquidation in the first quarter of 2020



Notes:
(1) This bar chart depicts the estimated effects of OEFs' liquidation in the first quarter of 2020 on the probability of obtaining new dollar bank loans by all corporates (grey), corporates with higher debt burdens (orange) and corporates with smaller debt burdens (green) in the second quarter of 2020; and
(2) The solid bars denote 10% level of statistical significance.
Source: HKMA staff estimates.

In addition, the impact on the banking sector may also be transmitted across borders. Our novel data suggest six-tenths of emerging Asian corporates' dollar bank loans came from banks headquartered in developed markets.[11] This suggests that the adverse impact may also spill over to developed markets.

[10] This is in line with a year-on-year increase of 32% in their new dollar bank loans obtained in the second quarter of 2020.

[11] While these bank lenders can be foreign bank branches operating in emerging Asian economies, the dollar funding of these branches is usually internally obtained from their parents or US branches (Bank for International Settlements, 2020).

Conclusion and implications

Our findings show that OEFs are a significant holder of emerging Asian dollar corporate bonds. While the increasing share of OEFs' investment enabled these corporates to issue more dollar bonds in the past few years, the build-up of leverage risk could subject them to significant vulnerabilities once OEFs' investment reverses.

Our empirical analysis shows that, in the March 2020 episode, OEFs' liquidation contributed to a surge in the corporates' dollar funding costs and dampened their ability to refinance via dollar bond markets, particularly for corporates with higher debt burdens. We further find these corporates became more likely to borrow from banks given the difficulty in bond refinancing, thus exposing banks' corporate loans to higher credit risks.

Looking ahead, the ongoing monetary policy normalisation in advanced economies will further tighten global financial conditions. This, coupled with the darkening world economic outlook, might amplify swings in OEF flows and add to the vulnerabilities of the financial system. This calls for close monitoring and policies to address potential systemic risks. In this regard, our findings have two policy implications:

(i) Policies to strengthen OEFs' liquidity management may help mitigate their liquidation of dollar corporate bonds and the subsequent impacts on emerging Asian corporates in times of stress; and

(ii) While banks may lend to corporate borrowers to help alleviate their financial pressures arising from drastic OEF fund outflows, a closer monitoring of the asset quality of corporate loan portfolios of banks is warranted.

References

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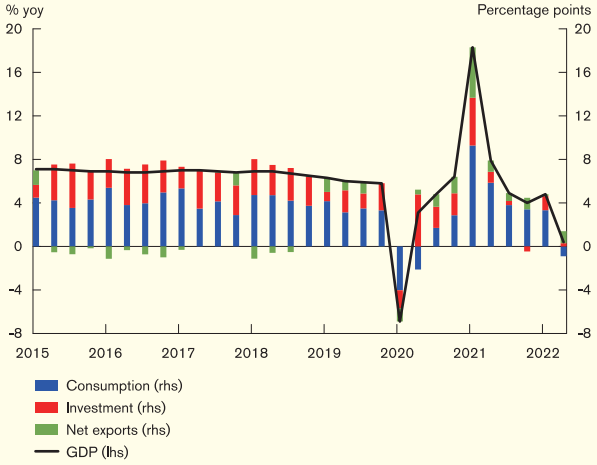
2.2 Mainland China

Real sector

Mainland China's GDP growth slowed down from 4.8% year on year in the first quarter to 0.4% year on year in the second quarter amid the Omicron outbreaks, the property market downturn and external uncertainties such as the Russia-Ukraine conflicts and the US policy normalisation. Overall, the Mainland economy grew by 2.5% year on year in the first half of 2022, falling short of the official growth target of about 5.5% for 2022 (Chart 2.12).

Chart 2.12
Mainland China: Contribution to GDP growth by demand component

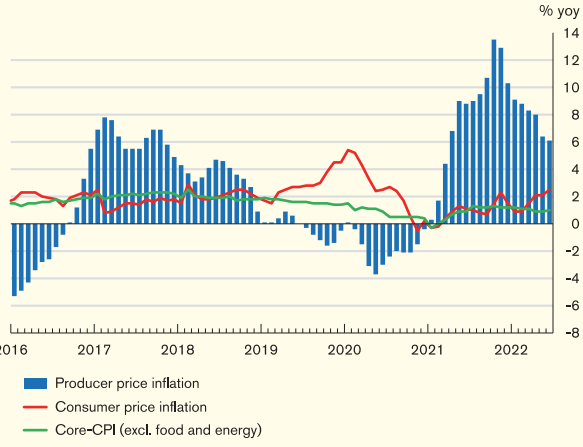


Sources: CEIC, NBS and HKMA staff estimates

Looking forward, the Mainland economy is likely to continue to recover in the second half following the containment of virus outbreaks and the introduction of various rounds of policy support. According to the latest consensus forecasts, the Mainland economy is expected to grow by 3.7% in 2022. However, there are several challenges to the economic outlook. Domestically, the ongoing downturn in property market activities is likely to persist in the near term as homebuyers' confidence remained weak amid the mortgage boycotts in response to delays in property project delivery. Consumption, particularly those related to in-person services, will likely continue to be affected by uncertainties surrounding the future development of the pandemic and the associated social distancing measures in place. Externally, weakened global demand amid worldwide energy shortages, front-loaded US policy normalisation amid surging inflation, as well as prolonged Russia-Ukraine conflicts could jeopardise export performance. To facilitate the monitoring of Mainland's economic performance, Box 2 introduces a GDP nowcasting model using both quarterly and monthly macroeconomic indicators.

Amid the elevated global inflation, the producer price inflation in Mainland China stayed at relatively high levels in the first half of 2022 (Chart 2.13). That said, the pass-through of the producer price inflation to the consumer price inflation was limited, with the headline consumer price inflation remaining moderate at 2.5% year on year in June 2022, in part reflecting subdued food prices (e.g. pork prices) and weak domestic demand amid property market downturns and repeated COVD-19 outbreaks. The latest consensus forecasts expect Mainland's consumer prices to rise mildly by 2.4% for 2022 as a whole.

Chart 2.13
Mainland China: Consumer price and producer price inflation

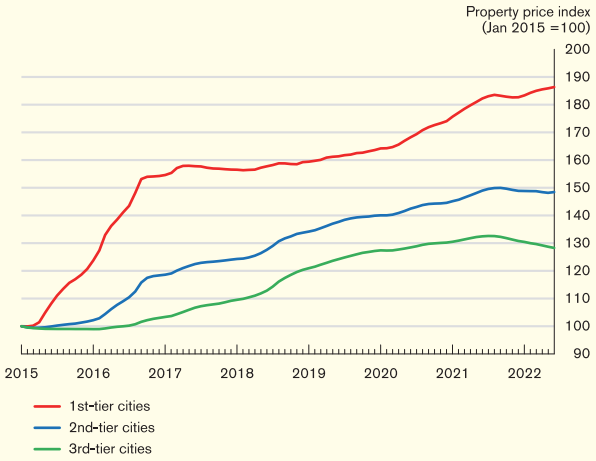


Sources: CEIC, NBS and HKMA staff estimates

Asset and credit markets

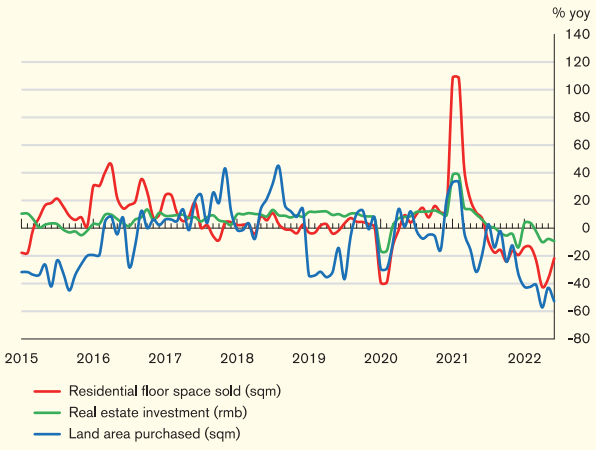
In the first half of 2022, Mainland property market continued to falter amid the financing difficulties of developers and the resurgence of COVID-19 outbreaks. Housing prices softened in most cities except for the first-tier ones (Chart 2.14), while residential floor space sold declined markedly year on year (Chart 2.15). Accordingly, the inventory-to-sales ratio picked up across all city tiers, with that in the third-tier cities surging to a historical high of 53 months in June 2022 (Chart 2.16).

Chart 2.14
Mainland China: Residential prices by tier of cities



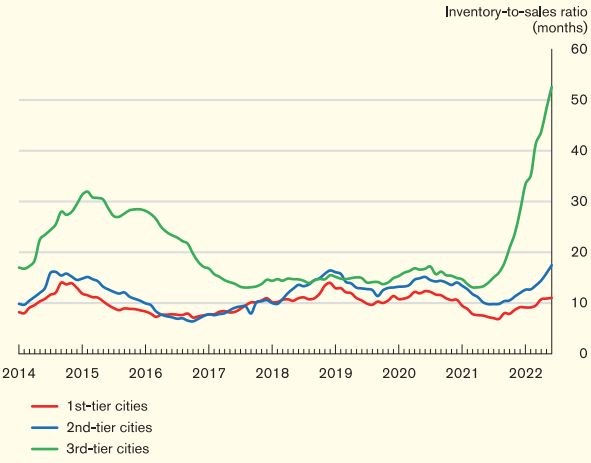
Sources: CEIC and HKMA staff estimates

Chart 2.15
Mainland China: Residential floor space sold, real estate investment and land purchase



Sources: CEIC and HKMA staff estimates

Chart 2.16
Mainland China: Inventory-to-sales ratios by tier of cities



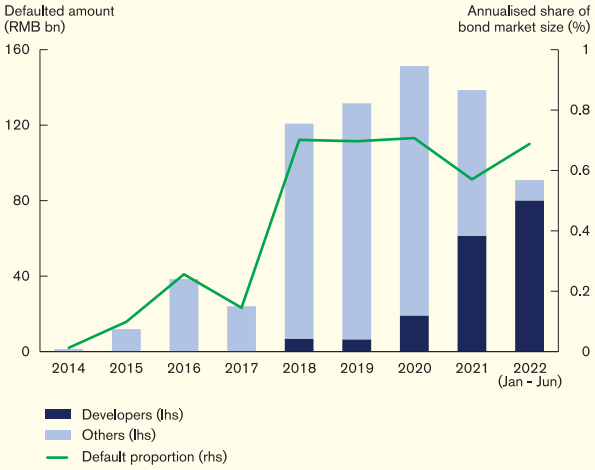
Sources: Wind and HKMA staff estimates

To stabilise the property market, the Mainland authorities stepped up supportive measures. On the demand side, the authorities cut both the mortgage reference rate (i.e. five-year Loan Prime Rate (LPR)) and the mortgage rate floor on first-home mortgages, while easing home purchase restrictions and the down payment ratio in different cities. On the supply side, in a bid to mitigate the financing difficulties facing property developers, the authorities encouraged banks to differentiate project-level risk from company-level risk to avoid blind withdrawal of loans from developers. To shore up homebuyers' confidence following the mortgage payment boycott in response to delays in project delivery, the authorities also pledged to promote home delivery and set up a fund amounting to RMB 200 billion, while emphasising local governments' responsibility to ensure the delivery of properties. Although the market showed some tentative signs of stabilisation in June along with pent-up demand, it remains unclear whether such a trend will continue amid weakened homebuyers' confidence.

With intensified liquidity stress amid the property market downturn, Mainland property developer defaults reached about RMB 80 billion in the onshore market in the first half of 2022.

Nevertheless, the annualised overall default rate in the onshore bond market remained low at around 0.7% in the first half of 2022, with property developers contributing about 88% of the total defaults (Chart 2.17).

Chart 2.17
Mainland China: Bond default size and rate in the onshore market

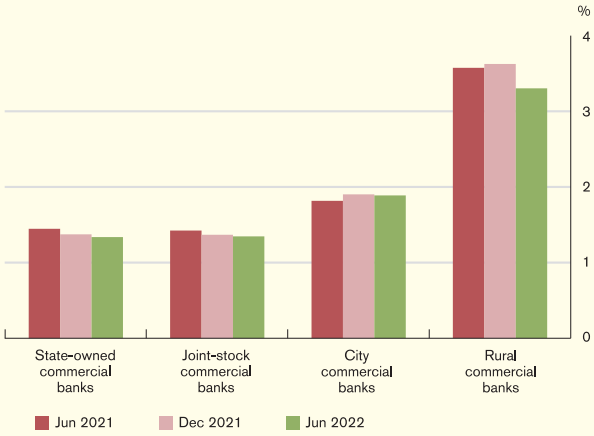


Note: Repeated defaults of the same bond are only counted once. Data covers enterprise and corporate bonds, medium-term notes, short-term commercial papers and private placement notes listed in both the interbank market and exchanges.

Sources: Wind and HKMA staff estimates

The overall risk in the banking sector remained manageable. The non-performing loan (NPL) ratios of state-owned banks remained low and further declined to 1.34% in June 2022 from 1.37% at the end of 2021 (Chart 2.18). In addition, the provision coverage ratio of large Mainland banks improved to 245% in June 2022 from 239% at the end of 2021, well above the regulatory requirement. That said, asset quality pressures facing some smaller banks should not be ignored amid the ongoing economic and property market downturns. For instance, the NPL ratio of rural commercial banks stayed at a relatively high level of 3.3% in June 2022 despite the decline in the first half of this year.

Chart 2.18
Mainland China: NPL ratios by bank type

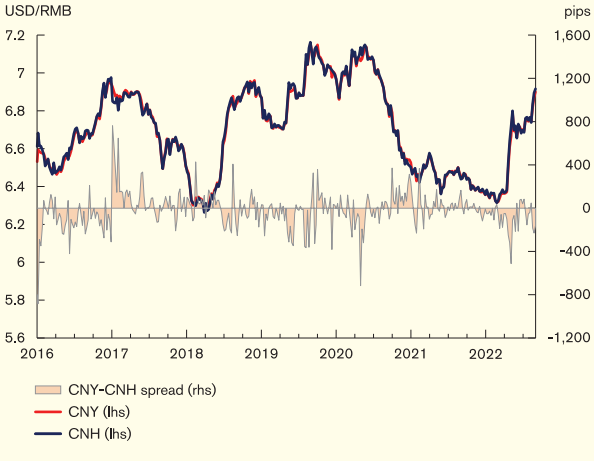


Source: CEIC

Exchange rate and cross-border capital flows

Following the interest rate hikes in the US since late March, the onshore renminbi (CNY) reversed its trend of strengthening against the US dollar, weakening notably during the following months. The CNH exchange rate traded weaker than its onshore counterpart, with the CNY-CNH spread widening notably to over 500 pips for a short period of time in May (Chart 2.19). To stabilise the renminbi exchange rate, the People's Bank of China (PBoC) announced on 25 April a 100 bps cut to the foreign exchange reserve requirement ratio (RRR) from 9% to 8% and another 200 bps cut to lower the ratio to 6% on 5 September in order to provide more foreign exchange liquidity to the market.

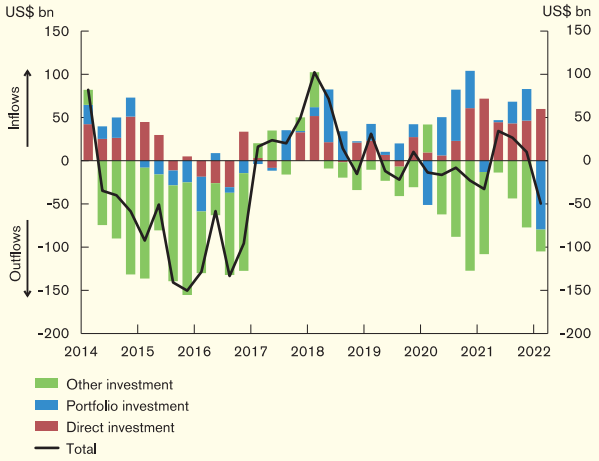
Chart 2.19
Mainland China: Onshore and offshore renminbi exchange rates against the US dollar



Sources: Bloomberg and HKMA staff estimates

Amid widened Mainland China-US interest rate differentials, the latest statistics on the Balance of Payments pointed to some net capital outflows in the first quarter of 2022, mainly driven by increased holding of foreign bonds and equities by domestic residents and a sell-off in onshore debt securities by foreign investors (Chart 2.20). Meanwhile, net direct investment inflows remained strong and further picked up as inward direct investment by foreigners outweighed outward direct investment by residents.

Chart 2.20
Mainland China: Net cross-border capital flows by type of flows



Sources: CEIC, State Administration of Foreign Exchange and HKMA staff estimates

Looking ahead, while Mainland China will continue to attract foreign investors in the long run because of its resilient economic fundamentals and further opening up of financial markets, the volatility of short-term cross-border capital flows is likely to increase amid widened Mainland China-US interest rate differentials, uncertainties over Mainland China's growth outlook, and intensified geopolitical tensions.

Monetary and fiscal policy

In light of the downward pressure on the economy, the authorities stepped up policy support to stabilise growth, including a comprehensive stimulus package unveiled in late May, which contained 33 measures in six fields (e.g. boosting infrastructure investment, stabilising supply chains, and supporting small and medium-sized enterprises (SMEs)), as well as a follow-up package containing 19 policies announced in late August to provide additional funding and aid.

On the monetary front, the PBoC: (i) cut the RRR by 25 basis points on 25 April 2022; (ii) lowered the five-year LPR by 15 basis points, on 20 May 2022 and 22 August 2022, respectively, and trimmed the one-year LPR by 5 basis points on 22 August to boost demand for investment; and, (iii) reduced both the one-year medium-term lending facility (MLF) rate and the seven-day reverse repo rate by 10 basis points on 15 August 2022. In addition, the PBoC announced that it would expand the use of structural monetary tools including targeted RRR cuts to support bank lending to small businesses. In the wake of a series of easing measures, the weighted average corporate loan interest rate declined to 4.2% in the second quarter of 2022 from 4.6% in 2021, reflecting the lowered funding costs for the real economy.

On the fiscal side, authorities increased its policy supports in both scope and scale. The latest major easing measures include further tax cuts for the retail and service sectors by RMB 142 billion, for car purchase by RMB 60 billion, and starting from September a deferral of tax payments totaling RMB 440 billion for manufacturing SMEs by another 4 months. In addition, policy banks have increased their credit lines for infrastructure lending by RMB 800 billion and issued financial bonds amounting to RMB 300 billion to fund infrastructure projects, while planning to issue another RMB 300 billion of bonds for the same purpose. The government also emphasised the importance of improving the effectiveness of

fiscal policy, in particular, by fully and better utilising the fund raised through local government special bond (LGSB) issuance to boost domestic demand. It subsequently announced in August an additional RMB 500 billion of LGSB issuance.

Despite a more proactive fiscal policy stance, the overall risk of local government debt remained manageable, with Mainland local government debt-to-GDP ratio standing low at 30% at the end of June 2022, a mild increase since the end of last year. However, the sluggish property market may affect the fiscal position of some local governments in areas with relatively greater reliance on land sales (e.g. Hainan, Heilongjiang and Ningxia). To better support local government fiscal spending, the PBoC announced a handover of over RMB 1 trillion in profits to the central government by the end of the year, which will be used for transfer payments to local governments especially those facing fiscal difficulties.

Box 2
Nowcasting GDP growth in Mainland China

Introduction

The Mainland economy faced strong headwinds in recent quarters amid a resurgence in COVID-19 infections and a downturn in the real estate sector. In light of the importance of Mainland China to the global economy, it is useful to have an accurate grasp of the current state of the Mainland economy. Given that Mainland GDP is available only at a quarterly frequency with some publication lags, this box presents a method to nowcast Mainland GDP growth by combining information at both quarterly and monthly frequencies using the unrestricted mixed data sampling (U-MIDAS) model, which is adopted by many central banks to nowcast GDP growth[12].

Methodology and Data

More specifically, our U-MIDAS regressions take the following form and include one particular monthly indicator each time:

$$y_t^{(Q)} = \alpha + \sum_{i=1}^{p} \beta_i y_{t-i}^{(Q)} + \psi(L) x_{j,t}^{(M)} + u_t$$

where $y_t^{(Q)}$ is the quarterly GDP growth rate, and $x_{j,t}^{(M)}$ denotes the *j*-th monthly economic series in quarter *t*. $\psi(L) = \sum_{k=0}^{q} \psi_k L^k = \psi_0 + \psi_1 L + \cdots + \psi_q L^q$ and L^k is the lag operator such that $L^k x_t^{(M)} = x_{t-k/3}^{(M)}$. p and q are the numbers of lags and may vary across each indicator[13].

Six categories of Mainland economic activity indicators are included in the model, covering: (i) surveys, (ii) manufacturing activities, (iii) real estate sector performance, (iv) international trade, (v) retail sales, and (vi) other activities[14]. These indicators are listed in Table B2.1.

Table B2.1
Monthly indicators used in U-MIDAS model

Indicator	Typical release date
Surveys	
1. Manufacturing PMI	End of current month
2. Manufacturing PMI: Production	End of current month
3. Non-manufacturing PMI	End of current month
4. Non-manufacturing PMI: Construction	End of current month
5. Caixin manufacturing PMI	1st of next month
6. Caixin services PMI	1st of next month
Manufacturing	
7. Electricity production	15th next month
8. Crude steel production	15th next month
9. Steel production	15th next month
10. Cement production	15th next month
11. Industrial production	15th next month
Real estate	
12. Building construction: new area started	15th next month
13. Floor space sold	15th next month
International trade	
14. Exports	7th next month
15. Imports	7th next month
16. Trade surplus	7th next month
17. Container throughput in major ports	15th next month
Retail sales	
18. Retail sales	15th next month
19. Retail sales: consumer goods	15th next month
Others	
20. Freight traffic of highways	15th next month
21. Core CPI	10th next month

Sources: Wind, the Ministry of Transport of the People's Republic of China and HKMA staff estimates

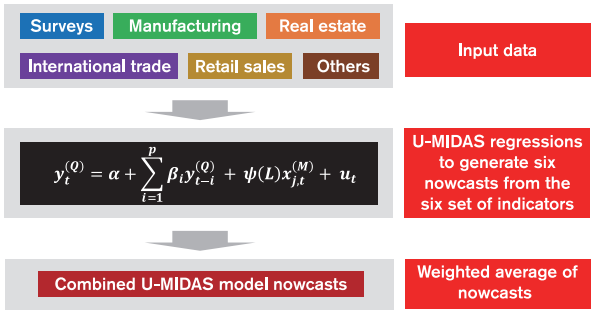
[12] The U-MIDAS was proposed by Foroni *et al.* (2015). It is a powerful tool for nowcasting GDP and is adopted by many central banks (see e.g. Anesti *et al.* (2017) and Chikamatsu *et al.* (2018)).

[13] The optimal lag length is decided based on the Bayesian information criterion.

[14] Financial variables are not included in the model following Bok *et al.* (2018) and Chikamatsu *et al.* (2018).

To obtain robust and accurate results, our GDP growth nowcasts are set as the weighted average of the nowcast results of the six sets of indicators, with the weights of each regression being determined by their nowcasting accuracy[15]. The whole procedure of our GDP growth nowcasting is summarised in Chart B2.1.

Chart B2.1
Nowcasting procedure of Mainland GDP growth

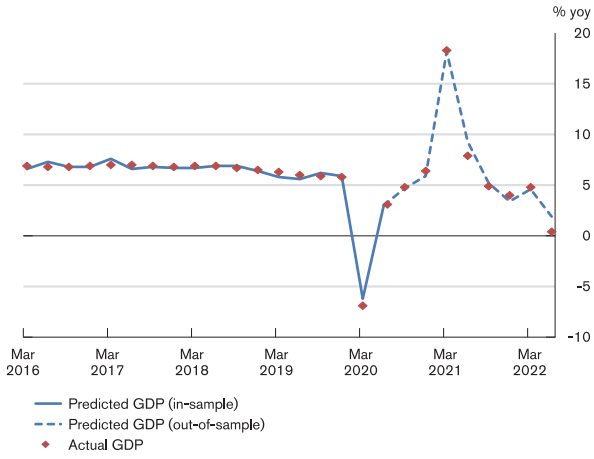


The full sample of data is split into two sub-periods. The combined U-MIDAS model is estimated by using the first subsample from January 2015 through to June 2020 to include the first COVID-19 outbreak. The sample is then extended to the second subsample period (July 2020-June 2022) on a rolling basis for out-of-sample assessment.

Nowcasting results

Chart B2.2 compares our nowcasts with actual GDP growth starting from 2016[16]. The chart shows that our nowcasts, both in-sample and out-of-sample, track GDP growth closely. In particular, our nowcasts capture the slump in the first quarter of 2020 due to the emergence of COVID-19 as well as the economic recovery in the following year.

Chart B2.2
In-sample and out-of-sample Mainland GDP growth nowcasts



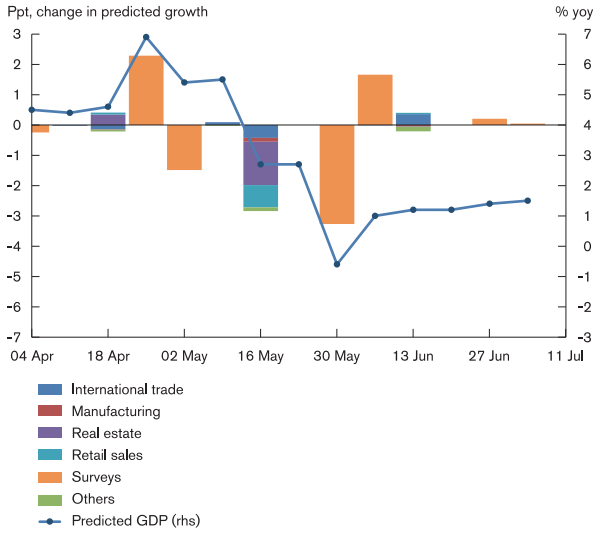
Note: The dotted line indicates that the results are estimated in the out-of-sample period while the solid line refers to the outcomes from in-sample estimation.
Sources: Wind, the Ministry of Transport of the People's Republic of China and HKMA staff estimates.

Another merit of the combined nowcasting method is that it enables us to explore which underlying factors drive the changes in our nowcasts over time. For instance, our GDP growth nowcast for the second quarter of 2022 edged down in April and May mainly due to the significant deterioration in survey readings, real estate sector performance, retail sales and international trade following Omicron outbreaks and city lockdowns. The GDP growth nowcast was then supported by the rebounds in survey and foreign trade data amid the relaxation of COVID restrictions (Chart B2.3). For the third quarter, our nowcasts suggested that growth will improve but remain soft amid economic headwinds.

[15] The inverse mean square error is adopted (i.e. the weights depend on models' mean square forecast error (MSFE)). Specifically, the weight assigned to indicator i at time t is calculated as follows, $w_{i,t} = \frac{1/MSFE_{i,t}}{\sum_{j=1}^{N} 1/MSFE_{j,t}}$ where N is the total number of indicators.

[16] Since most of the optimal lags are 12 months, our nowcasting starts from the first quarter of 2016.

Chart B2.3
Evolution of Mainland GDP growth nowcasts and contributing components for 2022Q2



Notes:
1. The blue dots refer to the weekly nowcasts based on the information available up to that point in time. The contribution to the change in the nowcast is represented by the stacked coloured bars, with each colour indicating one of the six set of indicators.
2. Nowcast starts in current quarter and consists of four months until the official GDP is released.

Sources: Wind, the Ministry of Transport of the People's Republic of China and HKMA staff estimates

Chart B2.3 shows that the accuracy of our nowcasts tends to improve when more information is incorporated in the run-up to the announcement of new official GDP figures. As suggested by our out-of-sample results, our nowcasts would normally converge to the actual GDP growth figures as early as one month ahead of the official release.

Conclusion

This box introduces a GDP growth nowcasting model based on 21 monthly indicators to track Mainland China's economic performance. Our nowcasting model exhibits a good track record during the sample period, and also appears to be able to reflect the key factors affecting the economic performance in Mainland China, including the slowdown in the real estate sector, deterioration in retail sales and weakened sentiment.

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Foroni, C., Marcellino, M. G., and Schumacher, C. (2015). "Unrestricted Mixed Data Sampling (MIDAS): MIDAS regressions with unrestricted lag polynomials." *Journal of the Royal Statistical Society Series A*, vol. 178(1), 57-82.

3. Domestic economy

After a sharp contraction in the first quarter, Hong Kong's economy improved sequentially in the second quarter as the local epidemic stabilised and domestic demand revived amid policy support measures. However, overall economic activities remained weak compared to a year ago mainly due to declines in merchandise exports. Looking ahead, the economic recovery will still face multiple challenges including the worsened global economic prospects. The unemployment rate fell in recent months and is likely to ease further in the near term. Despite surging external prices, local inflation remained moderate due to soft domestic cost pressures.

3.1 Real activities

The Hong Kong economy saw some sequential improvement during the first half of the year, but overall economic activities remained weak compared to a year ago. On a quarter-on-quarter basis, GDP picked up by 1.0% in the second quarter, following a broad-based contraction of 2.9% in the first quarter amid the fifth wave of the local epidemic (Table 3.A and Chart 3.1). As the situation stabilised, private consumption bounced back in the second quarter along with a decreasing unemployment rate and the implementation of a new round of the Consumption Voucher Scheme (CVS). Overall investment spending also rebounded amid recovering business sentiment.[17] Externally, Hong Kong's merchandise trade performance deteriorated in the first half of the year due to moderating external demand and epidemic-induced cross-boundary transportation disruptions[18] (Chart 3.2). Although it is still way below its pre-pandemic level, trade in services continued to stabilise, in part, because tourist arrivals edged up.[19] On a year-on-year comparison, however, real GDP declined successively in the second quarter (Table 3.A), mainly reflecting external headwinds.

Table 3.A
Real GDP growth

		Seasonally adjusted quarter-on-quarter growth rate (%)	Year-on-year growth rate (%)
2021	Q1	5.8	8.0
	Q2	-1.7	7.6
	Q3	0.7	5.4
	Q4	0.0	4.7
2022	Q1	-2.9	-3.9
	Q2	1.0	-1.3

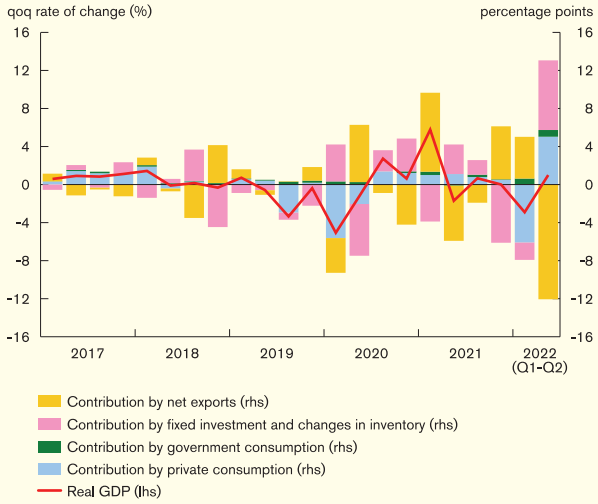
Source: C&SD.

[17] The Purchasing Managers' Index has returned to the expansionary zone since April 2022 and rose to 54.9 in May, the highest level in the recent decade.

[18] The fifth wave of the local epidemic has disrupted cross-boundary cargo truck services between Mainland China and Hong Kong since late January 2022, resulting in delays and rising transport costs. In particular, the disruption to the cross-boundary land transport of goods has created a ripple effect across the supply chains in Hong Kong, partly because land transport cannot be seamlessly connected to ocean or air transport. This has further increased trade costs and weighed on trade volume.

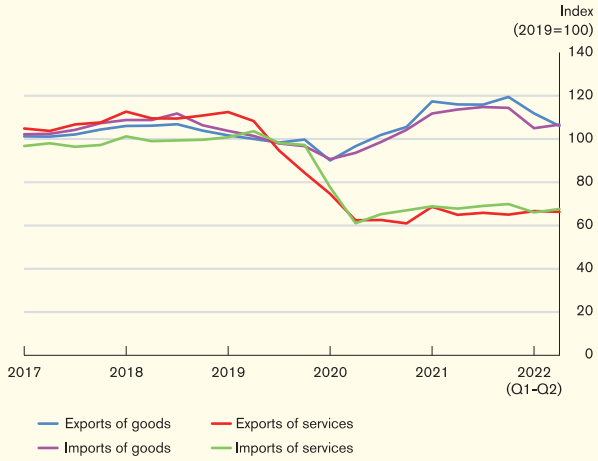
[19] The Government has lifted the ban on non-Hong Kong residents entering Hong Kong since May and suspended the circuit breaker mechanism applied to airline routes since July. The quarantine rules for overseas arrivals were also adjusted in August and September respectively. Total tourist arrivals rose to about 107,900 in May–July, up from around 16,200 in January–April. Still, the number of tourist arrivals is far below the pre-pandemic level.

Chart 3.1
Real GDP growth and contribution by major expenditure component



Note: Growth rates are seasonally adjusted.
Sources: C&SD and HKMA staff estimates.

Chart 3.2
Export and import volume



Note: The data are seasonally adjusted.
Source: C&SD.

In the near term, Hong Kong's economic outlook will still face considerable challenges. While an improving labour market and the disbursement of Phase II consumption vouchers[20] will support private consumption and hence overall economic recovery, tighter financial conditions could dampen growth. In addition, the worsened global growth prospects may continue to drag on Hong Kong's export performance.[21] In view of the worse-than-expected economic performance in the first half of the year, the Government and private-sector analysts have revised their forecasts of Hong Kong's economic growth for 2022 downwards to -0.5% to 0.5% and 0% respectively. This economic outlook is subject to other risks and uncertainties, including those stemming from the pandemic, the pace of monetary policy normalisation of major central banks and geopolitical concerns (see discussion in the previous chapters).

3.2 Labour market conditions

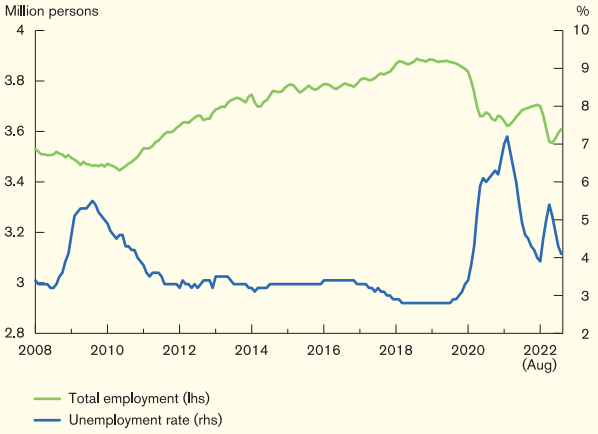
Following a deterioration in early 2022, the labour market saw some improvement in the past few months, partly supported by the gradual relaxation of social distancing measures and various policy measures, including the 2022 Employment Support Scheme. The seasonally adjusted unemployment rate declined from a recent high of 5.4% in April to 4.1% in August (Chart 3.3), and the decline was broad-based across all major economic sectors.[22] Total employment and the labour force participation rate have also picked up since June, though still below their pre-pandemic levels. Data on online job advertisements also indicate that more vacancies have become available. In the near term, pressures on the labour market are likely to ease further alongside a pick-up in local economic activities.

[20] The Government began the disbursement of the Phase II electronic consumption vouchers (HK$5,000) in August. According to the Financial Secretary, the CVS is expected to boost consumption and increase real GDP growth by 1.2 percentage points in the long run.

[21] However, cross-boundary transportation disruptions may gradually ease alongside a stabilisation in local epidemic situation, thereby providing some relief to external trade.

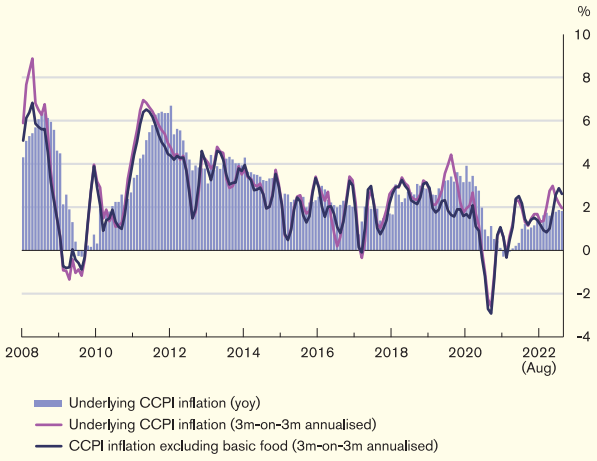
[22] For example, the unemployment rate of the food and beverage services sector fell notably from 12.9% in April to 6.7% in August, and that of the construction sector also decreased by 2.3 percentage points to 6.4% in August.

Chart 3.3
Labour market conditions



Source: C&SD.

Chart 3.4
Different measures of consumer price inflation

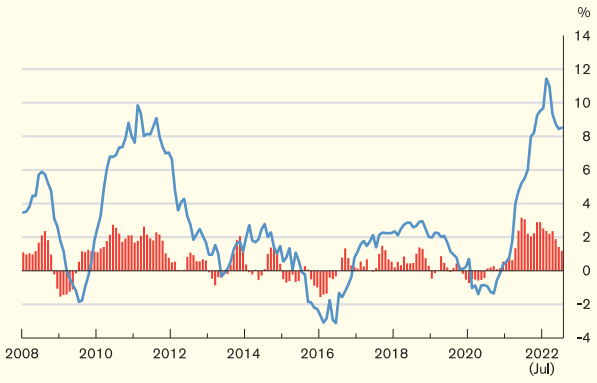


Sources: C&SD and HKMA staff estimates.

3.3 *Inflation*

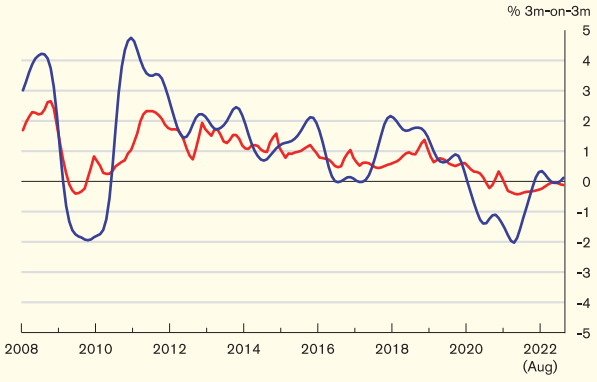
Local inflationary pressures remained moderate, although they have edged up recently (Chart 3.4). On a year-on-year comparison, the underlying composite consumer price index (CCPI) increased by 1.6% and 1.7% in the first and second quarters respectively, and by 1.8% in August.[23] Inflation momentum, as measured by the annualised three-month-on-three-month underlying inflation rate, also picked up. Prices of basic food and energy-related items saw a stronger increase along with the persistent rise in import prices (Chart 3.5). The price of clothing, footwear and meals out also rose as the local COVID-19 situation stabilised and consumption demand revived. By contrast, the housing rental component of the CCPI was broadly stable, thereby constraining the overall inflation momentum (Chart 3.6). Real unit labour costs also moderated in the first and second quarters (Chart 3.7).

Chart 3.5
Hong Kong's import prices



Source: C&SD.

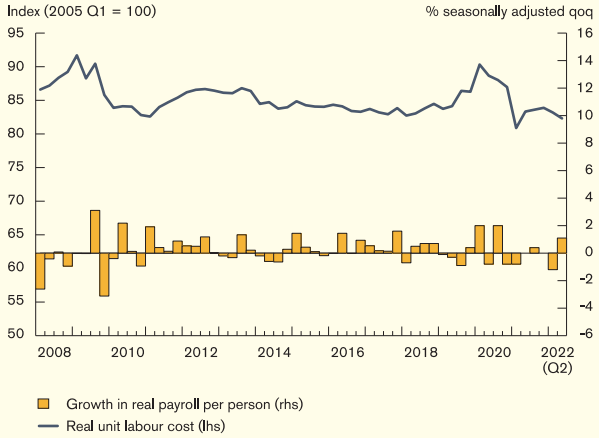
Chart 3.6
CCPI rental component and market rental



Sources: C&SD and R&VD.

[23] Inclusive of the effects of the Government's relevant one-off relief measures, the year-on-year headline inflation rate was 1.9% in August, and 1.5% in both the first and second quarters of 2022.

Chart 3.7
Unit labour cost



Sources: C&SD and HKMA staff estimates.

While external price pressures are expected to remain elevated in the near term, local inflation should stay mild due to the moderated fresh-letting residential rentals earlier and restrained local labour costs. The Government projection of underlying and headline inflation rates for 2022 is maintained at 2.0% and 2.1% respectively, while the latest market consensus forecasts that the headline inflation rate for the year will hit 2.1%.

4. Monetary and financial conditions

The Hong Kong dollar softened during the review period, driven by increased interest rate carry trade activities amid the widening of the negative HIBOR-LIBOR spreads in the first half of 2022 and the lacklustre performance of the local stock market. While the weak-side Convertibility Undertaking (CU) was triggered 31 times from May to August and Hong Kong Interbank Offered Rate (HIBOR) increased, the monetary environment in Hong Kong remained accommodative. Overall, the Hong Kong dollar exchange and money markets continued to trade in a smooth and orderly manner. Looking ahead, fund flows may be subject to heightened volatilities amid elevated uncertainties on various fronts, including the pace of US monetary policy normalisation, the evolving pandemic developments and the lingering geopolitical tensions. However, with the ample foreign reserves position and a robust financial system, Hong Kong is able to withstand outflows without jeopardising monetary and financial stability.

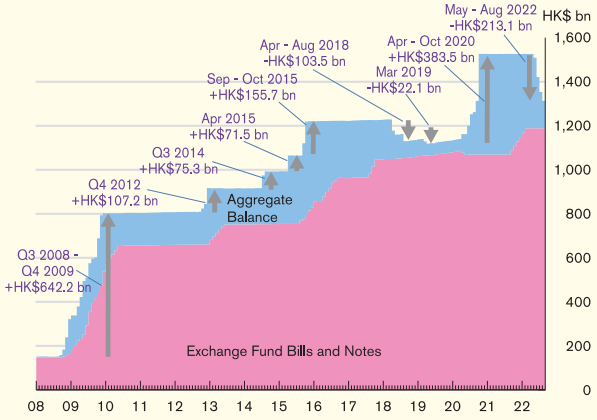
4.1 Exchange rate and capital flows

The Hong Kong dollar has softened since late April, driven by increased interest rate carry trade activities amid the widening of the negative HIBOR-LIBOR spreads in the first half of 2022 and the lacklustre performance of the local stock market. During the review period, the Hong Kong dollar traded within a range between 7.814 and 7.850 against the US dollar (Chart 4.1), with the weak-side CU being triggered 31 times. Since the first triggering of the weak-side CU on 11 May (US time), the HKMA has purchased a total of HK$213.1 billion (as at the end of August) at the request of banks in accordance with the design of the Linked Exchange Rate System (LERS). As a result of these purchases, the Aggregate Balance of the banking system declined from HK$337.6 billion at the end of February to HK$125.0 billion at the end of August (Chart 4.2).

Chart 4.1
Hong Kong dollar exchange rate

Source: HKMA.

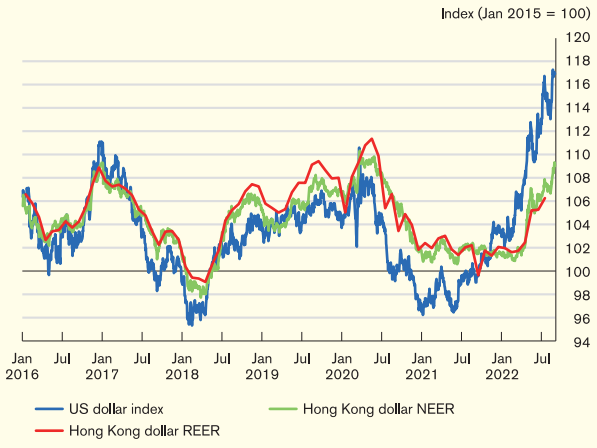
Chart 4.2
Aggregate Balance and Exchange Fund Bills and Notes (EFBNs)



Source: HKMA.

Broadly tracking the movements of the US dollar, the Hong Kong dollar nominal effective exchange rate index (NEER) strengthened during the review period (Chart 4.3). The Hong Kong dollar real effective exchange rate index (REER) generally followed the movement of the NEER.

Chart 4.3
NEER and REER



Note: The REER is seasonally adjusted and available only on a monthly basis.
Sources: CEIC, C&SD and HKMA staff estimates.

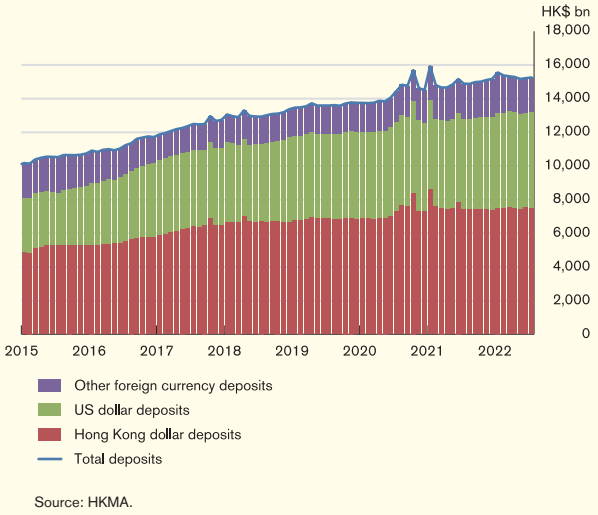
The fund flows may be subject to heightened volatilities in the period ahead due to the elevated uncertainties on various fronts, including the pace of US monetary policy normalisation, the evolving pandemic situation, and lingering geopolitical tensions. As the differentials between the higher US dollar interbank rates and the lower Hong Kong dollar interbank rates widen, there would be more carry trades in the market. According to the design and operation of the LERS, with the triggering of the weak-side CU, funds flow out from the Hong Kong dollar system and the interest rate automatic adjustment mechanism will kick in. The Hong Kong dollar interbank rates will gradually rise, offsetting the incentives for interest rate carry trades, slowing down fund outflows from the Hong Kong dollar market and stabilising the Hong Kong dollar exchange rate within the 7.75–7.85 Convertibility Zone. Over the years, the HKMA has built up strong buffers and resilience in the financial and banking systems. With ample foreign reserves, the HKMA has the capability and resolve to maintain the LERS and Hong Kong's monetary and financial stability.

4.2 Monetary environment and interest rates

Despite the triggering of the weak-side CU and the purchase of Hong Kong dollars at the request of banks, Hong Kong's monetary environment remained accommodative during the review period, with the Hong Kong dollar Monetary Base remaining sizeable at HK$1,930.3 billion at the end of August 2022.

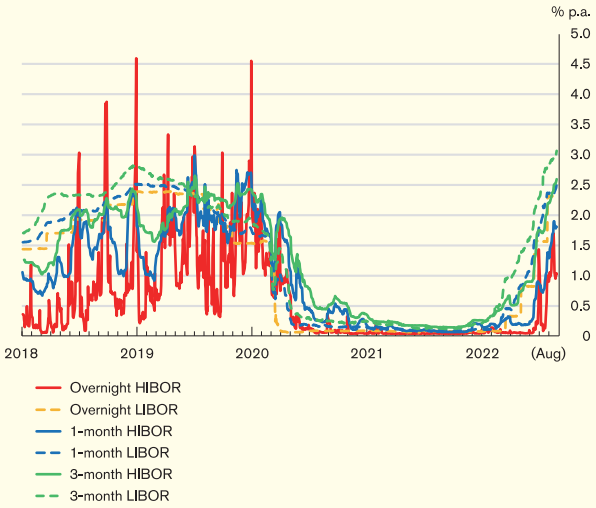
In the first seven months of 2022, total deposits with AIs increased modestly by 0.6%, with Hong Kong dollar deposits increasing by 1.6% while foreign currency deposits edged down by 0.3% (Chart 4.4). It should be noted, however, that monetary statistics are subject to volatility due to a wide range of transient factors, such as seasonal and initial public offering (IPO) related funding demand as well as business and investment-related activities. Therefore it is more appropriate to observe the longer-term trends.

Chart 4.4
Deposits with Authorized Institutions (AIs) by currency



Source: HKMA.

Chart 4.5
Hong Kong dollar and US dollar interbank interest rates



Sources: CEIC and HKMA.

Overall, Hong Kong's interbank market continued to trade in a smooth and orderly manner. Against the background of continued US rate hikes, HIBORs increased, with the negative HIBOR-LIBOR spread narrowing more recently (Chart 4.5). The average lending rate for new mortgages increased from 1.56% in January 2022 to 2.31% in July 2022, mainly reflecting the increase in HIBOR. After the Fed hiked its policy rate in September, some banks raised their Best Lending Rates by 12.5 basis points, marking the first increase since 2018. Some banks also increased the cap on HIBOR-based mortgage rates of newly approved mortgage loans in recent months.

Looking ahead, as the Fed is expected to continue its monetary policy normalisation at a fast pace, the HKMA may purchase more Hong Kong dollars at the request of banks and the Aggregate Balance may decline further, in line with the design and expectations of the LERS. While the Hong Kong dollar interbank rates will generally track the US dollar interest rates, the speed and the magnitude of the HIBORs' catching up with their US dollar counterparts will still be subject to the supply and demand for Hong Kong dollar funding in the local market. For banks' commercial interest rates, it will be up to the banks to decide whether to adjust the rates, when to adjust them and by how much, having regard to their own funding cost structures and other relevant considerations.

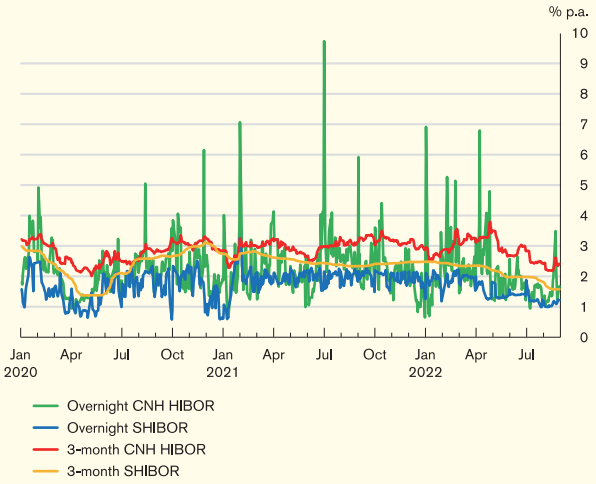
Offshore renminbi banking business

Liquidity conditions in the offshore renminbi (CNH) interbank market continued to be stable during the review period.[24] While the overnight CNH HIBOR saw brief fluctuations due to occasional funding needs for foreign exchange settlement and seasonal liquidity demand, it mostly traded below 4% (Chart 4.6). On the

[24] See Chapter 2.2 for the development of offshore and onshore renminbi exchange rates.

other hand, the three-month CNH HIBORs remained relatively steady and hovered around 3% throughout the review period.

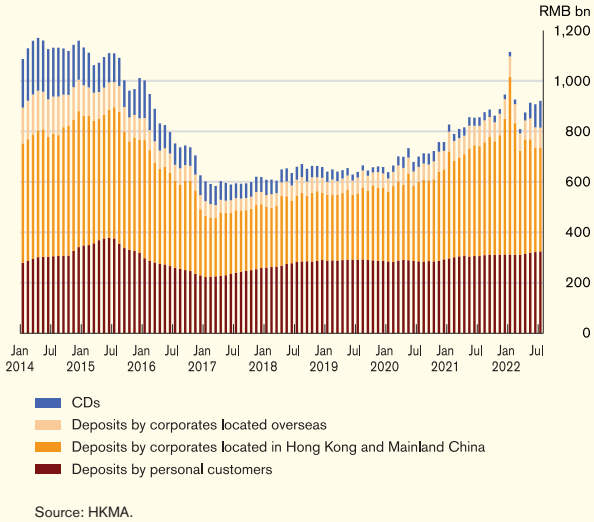
Chart 4.6
The overnight and the three-month CNH HIBOR fixings



Source: CEIC.

Hong Kong's CNH liquidity pool consolidated during the review period. In the year to end-July, total outstanding renminbi customer deposits and certificates of deposit (CDs) decreased by 2.6% to RMB919.9 billion (Chart 4.7 and Table 4.A). Largely driven by fund flows of corporates, renminbi customer deposits fell by 12.2%. On the other hand, outstanding CDs expanded by 494.0% along with the rise in renminbi CD issuance during the same period.

Chart 4.7
Renminbi deposits and CDs in Hong Kong



Source: HKMA.

Table 4.A
Offshore renminbi banking statistics

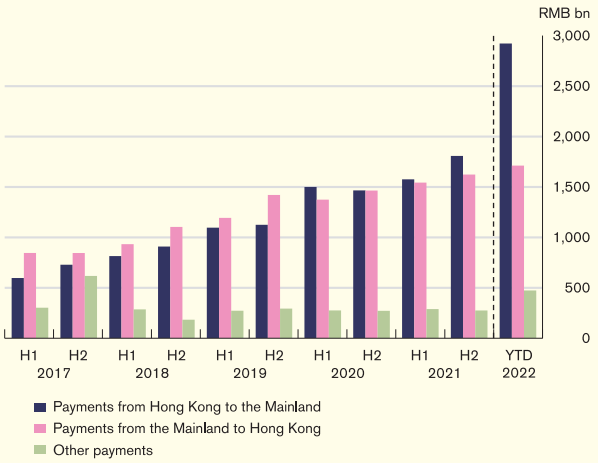
	Dec 2021	Jul 2022
Renminbi deposits & CDs (RMB bn)	944.7	919.9
Of which:		
Renminbi deposits (RMB bn)	926.8	813.7
Share of renminbi deposits in total deposits (%)	7.5	6.2
Renminbi CDs (RMB bn)	17.9	106.2
Renminbi outstanding loans (RMB bn)	163.6	172.5
Number of participating banks in Hong Kong's renminbi clearing platform	212	211
Amount due to overseas banks (RMB bn)	102.9	117.4
Amount due from overseas banks (RMB bn)	100.4	130.0
	Jan – Jul 2022	
Renminbi trade settlement in Hong Kong (RMB bn)	5,090.0	
Of which:		
Inward remittances to Hong Kong (RMB bn)	1,705.9	
Outward remittances to Mainland China (RMB bn)	2,913.8	
Turnover in Hong Kong's RMB real time gross settlement (RTGS) system (Daily average during the period; RMB bn)	1,669.5	

Source: HKMA.

Despite the consolidation in the renminbi liquidity pool, other aspects of the CNH banking business continued to grow. The outstanding amount of renminbi loans grew by 5.4% in the first seven months of 2022. Hong Kong's renminbi trade settlement also continued to pick up. Transactions handled by banks in Hong Kong amounted to RMB5,090.0 billion in the first seven months of 2022 (Chart 4.8), up by 26.6% compared with RMB4,020.0 billion during the same period last year. The renminbi liquidity pool in Hong Kong continued to support a large

amount of renminbi payments and financing transactions. During the first seven months of 2022, the average daily turnover of the renminbi RTGS system stayed high at RMB1,669.5 billion, compared with RMB1,531.2 billion in the same period in 2021.

Chart 4.8
Flows of renminbi trade settlement payments



Source: HKMA.

Going forward, the enhanced Currency Swap Agreement with the PBoC, as well as the enhancement to the HKMA's renminbi liquidity facility, will further support and deepen Hong Kong's renminbi liquidity pool. At the same time, the continuous enhancement to the mutual market access schemes with the Mainland, including the recently announced Swap Connect, the two-way Stock, Bond, and Cross-boundary Wealth Management Connects, and the planned modernisation of the CMU into a major international central securities depository (ICSD) in Asia, will provide a convenient and secure channel for overseas investors to trade renminbi assets through a connection between infrastructure institutions in the two centres. With these initiatives, Hong Kong stands ready to capture opportunities brought by the continuing liberalisation of Mainland's capital account and the deepening regional economic and financial co-operation under the Belt and Road and the Guangdong-Hong Kong-Macao Greater Bay Area initiatives.

Asset markets

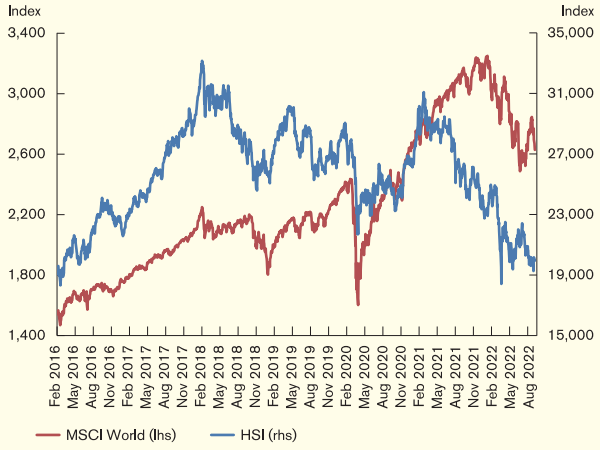
Along with the decline in global equity markets, the Hong Kong equity market dropped to a six-year low in March 2022 and remained volatile throughout the review period amid lingering threats of the pandemic, front-loaded monetary tightening in the US, and impacts of the Russia-Ukraine conflict on the global economy. Despite the volatile market condition, the Hong Kong dollar and offshore renminbi debt markets in Hong Kong continued to expand in the first half of 2022. After experiencing some stabilisation in the second quarter, the residential property market softened recently as market sentiment turned cautious amid rising interest rates.

4.3 Equity market

Along with the decline in global equity markets, the Hong Kong equity market plummeted in March 2022 and reached a six-year low of 18,415 points on 15 March (Chart 4.9). Major and local equity markets remained volatile throughout the review period amid lingering threats of the pandemic, front-loaded monetary tightening in the US, and impacts of the Russia-Ukraine conflict on the global economy. The option-implied volatilities of the S&P 500 Index and the Hang Seng index both moved to a high level relative to the average level during the past ten years (Chart 4.10). Reflecting investors' willingness to pay for downside protection, the SKEW index rose and reached its recent peak in April 2022, before trending down afterwards.[25]

Overall, the Hang Sang Index dropped by 12.1% from the end of February to the end of August 2022, while the MSCI World Index recorded a 11.8% decline in the same period.

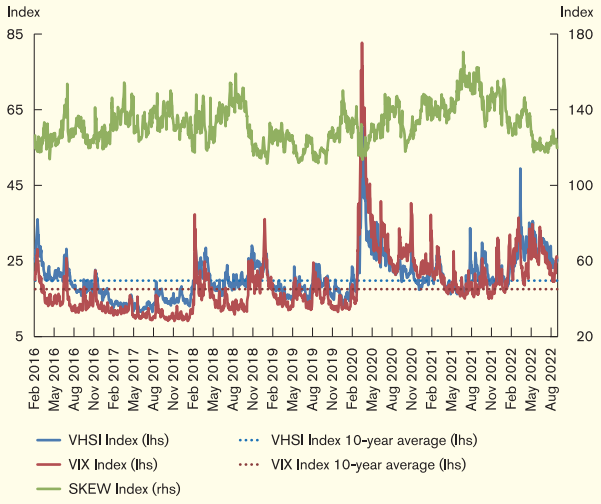
Chart 4.9
The Hang Seng Index and the MSCI World Index



Source: Bloomberg.

[25] The SKEW Index is calculated by the Chicago Board Options Exchange from the prices of the S&P 500 out-of-the-money options. An index value of 100 means that the probability of outlier negative returns on a 30-day horizon is negligible. As the SKEW Index rises above 100, the left tail of the S&P 500 returns distribution acquires more weight, suggesting that the probability of outlier negative returns has become more significant. For details, see https://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew.

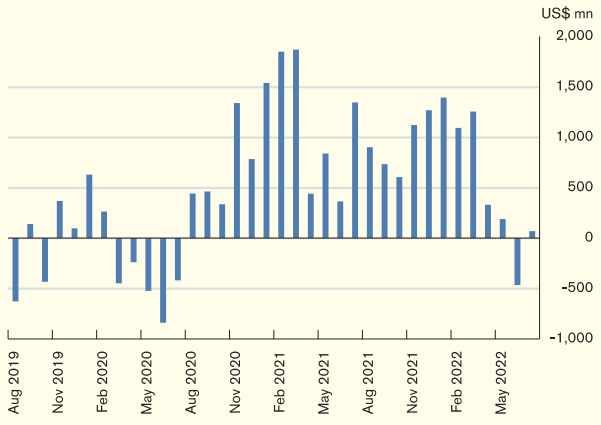
Chart 4.10
Option-implied volatilities of the Hang Seng Index and the S&P 500 Index, and the SKEW Index



Source: Bloomberg.

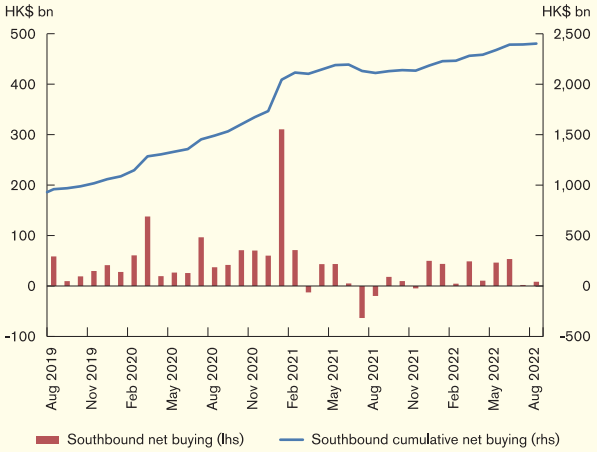
The volatility in the local equity market was accompanied by a slowdown in net inflows through the equity market funds (Chart 4.11), with the amount of inflows totaled US$2,469.7 million between February and July 2022. Meanwhile, buying interest through the southbound Stock Connects stayed relatively stable, and registered a net inflow of HK$169.6 billion between the end of February and the end of August 2022. During the review period, the cumulative net buying amount increased by 7.6% to HK$2,402.6 billion (Chart 4.12).

Chart 4.11
Equity market fund flows into Hong Kong



Source: EPFR Global.

Chart 4.12
Net buying through southbound Stock Connect over time

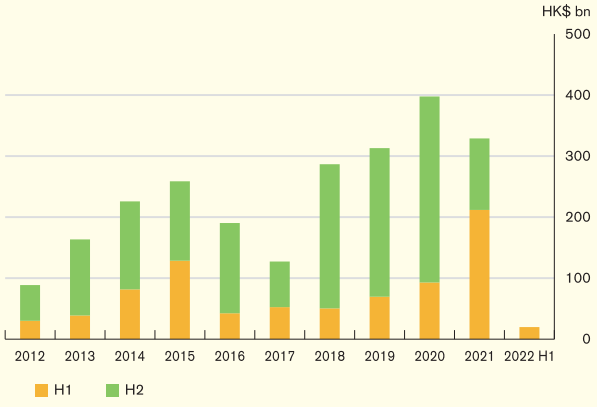


Note: Southbound net buying is the sum of such buying on the Shanghai-Hong Kong Stock Connect and the Shenzhen-Hong Kong Stock Connect.

Sources: CEIC and HKMA staff estimates.

The uncertainties surrounding the geopolitical and global macro-economic environments have also slowed down primary market activities worldwide. In Hong Kong, the amount raised through IPO in the first half of 2022 dropped by 90.7% compared with the first half of 2021, mainly reflecting the base effect due to the strong IPO activities recorded in the first half of 2021 (Chart 4.13). Nevertheless, the demand for listing in Hong Kong has not slowed, with the Stock Exchange of Hong Kong processing 189 listing applications as at the end of June 2022.

Chart 4.13
Initial public offering market in Hong Kong

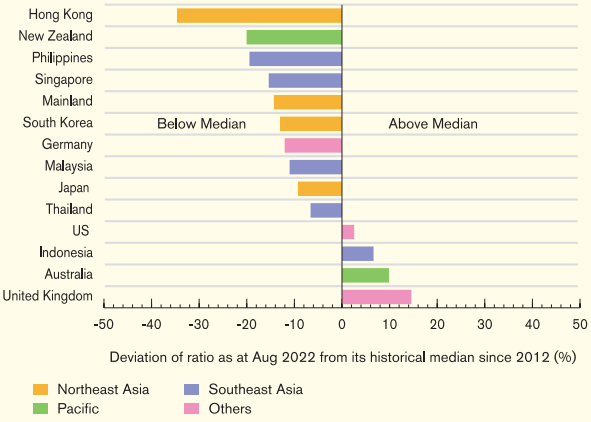


Source: HKEX.

The outlook for the local equity market is subject to headwinds in the external environment. Lingering geopolitical tensions, concerns over global economic growth slowdown and inflationary pressure as well as the tightening monetary policies of major central banks may hurt the long-term prospects of corporates' earnings. Persistent strength of the US dollar, which has stayed at a high level after reaching a 20-year high in July 2022, could add further pressure on the debt-servicing burdens of corporates with large US dollar debt. On the domestic front, uncertainties over the epidemic situation in Hong Kong remains one risk factor going forward.

On a positive note, monetary and fiscal policy support to the Mainland economy, and the inclusion of eligible exchange-traded funds (ETFs) in the Stock Connect scheme since 4 July 2022 may improve the Hong Kong equity market sentiment. The more favourable valuation of the Hong Kong equity market compared to both historical levels and major equity markets, as reflected by a lower cyclically-adjusted price-to-earnings ratio, may help lessen the impact of future headwinds to some extent (Chart 4.14).

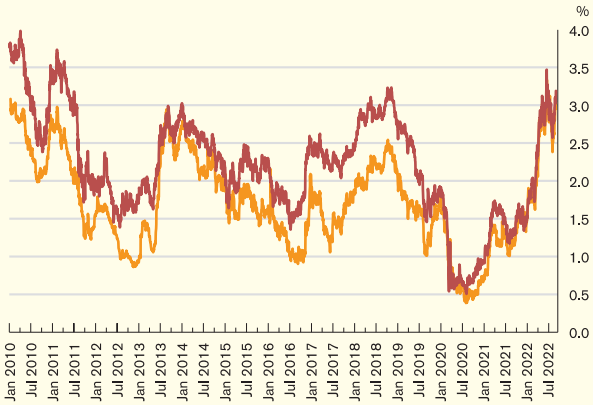
Chart 4.14
Cyclically-adjusted price-earnings ratios of Asia Pacific and other major markets



4.4 Debt market

The Hong Kong dollar debt market grew mildly in the first half of 2022 amid surges in bond yields. The interest rate hikes in the US in light of the inflationary pressure sent the US 10-year Treasury yield to an 11-year high on 14 June 2022. The US Treasury yield continued to hover around the recent high level as inflationary pressure persisted while concerns over US economic growth slowdown emerged. In tandem with the movements in the US 10-year Treasury yield, the yield of the Hong Kong dollar 10-year Government Bond rose to an all-time high of 3.34% on 15 June 2022 and remained volatile afterwards (Chart 4.15).

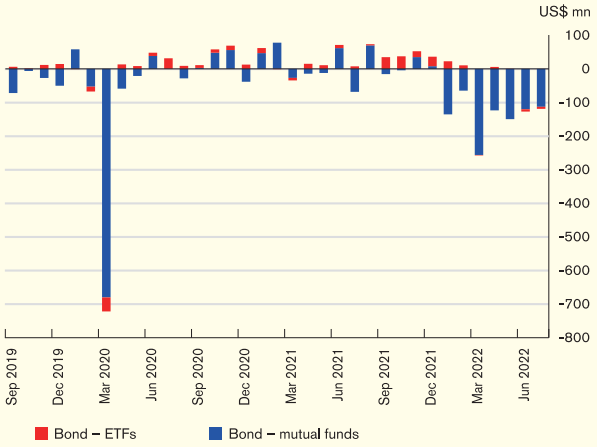
Chart 4.15
10-year Hong Kong Government Bond and US Treasury yield



Note: Daily figures of the Hong Kong 10-year Government Bond yield under the Institutional Bond issuance program is available since 11 January 2010.
Sources: Bloomberg and HKMA.

The bond yields rose along with net bond fund outflows from Hong Kong. Between February and July 2022, bond funds as a whole registered a net outflow of US$825.3 million from Hong Kong (Chart 4.16), driven by outflows of bond mutual funds.

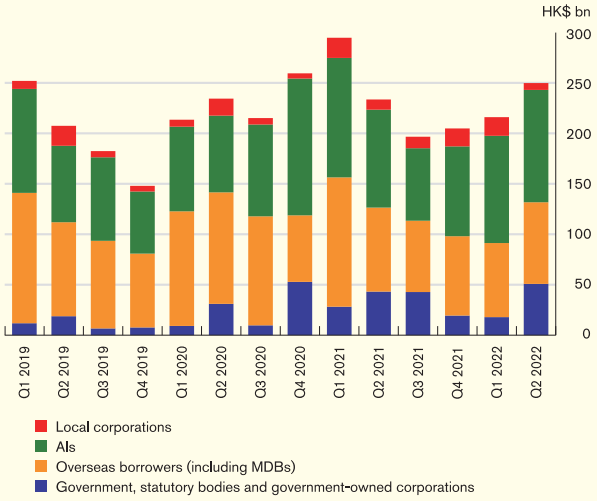
Chart 4.16
Flows of bond ETFs and mutual funds into Hong Kong



Source: EPFR Global.

The total issuance of Hong Kong dollar debt in the first half of 2022 increased by 8.4% year-on-year to HK$2,352.6 billion, contributed mainly by the 14.9% rise in the issuance of EFBNs. For non-EFBNs, bonds issued by government and statutory bodies, which include the HK$20 billion inaugural retail green bond of the Hong Kong Government issued on 18 May 2022, stayed relatively stable at HK$68.7 billion during the first half (Chart 4.17). The Hong Kong dollar debts issued by AIs and local corporations also remained steady while the issuance by overseas borrowers dropped noticeably in the first half of 2022, compared with the same period last year.

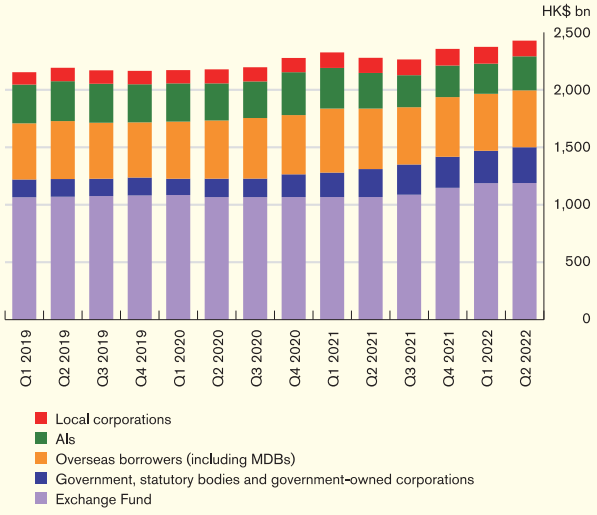
Chart 4.17
New issuance of non-EFBN Hong Kong dollar debt



Sources: HKMA staff estimates based on data from Bloomberg, CMU, Dealogic and Reuters.

At the end of June 2022, the outstanding Hong Kong dollar debt grew by 6.5% year-on-year to HK$2,428.6 billion (Chart 4.18). The amount was equivalent to 29.5% of Hong Kong dollar M3, and to 24.1% of the Hong Kong dollar-denominated assets of the banking sector. Within the government sector, the outstanding non-EFBN debt increased by 27.9% year-on-year to HK$311.2 billion, while the outstanding EFBN debt increased by 11.4% to HK$1,190.4 billion.

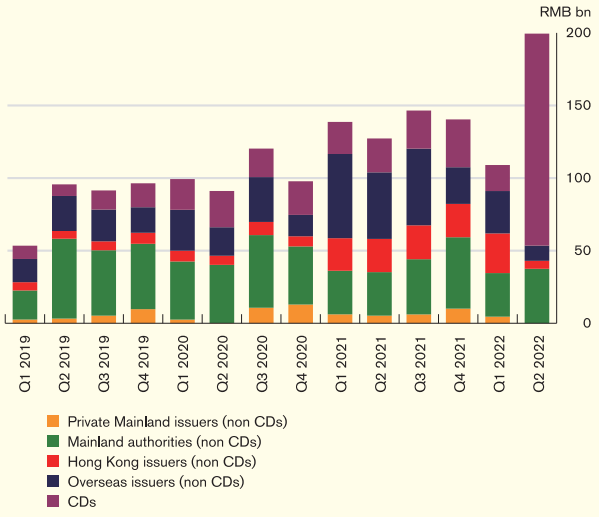
Chart 4.18
Outstanding Hong Kong dollar debt by issuer



Sources: HKMA staff estimates based on data from Bloomberg, CMU, Dealogic and Reuters.

The CNH debt market in Hong Kong continued to expand in the first half of 2022. New issuance increased by 16.4% year-on-year to RMB 309.5 billion in the first half of 2022 (Chart 4.19). The growth was mainly driven by a surge in CDs issuance in the second quarter of 2022, which increased by five times to RMB 146.0 billion compared with the second quarter of 2021. The increase in CDs issuance offset the noticeable slowdown in non-CDs issued by private issuers during the same quarter. Meanwhile, non-CDs issued by the Mainland authorities increased by 12.5% year-on-year to RMB 67.5 billion in the first half of 2022.

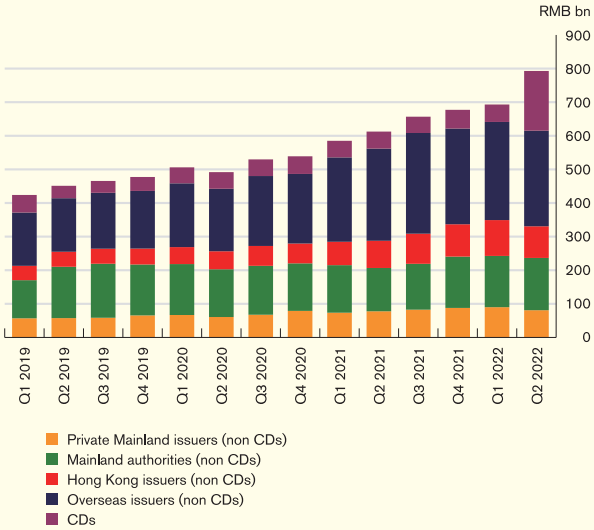
Chart 4.19
New issuance of CNH debt securities in Hong Kong



Sources: HKMA staff estimates based on data from Bloomberg, CMU, Dealogic and Reuters.

As a result, total outstanding CNH debt securities recorded a 29.4% year-on-year growth and reached RMB 792.8 billion at the end of June 2022 (Chart 4.20).

Chart 4.20
Outstanding CNH debt in Hong Kong



Sources: HKMA staff estimates based on data from Bloomberg, CMU, Dealogic and Reuters.

Looking ahead, the debt market in Hong Kong will be subject to a number of challenges. Sharp interest rate hikes by major central banks and concerns over global economic growth slowdown could make corporates more cautious in raising debt. Meanwhile, downward pressure on the Mainland economy, volatility in the CNH exchange rate and lingering risks of rising bond defaults may cast uncertainties over the outlook for the CNH debt market, even though the monetary and fiscal policy support to the Mainland economy could help lift market sentiment.

During the review period, policy initiatives were introduced to foster the development of Hong Kong's bond market. In particular, the Financial Secretary announced in the 2022-23 Budget plans to develop the CMU into a major international central securities depository in Asia. The development includes the HKMA's three-year enhancement programme plan to upgrade the CMU system and services, which will help strengthen Hong Kong's position as a bond hub.[26]

[26] For details, please refer to the inSight articles "Developing the CMU to reinforce Hong Kong's status as an IFC" on 13 June 2022 and "New Impetus for Hong Kong Offshore Renminbi Business" on 4 July 2022.

In addition, the recent successful debut of the Government's retail green bond has broadened the variety of green financial products in Hong Kong, reinforcing Hong Kong's position as a premier green finance hub. The vibrant development of Hong Kong's bond market will help maintain Hong Kong's leading position as an international financial centre.

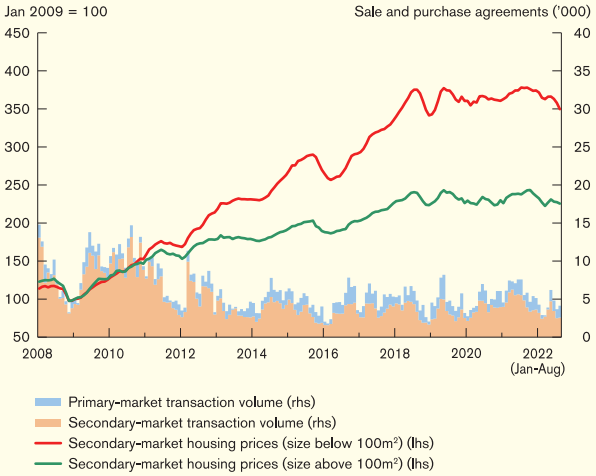
4.5 Property markets

Residential property market

The residential property market stabilised in the second quarter following a moderation in the first quarter. As the fifth wave of the local epidemic receded, flat viewing and transaction activities bounced back alongside improving market sentiment and pent-up demand. Property developers also resumed the launch of new projects with competitive pricing strategies to boost sales. As a result, the average monthly transactions picked up to 4,975 units in the second quarter from a low of 3,352 units in the first quarter (Chart 4.21). More recently, market sentiment again turned cautious amid concerns over rising interest rates, and average monthly housing transactions fell back to 3,904 units in July–August.

Secondary-market housing prices edged up by 0.2% in the second quarter following a 3.2% decline in the first quarter. Analysed by size, prices of large flats (with a saleable area of at least 100m^2) increased faster than that of small and medium-sized flats (with a saleable area of less than 100m^2), partly reflecting local families' upgrading demand (Chart 4.21). More timely market data indicated that flat prices softened again in July and August.

Chart 4.21
Residential property prices and transaction volumes



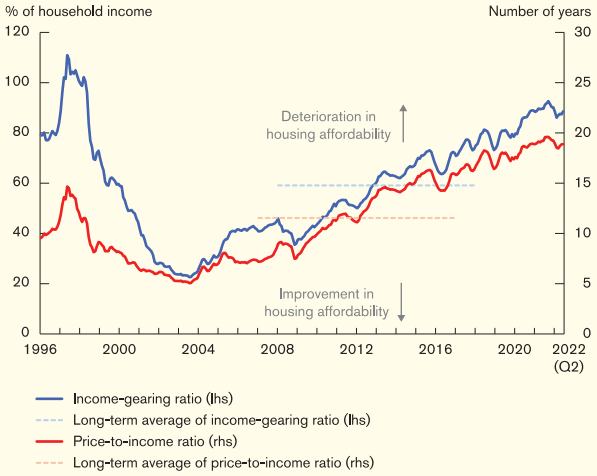
Sources: R&VD and Land Registry.

Housing affordability remained stretched, despite improving somewhat during the first half of the year. Compared to the final quarter of 2021, the housing price-to-income ratio eased to a still-high level of 18.8 in the second quarter of 2022, which was still higher than the peak value of about 15 in 1997. The income-gearing ratio also retreated to 87.9, but still remained well above the long-term average (Chart 4.22).[27] On the other hand, housing rentals zigzagged upwards by 1.4% during May–August (Chart 4.23) after declining by about 4% in the seven months through April.[28] Residential rental yields stayed low at 2.0–2.5% in July.

[27] The price-to-income ratio measures the average price of a typical 50m^2 flat relative to the median income of households living in private housing. Alternately, the income-gearing ratio compares mortgage payment for a typical 50m^2 flat (under a 20-year mortgage scheme with a 70% loan-to-value ratio (LTV) ratio) to the median income of households living in private housing. The income-gearing ratio is not the same as a borrower's actual debt-servicing ratio, which is subject to a maximum cap under HKMA prudential measures.

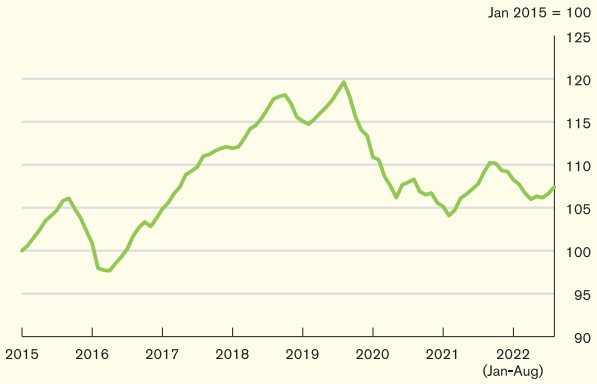
[28] Market information suggests that the leasing market was partly supported by demand from Mainland students.

Chart 4.22
Indicators of housing affordability



Sources: R&VD, C&SD and HKMA staff estimates.

Chart 4.23
Residential property rental index



Source: R&VD.

With an uptick in the one-month HIBOR, local mortgage interest rates have picked up since June, adding to the repayment burden on borrowers (see also section 4.2). In response to the higher costs of liquidity, some banks also raised the cap on their HIBOR-based mortgage rates in recent months and their Best Lending Rates in September. The public should carefully assess and manage the relevant risks when buying property, arranging mortgages or making other relevant decisions. [29] However, the macro-prudential measures implemented by the HKMA since 2009 have helped contain household leverage and strengthen banks' risk management for mortgage loans, thereby improving their resilience to interest rate and property market shocks. The average loan-to-value (LTV) ratio for new mortgages was about 56% in July 2022, still below the prevailing ratio of 64% before the measures were first introduced. The debt-servicing ratio (DSR) also stayed at a low level of around 37%, and borrowers are stress-tested to ensure their ability to withstand rising interest rates.[30] In addition, over half of the private housing units did not have any outstanding mortgages at the end of 2021.[31] Box 3 explores the use of machine learning techniques to predict credit deterioration in RMLs in view of the upward pressures on mortgage rates.

The residential property market outlook is subject to a number of uncertainties and risks as discussed in the previous chapters. In particular, a prolonged local epidemic, coupled with higher mortgage interest rates, could suppress housing demand, while concerns about the global economic prospects and the uncertainty over the pace of US rate hikes will continue to cloud housing market sentiment. Over the longer

[29] The HKMA has also reminded homebuyers to be aware of property price or interest rate adjustment risks when buying first-hand, incomplete flats via stage payment schemes. In particular, when these buyers arrange mortgage later on, they may face more conservative property valuations or may not pass the stress test amid rising interest rates.

[30] Taking into account the prevailing interest rate environment, the trend of mortgage rates and their long-term historical average, the HKMA considers it appropriate to lower the interest rate stress testing requirement for property mortgage lending from 300 basis points to 200 basis points, with immediate effect on 23 September 2022. This level is considered to be sufficiently prudent from the perspective of effective risk management of the banks' property lending business. For more details, see the press release "Property Mortgage Lending" issued by the HKMA on 23 September 2022.

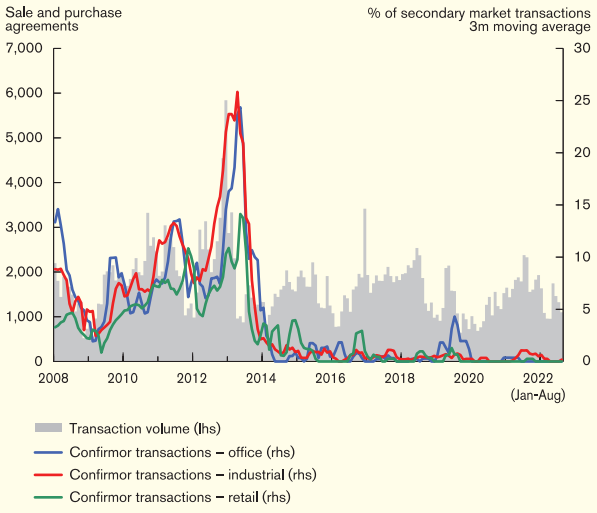
[31] See "Box 4: Using transactional big data to monitor Hong Kong's residential mortgage loans offered by non-bank institutions", *HKMA Half-yearly Monetary and Financial Stability Report*, March 2022. The 2021 Population Census data also show that 66% of owner-occupier households did not have any mortgage.

term, the outlook for the housing market will depend on the supply-demand gap. The Government projects that private housing supply will remain high in the coming years.[32]

Non-residential property market

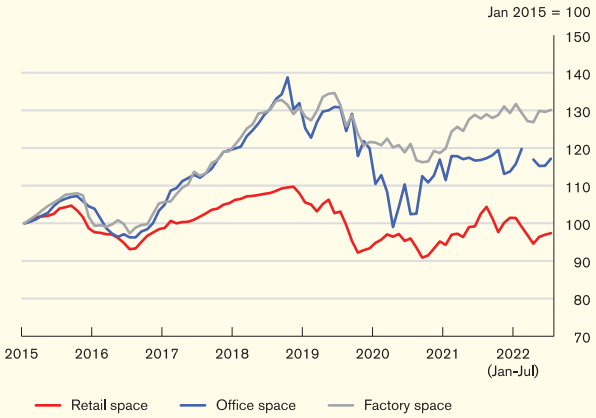
Amid the fifth wave of the local epidemic and the resultant restrictive measures, the non-residential property market consolidated in the first half of the year. Average monthly transactions declined to about 1,300 units during the period, while speculative activities remained muted (Chart 4.24). The price of retail premises softened again amid a challenging business environment, while the price of office spaces and flatted factories zigzagged sideways (Chart 4.25). In the leasing market, rentals of commercial properties remained soft (Chart 4.26). Rental yields across the segments stayed low at 2.5–2.9% in July.

Chart 4.24
Transactions in non-residential properties



Sources: Land Registry and Centaline Property Agency Limited.

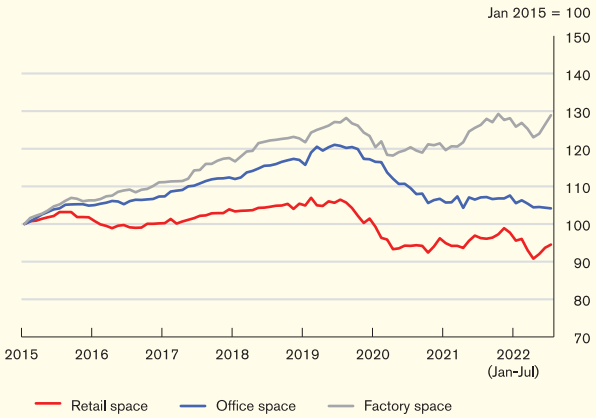
Chart 4.25
Non-residential property price indices



Note: The price index of office space cannot be compiled in March 2022 due to insufficient transactions for analysis.

Source: R&VD.

Chart 4.26
Non-residential property rental indices



Source: R&VD.

The outlook for the non-residential property market remains challenging in the near term. For example, while the disbursement of the government's consumption vouchers should stimulate local consumption and thereby provide some support to the retail segment, subdued inbound tourism continues to be a drag. The rental and capital values of office spaces may remain under pressure due to the high vacancy rate and more new supply in the upcoming years.

[32] Total private supply of first-hand flats in the coming three to four years will remain at a high level of 98,000 units as estimated by the Housing Bureau at end-June 2022. To expedite land and housing supply, the Government also set up the "Steering Committee on Land and Housing Supply" and the "Task Force on Public Housing Projects" in July 2022 with the aim of streamlining development-related procedures and unleashing the development potential of land.

Box 3
Using data science to assess banks' mortgage credit risks

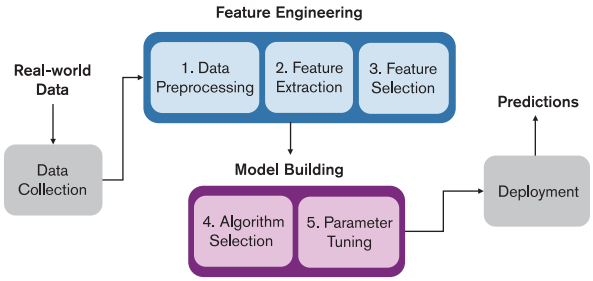
Introduction

In Hong Kong, RML is a significant area of loan exposure for banks and borrowers, accounting for 24% of the loans for use in Hong Kong and 70% of local household debts as of June 2022. While the residential mortgage delinquency ratio has remained at a very low level of around 0.01% to 0.05% following several rounds of macroprudential measures implemented by the HKMA since 2009, it is still imperative for regulators to closely monitor the credit risks of RMLs, particularly in view of the upward pressures on mortgage rates amid the aggressive rate hike by the Fed. Against this background, this box explores the use of machine learning techniques to predict credit deterioration in RMLs to facilitate risk monitoring.

Data and Methodology

The HKMA initiated the Granular Data Reporting (GDR) programme in April 2019, under which participating AIs are required to report transaction-level RML data to the HKMA on a monthly basis. The programme was introduced in phases, and in July 2020 all the AIs covered by the HKMA's residential mortgage survey started reporting the transaction-level records of all their outstanding RMLs[33]. As of May 2022, the GDR dataset contained over 598,000 outstanding RMLs associated with around 678,000 borrowers. The dataset is highly granular with each reported RML carrying around 200 unique data fields.

Chart B3.1
Typical machine learning pipeline



Source: Elshawi et al. (2019).

We explore the use of machine learning techniques to build a model with the GDR dataset for predicting the technical delinquency of RMLs, which are identified to be overdue for more than 90 days using the information reported in the GDR dataset[34]. It should also be noted that the GDR dataset currently does not contain any information on principal moratorium. Hence, the technically delinquent loans identified using the GDR dataset may include those that are under the principal moratorium plan offered by AIs to help relieve borrowers' cash-flow pressure during the COVID-19 outbreak[35]. Building a high-quality machine learning model requires informed decisions to be made by researchers at each step of a typical machine learning pipeline outlined in Chart B3.1[36]. In particular, as no single machine learning method can perform best on all types of data and that the performance of

[33] The RMLs of the AIs covered in the GDR programme and the residential mortgage survey represent about 99% of all the RMLs in the banking sector.

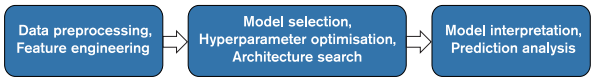
[34] We identify the technically delinquent RMLs by using the data field "number of days in arrears". For RMLs with missing information in this data field, we use their "beginning outstanding amount" and "closing outstanding amount" to infer whether the loan has been overdue for three consecutive months.

[35] For details on principal moratorium, see HKMA's press release "The HKMA and the banking sector join forces to help Hong Kong's economy overcome the outbreak of COVID-19" published on 3 April 2020, https://www.hkma.gov.hk/eng/news-and-media/press-releases/2020/04/20200403-4/.

[36] Elshawi R, Maher M, Sakr S (2019). "Automated Machine Learning: State-of-the-art and Open Challenges", *arXiv.org*, 1906.02287.

some methods rely heavily on hyperparameter tuning, researchers in applied machine learning are generally challenged with the need to select among a wide range of algorithms and to tune the hyperparameters of the selected model[37]. To tackle these challenges, this study uses a state-of-the-art approach, namely automated machine learning (AutoML), under which the process of algorithm selection and hyperparameter tuning would be automated. Depending on the choice of tools, a common AutoML pipeline would involve automating the three stages as illustrated in Chart B3.2, with each stage being optimised iteratively to obtain the best outcome[38&39].

Chart B3.2
Common AutoML pipeline



Source: Truong et al. (2019).

Regarding the data input, we use the GDR data reported during the period from July 2020 to May 2022. As with any other big data, the GDR data, especially those that were reported in the initial stage of the programme, do not come with perfect quality. Instead of relying completely on AutoML, we preprocess the data and perform some parts of the feature engineering steps by leveraging our domain knowledge in RML and the GDR dataset. First, we drop the data fields that either contain missing information for most of the RML transactions or cannot be imputed with a meaningful representation. Secondly, we impute the missing values or create new variables by combining the incomplete information reported in different but related data fields. After these data preparation steps, we are left with 37 variables which contain information on loan characteristics, the borrowers and the mortgaged properties. We also supplement the transaction-level information with some macroeconomic indicators. The explanatory variables used in our prediction model are listed in Table B3.1.

Table B3.1
List of explanatory variables in the prediction model

	Category	Data field/variable
GDR	Borrower information	DSR at origination, Employment status, Fixed income proportion*, Hong Kong connection*, Individual/corporate borrower*, Martial status, Mega corporate indicator, Number of borrowers/ guarantors*, Total monthly income*, Year of birth
	Loan characteristics	Approval basis, Closing outstanding amount, Co-financing indicator, Equitable mortgage indicator, Interest rate cap: reference rate, Interest rate type, Loan amount at origination (HKD equivalent), Latest updated LTV, LTV ratio at origination, Mortgage Insurance Programme (MIP) indicator*, Number of collateral*, Payment frequency, Reference rate, Remaining tenor, Staff loan indicator, Tenor at origination, Guarantee*, Other collateral*, Type of financing, Mortgage cash rebate
	Property characteristics	Car parking space, Collateral value, Intention of use, Original collateral (property) value, Rented out on origination date, Saleable area, Type of building
	Housing market indicators	Centaline leading index, Centa-salesman index, Centa-valuation index, Completions of private domestic, Midland 35 Estate Transactions, Property market sentiment index, R&VD residental property prices, R&VD residental property rentals, Ricacorp flat viewing appointment, Sales transactions of private domestic
	Macro-financial indicators	1-month HIBOR, Effective mortgage rate, Hang Seng Index, Hong Kong economic policy uncertainty index, HSI volatility index, Inflation rate, Median household income, PMI, Prime rate, Retail sales value and volume, Turnover value of Hong Kong stocks, Unemployment rate

Note: Data fields marked with * are created by combing information reported in different but related data fields.

To enable the machine to learn in a supervised way, we assign the label "delinquent" or "healthy" to each RML transaction based on whether it was delinquent three months following the reporting position date. After identifying all the technically delinquent RMLs, we randomly draw a subset of the healthy loans from the GDR dataset. The number of healthy loans drawn is four times that of the technically delinquent RMLs. This under-sampling step aims to address the imbalance between the two classes of loans in order to ensure that our model is able to capture the characteristics of the delinquent

[37] Feurer, M., Klein, A., Eggensperger, K., Springenberg, J., Blum, M., & Hutter, F. (2015). "Efficient and robust automated machine learning", In *Advances in neural information processing systems* (pp. 2962-2970).

[38] Truong, A., Walters, A., Goodsitt, J., Hines, K., Bruss, C. B., Farivar, R. (2019). "Towards Automated Machine Learning: Evaluation and Comparison of AutoML Approaches and Tools", *arXiv.org*, 1908.05557.

[39] Examples of AutoML tools include DataRobot, H2O AutoML, Auto-keras, Auto-Weka, Azure ML and Auto-sklearn.

loans. Overall, we include 56,212 unique RMLs with around 847,000 records spanning the entire sampling period. To ensure the trained model can perform well on unseen data, these sampled transactions are split into two groups, with 80% of the unique RMLs being used as the training set and the remaining as the testing set.

With the data ready, we initiate the AutoML pipeline under which the training set are used to train over 100 models using a pre-defined set of algorithms with each carrying a list of hyperparameters to be searched over[40]. The performance of each trained model is evaluated automatically using the testing data. Leveraging the computing power of the in-house Data Science Lab, the entire AutoML process can be completed in around 600 minutes.

Empirical results

Different evaluation metrics are generated to compare the performance of all the trained models. Given that the aim of our model is to tackle a binary classification problem (i.e. predicting whether an RML would become delinquent in three-month's time), the evaluation metric called the area under the curve of receiver operating characteristic (AUC) can be used to select the best model. Table B3.2 shows the evaluation metrics of the best trained model for each category based on AUC. As shown in the table, the best model is one of the stacked ensemble models which carries an AUC of 0.9388. According to the literature benchmark, the performance of this model can be considered as excellent[41].

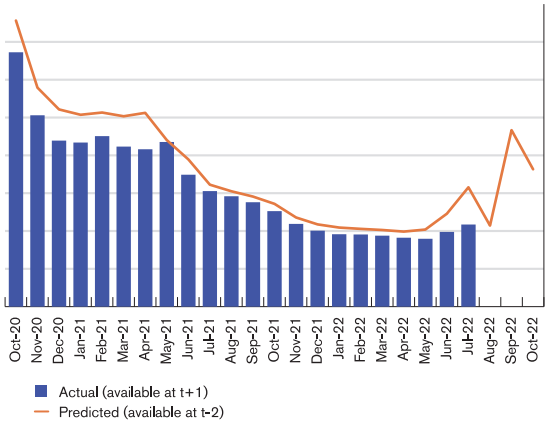
This selected model can be deployed to offer timely insights on the trend of credit risk in AIs' RMLs. Chart B3.3 compares the model predictions with the actual number of technical delinquency identified using the GDR data. As can be seen in the chart, the selected model performs fairly well in predicting the total number of technical delinquency with a three-month lead time. Amid the deteriorated economic condition caused by the fifth wave COVID-19 infections and the upward pressures on mortgage rates, the selected model predicts that the number of technical delinquency may increase but will still remain at a relatively low level.

Table B3.2
Key evaluation metrics of the best trained model for each category

Model Types	AUC	Precision-recall AUC
Deep neural network	0.8980	0.5785
Distributed random forest	0.9116	0.7123
Gradient boosting machine (GBM)	0.9322	0.7563
Generalised linear model	0.8184	0.4182
Stacked Ensemble Type 1	**0.9388**	**0.7837**
Stacked Ensemble Type 2	0.9373	0.7697
XGBoost GBM	0.9325	0.7587

Source: HKMA staff estimates.

Chart B3.3
Comparing model predictions with actual number of technical delinquency



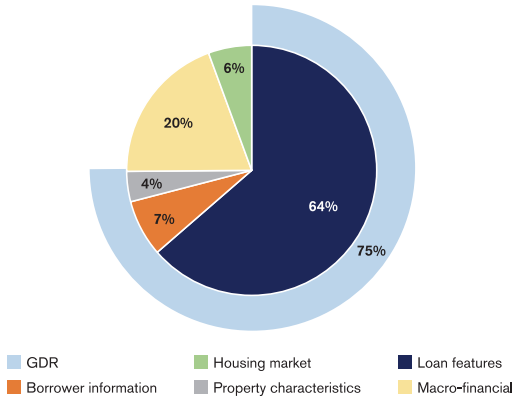
Source: HKMA staff estimates.

[40] Throughout the AutoML process, 100 base models are trained using five-fold cross validation and a number of machine learning algorithms, including distributed random forest, generalised linear model, gradient boosting machine (GBM), XGBoost GBM, and deep neural network. Several stacked ensemble models are also trained based on a subset of the 100 base models.

[41] In theory, a perfect model has an AUC of one. The literature suggested that a model with an AUC of 0.9 and 0.8 could respectively be considered as an excellent and a good model. For details, see Hosmer Jr, D. W., Lemeshow, S., Sturdivant, R. X. (2013). *Applied Logistic Regression* 398. John Wiley & Sons.

We also try to identify through reverse engineering the factors that are most influential to our model predictions. Our selected model highlights that 75% of the information used for predicting delinquency is provided by the GDR dataset (Chart B3.4). Among all the GDR variables, loan characteristics, such as LTV ratio, tenor and the outstanding amount of an RML are considered as important drivers. Other influential GDR variables highlighted by our model include DSR and borrower's employment and income information. As for the macro-financial data, effective interest rate is found to be the most important factor. Our finding is in line with a similar study conducted by the Bank of England in 2019[42]. Furthermore, by highlighting LTV ratio and DSR as part of the key drivers that could render a loan vulnerable to delinquency, our finding confirms that the HKMA's macro-prudential measures could help contain credit risks by setting limits on these ratios.

Chart B3.4
Importance of input variables grouped by category



Notes:
1. Variable importance is measured by using variable drop-out loss, which refers to the drop in model performance when a variable is removed from the model training process. A higher drop-out loss indicates greater importance of the variable.
2. Figures may not add up to 100% due to rounding.

Source: HKMA staff estimates.

Conclusion

To conclude, this box experiments the use of AutoML technique to develop a toolkit for facilitating risk monitoring of AIs' RML portfolio. In particular, we have trained a model capable of predicting RML technical delinquency three months ahead. Through reverse engineering, we also find that GDR data provides valuable information for predicting technical delinquency in RML, with loan features being the most important category of information.

Despite the reasonably good performance of our trained model, it is important to note that our exploratory model is not without its limitations. In particular, given the short timeframe of the GDR dataset and the imperfect data quality, our model may not be able to capture all the important contributing factors and the structural changes across different economic cycles. That said, the use of AutoML technique allows us to easily refine the model as the quality and the coverage of GDR data improve over time. The refined model can be used as a supplementary tool to provide an early warning signal to credit deterioration in RMLs.

[42] Bracke, P., Datta, A., Jungm C., Sen, S. (2019). "Machine Learning Explainability in Finance: an Application to Default Risk Analysis", *Bank of England Staff Working Paper No. 816*.

5. Banking sector performance

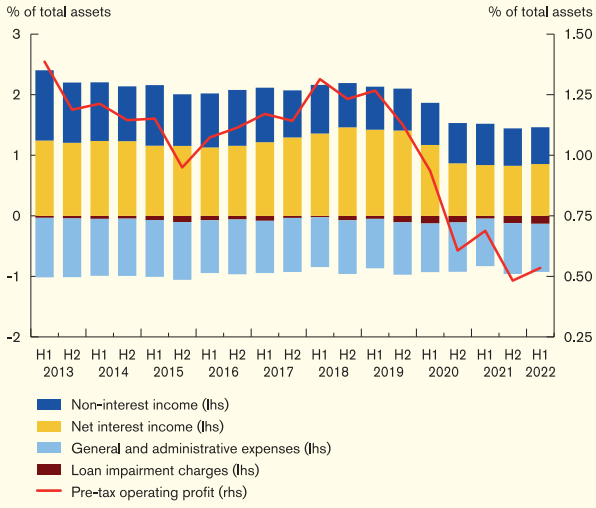
Against the background of the fifth wave of local COVID-19 infections during the first half of 2022, retail banks' profits declined along with a slight deterioration in asset quality. However, the Hong Kong banking sector remained resilient, underpinned by robust capital and liquidity positions. Reflecting upward pressure on the Hong Kong dollar interbank interest rates amid the US interest rate hikes, the Hong Kong dollar funding costs of retail banks increased, albeit remaining relatively low. In the period ahead, the heightened economic uncertainties arising from the pace and magnitude of subsequent US interest rate rises, the evolving local epidemic situation and geopolitical risks, could pose challenges to banks' credit risk management. In particular, as the debt repayment abilities of some households and corporates have been weakened since the fifth wave outbreak, banks should carefully assess the potential impacts of sharp rises in interest rates on their loan portfolios.

5.1 Profitability and capitalisation

Profitability

The aggregate pre-tax operating profit of retail banks[43] decreased by 19.5% in the first half of 2022, compared with the same period in 2021. The return on assets fell to 0.54% in the first half of 2022, compared with 0.69% in the same period in 2021 (Chart 5.1). The decline in profit was attributable to a reduction in non-interest income and a pick-up in higher loan impairment charges, which more than offset the mild increase in net interest income.

Chart 5.1
Profitability of retail banks

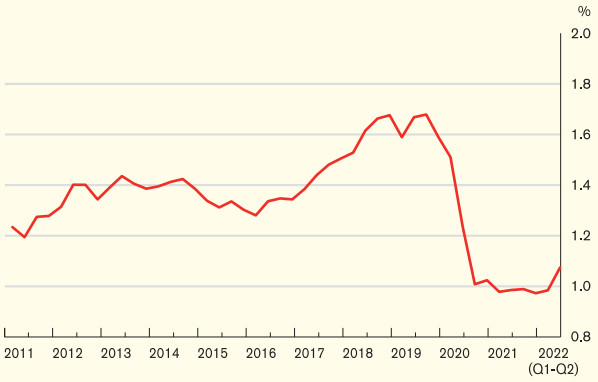


Note: Annualised semi-annual figures.
Source: HKMA.

In part reflecting the rising interest rate environment, there was a slight improvement in retail banks' net interest margins (NIMs), with their NIMs edging up to 1.03% in the first half of 2022 from 0.98% a year ago (Chart 5.2).

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

Chart 5.2
Net interest margin of retail banks

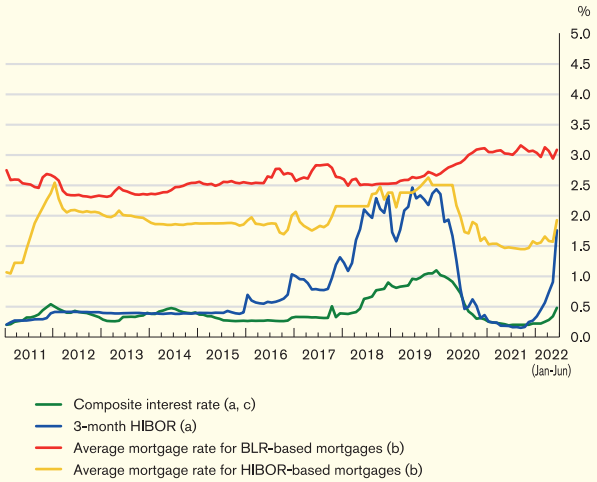


Note: Annualised quarterly figures.
Source: HKMA.

Broadly reflecting the increases in US interest rates and a sizable decline in the Hong Kong dollar interbank liquidity following the triggering of the weak-side Convertibility Undertaking (CU), the interbank funding costs in Hong Kong picked up notably in the second quarter of 2022.[44] In particular, the three-month Hong Kong Interbank Offered Rate (HIBOR) increased markedly by 120 basis points in the second quarter to 1.75% at the end of June 2022, following a mild increase of 30 basis points in the first quarter (the blue line in Chart 5.3).

On the retail front, while some retail banks have started to offer more attractive time-deposit rates to compete for longer term stable funding as HIBORs increased, the rise in the aggregate Hong Kong dollar funding costs has so far been relatively moderate. Specifically, the composite interest rate, a measure of the average Hong Kong dollar funding costs for retail banks, has increased by 26 basis points over the past six months to 0.47% at the end of June 2022 (green line in Chart 5.3).

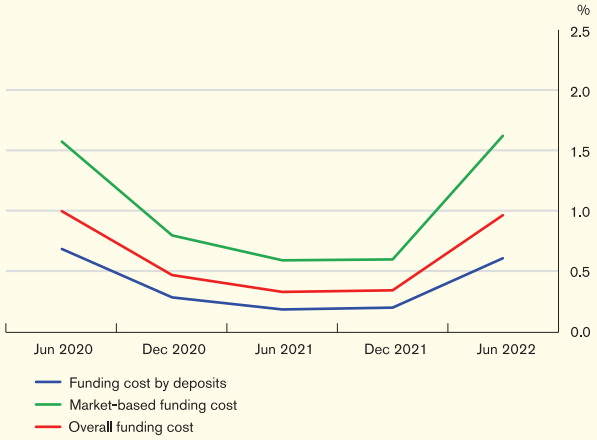
Chart 5.3
Interest rates



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, figures from June 2019 onwards are not strictly comparable with those of previous months.
Sources: HKMA and staff estimates.

More broadly, the overall Hong Kong dollar and US dollar funding costs for licensed banks in Hong Kong increased by 62 basis points during the first half of 2022 (red line in Chart 5.4).

Chart 5.4
Hong Kong dollar and US dollar funding costs of licensed banks



Note: Since June 2019, licensed banks which have not been 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 has been calculated as the weighted averages of the respective funding costs 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.

[44] The weak-side CU has been triggered multiple times since May 2022, resulting in a sizable reduction in the Aggregate Balance. For details, please refer to Chapter 4.1.

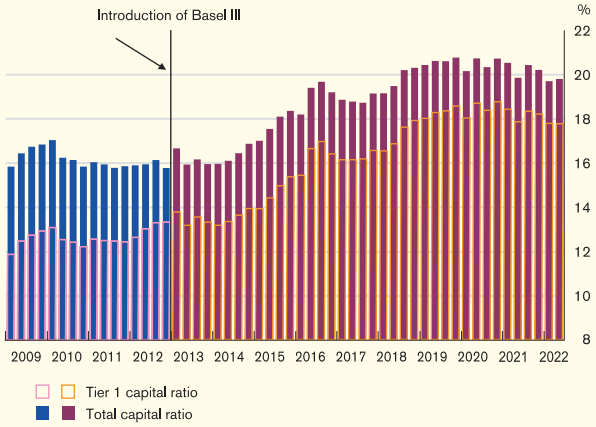
The faster rise in HIBORs than the overall funding cost of banks may represent a positive development for the margin of banks' HIBOR-based assets. However, the extent of improvement in NIMs may be partially offset by the fact that a significant portion of HIBOR-based mortgage loans has already reached their Best Lending Rate (BLR)-based cap rates.[45] Although banks have raised their BLRs since late September, the rises have so far been relatively modest. Given the pace and the size of future rises in BLR remain uncertain as it will be determined by banks' own funding cost structure and other relevant considerations, the continued rising trend in banks' funding costs may thus limit the overall improvement in NIMs.

The outlook for banks' profitability will be subject to a host of uncertainties. Externally, uncertainty surrounding the pace of monetary policy tightening in advanced economies and the lingering geopolitical risks arising from the Russia-Ukraine conflict will cloud the global growth prospect and may dampen loan demand. Domestically, while higher interest rates would benefit banks' NIM, a rapid rise in domestic interest rates amid more aggressive US interest rate hikes could pose challenges to banks' credit risk management for their loan portfolios. Should these uncertainties intensify further and lead to a notable decline in lending and worsening asset quality, it could significantly weigh on banks' profitability.

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) stood at a high level of 19.8% at the end of June 2022 (Chart 5.5), well above the international minimum requirement of 8%. The Tier 1 capital ratio was 17.7%, whereby 15.8% was contributed by Common Equity Tier 1 (CET1) capital ratio. In addition, the non-risk-based Leverage Ratio (LR)[46] of locally incorporated AIs recorded a healthy level of 7.7% at the end of June 2022, exceeding the statutory minimum of 3%.

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.

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)[47], remained sound during the review period. The average LCR of category 1 institutions rose to 154.9% in the second quarter of 2022 from 151.9% in the fourth quarter of

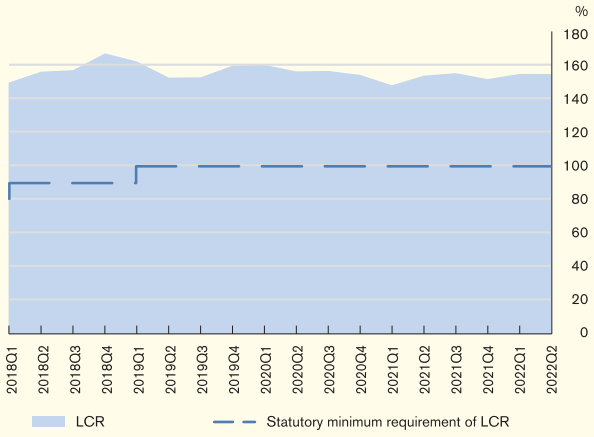
[45] HIBOR-based mortgage is usually protected by an interest rate cap linked with the BLR (often in the form of a fixed spread below the BLR). Market information showed that many retail banks have raised their BLR-based cap for new mortgage loan applications since June 2022, probably reflecting higher funding cost pressures for these banks.

[46] The Basel III non-risk-based LR requirement acts as a "backstop" to restrict the build-up of excessive leverage in the banking sector. For details, see Banking (Capital) Rules (Cap. 155L).

[47] 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*".

2021 (Chart 5.6), staying well above the statutory minimum requirement of 100%. The average Liquidity Maintenance Ratio (LMR) of category 2 institutions was 58.4% during the same period, also well above the statutory minimum requirement of 25%.

Chart 5.6
Liquidity Coverage Ratio



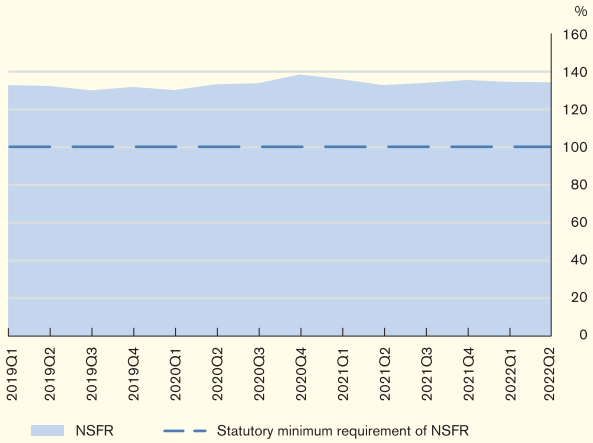
Notes:
1. Consolidated basis.
2. Quarterly average figures.

Source: HKMA.

The latest ratios of the Net Stable Funding Ratio (NSFR)[48] requirement also reflected a stable funding position of AIs. The average NSFR of category 1 institutions remained at a high level of 134.1% in the second quarter of 2022 (Chart 5.7), well above the statutory minimum requirement of 100%. The average Core Funding Ratio (CFR) of category 2A institutions also stayed at a high level of 147.7%, exceeding the statutory minimum requirement of 75%. The strong liquidity and stable funding positions of AIs suggest that the Hong Kong banking sector is well positioned to withstand liquidity shocks.

[48] The Basel III NSFR requires banks to maintain a stable funding profile in relation to the composition of their assets and off-balance-sheet activities. 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. For details, see Banking (Liquidity) Rules (Cap. 155Q).

Chart 5.7
Net Stable Funding Ratio

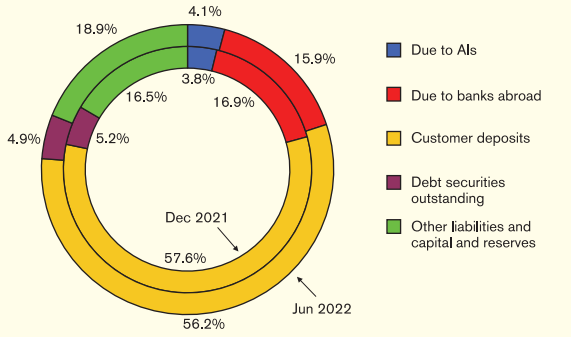


Note: Consolidated basis.

Source: HKMA.

At the end of June 2022, the share of customer deposits to all AIs' total liabilities declined marginally to 56.2% from 57.6% six months ago (Chart 5.8). Despite the mild decrease, customer deposits continued to be the primary source of funding for AIs, underpinning a stable funding structure in the banking system.

Chart 5.8
The liability structure of all AIs



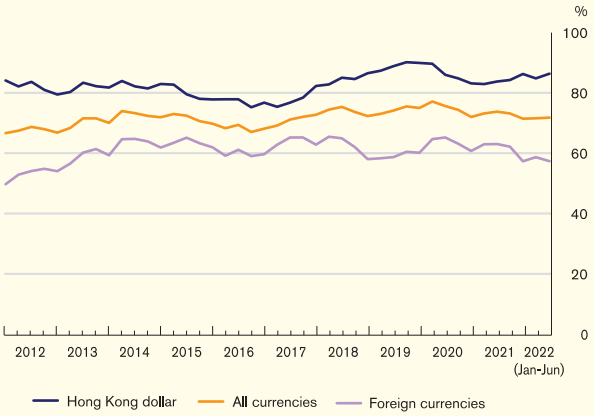
Notes:
1. Figures may not add up to total due to rounding.
2. Figures refer to the percentage of total liabilities, including capital and reserves.
3. Debt securities comprise negotiable certificates of deposit and all other negotiable debt instruments.

Source: HKMA.

The average all-currency loan-to-deposit (LTD) ratio of all AIs edged up to 72.1% at the end of June this year from 71.8% six months ago (Chart 5.9). It was mainly driven by a slight increase in Hong Kong dollar LTD, as the growth in Hong Kong loans and advances slightly outpaced that of Hong Kong dollar deposits

during the review period. Meanwhile, the average foreign currency LTD ratio stayed at a level similar to that six months ago.

Chart 5.9
Average loan-to-deposit ratios of all AIs

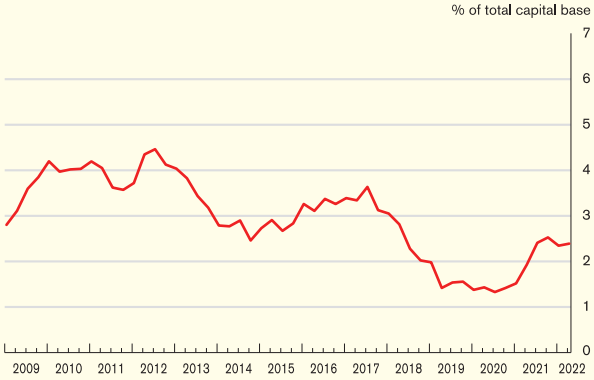


Note: End-of-quarter figures.
Source: HKMA.

Interest rate risk

The interest rate risk exposure of locally incorporated licensed banks remained at a relatively low level in the second quarter of 2022. 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 is estimated to decline by an amount equivalent to 2.39% of their total capital base at the end of June 2022 (Chart 5.10)[49].

Chart 5.10
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 2022.
2. The impact of the interest rate shock refers to its impact on the economic value of the banking and trading book[50], 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

Reflecting the adverse impacts of the fifth wave of local COVID-19 outbreak and the global supply chain disruptions, bank credit growth remained sluggish during the first half of 2022. On a half-yearly basis, total loans and advances of all AIs grew by 0.8%, following a mild decline of 0.6% (excluding initial public offering (IPO) loans straddled at the end of June 2021) in the second half of 2021 (Chart 5.11).[51]

The sluggish growth in total loans was due to a decline in loans for use outside Hong Kong by 2.3% during the first half of 2022, which partially

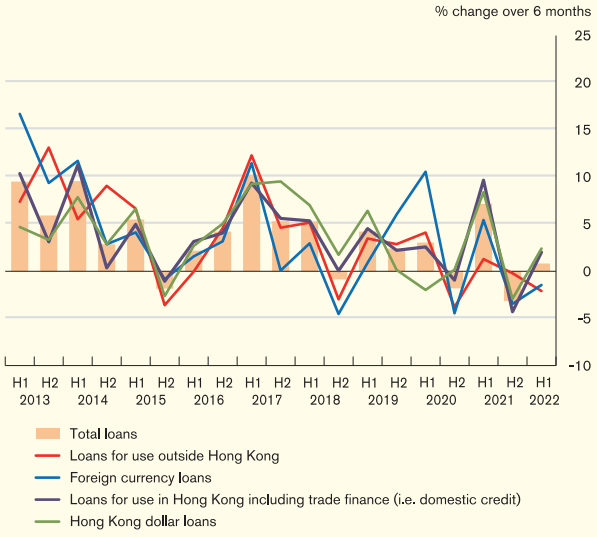
[49] This estimation does not take into account the effect of any mitigating action by banks in response to the shock. The impact will be smaller if mitigating action is taken.

[50] 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.

[51] If IPO loans straddled at the end of June 2021 were included, bank credit would have decreased by 3.1% during the second half of 2021.

offset a modest growth in domestic credit (comprising loans for use in Hong Kong and trade financing) of 2.1% during the review period.

Chart 5.11
Loan growth



Note: Since December 2018, figures for loans for use in or 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.

The credit demand outlook is likely to be stable in the near term. According to the results of the HKMA Opinion Survey on Credit Condition Outlook in June 2022, 70% of the surveyed AIs expected loan demand to be the same in the following three months, a level same as six months (Table 5.A).

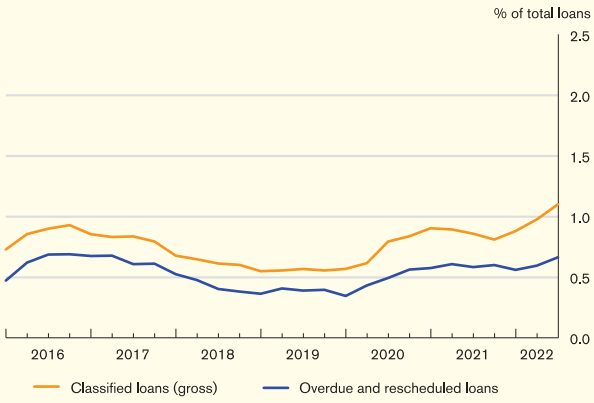
Table 5.A
Expectations of loan demand in the next three months

% of total respondents	Sep-21	Dec-21	Mar-22	Jun-22
Considerably higher	3	0	0	0
Somewhat higher	30	23	20	20
Same	60	70	60	70
Somewhat lower	7	7	20	10
Considerably lower	0	0	0	0
Total	100	100	100	100

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

Against the backdrop of a domestic economic downturn and the debt problems surrounding some Mainland property developers, the asset quality of banks' loan portfolios showed a slight deterioration during the first half of 2022. Specifically, the gross classified loan ratio (CLR) of all AIs increased to 1.10% in June 2022 from 0.88% in December 2021, while the ratio of overdue and rescheduled loans of all AIs also rose to 0.66% from 0.56% (Chart 5.12). Despite the increases, asset quality still remained at a healthy level by both historical and international standards.

Chart 5.12
Asset quality of all AIs[52]



Note: Classified loans are those loans graded as "sub-standard", "doubtful" or "loss".
Source: HKMA.

Household exposure[53]

Household debt grew by 0.7% in the first half of 2022, visibly slower than the 4.4% increase in the second half of 2021 amid the fifth wave of the local COVID-19 epidemic (Table 5.B). A breakdown of the data shows that the growth of residential mortgage loan moderated to 2.1%, given the lower number of residential property transactions in the first half of 2022. Personal loans reverted to a decline of 2.5%.

[52] Starting from this issue, this chart will present the asset quality of all AIs, rather than the related figures of all retail banks in previous issues. For retail banks, the gross CLR increased to 1.05%, while the ratio of overdue and rescheduled loans rose to 0.58% at the end of June 2022.

[53] Loans to households constitute lending to professional and private individuals, excluding lending for other business purposes. Mortgages account 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 2022, household lending accounted for 34.1% of domestic lending.

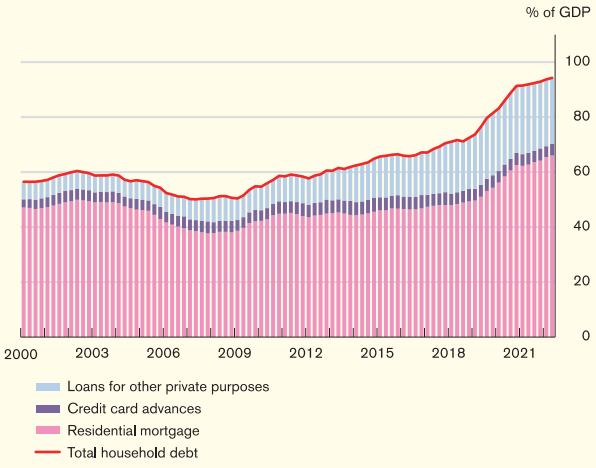
Table 5.B
Half-yearly growth of loans to households of all AIs

(%)	2019 H1	2019 H2	2020 H1	2020 H2	2021 H1	2021 H2	2022 H1
Residential mortgages	4.7	5.5	3.5	4.7	4.0	5.7	2.1
Personal loans	11.2	5.9	-2.4	2.2	5.3	1.6	-2.5
of which:							
Credit card advances	-3.8	4.1	-9.0	0.0	-0.4	8.1	-5.3
Loans for other private purposes	14.9	6.2	-1.1	2.6	6.4	0.4	-2.0
Total loans to households	6.8	5.6	1.5	3.9	4.4	4.4	0.7

Source: HKMA.

Despite the slower growth of household debt in the first half of 2022, the household debt-to-GDP ratio rose slightly to 94.3% in the first half of 2022 from 92.9% in the second half of 2021 (Chart 5.13). This was mainly driven by the decline in Hong Kong's nominal gross domestic product (GDP) over the same period amid the fifth wave of the local epidemic. Indeed, the contraction in the nominal GDP contributed 0.8 of the 1.4-percentage-point increase in the household debt-to-GDP ratio from the second half of 2021, while the growth in household debt contributed a smaller share (0.6 percentage point) of the increase.

Chart 5.13
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.

Source: HKMA.

It is noteworthy that the household debt-to-GDP ratio is a widely-used measure for gauging the financial soundness of households due to its simplicity. When interpreting this ratio, it is important to take into account that: (i) the denominator of the ratio uses nominal GDP as a proxy for the household income for ease of comparison across economies, and is thus not the actual income of the households with borrowings. Therefore, the household debt-to-GDP ratio does not reflect the actual debt servicing burden of households in the economy; and (ii) the numerator takes into account only the gross debts of households (instead of the net debts which take into account household assets).

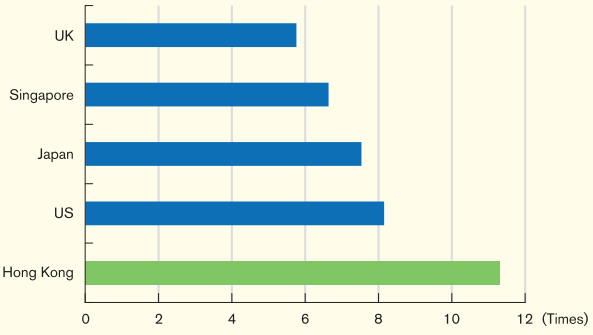
As such, a full and objective assessment of the risks associated with household debt requires the consideration of other factors, including the actual debt servicing ratio and the asset side of the household balance sheet. In fact, the average debt servicing ratio of new mortgages remained at a healthy level of 36.5% in July 2022. The household net worth has also stayed at a high level. Specifically, both the net worth-to-liabilities ratio and safe asset-to-liabilities ratio of Hong Kong's household sector remained high at 11.3 times and 2.96 times respectively in 2020 (Charts 5.14 and 5.15), which are much higher than those of most other developed economies. This suggests that Hong Kong's households, on aggregate, are financially sound and have a strong buffer to cushion potential financial and economic shocks.

The HKMA has been closely monitoring household indebtedness and regularly collects data from the banks. The majority of the household debts are residential mortgage loans, which are governed by the macroprudential policy framework, as well as collateralised loans to wealth management customers against financial assets. Coupled with the fact that household net worth has stayed at a high level, the HKMA considers the household balance sheet remains healthy and the associated credit risk is manageable.

For residential mortgages, the average loan-to-value (LTV) ratio and average debt-servicing ratio of newly approved mortgage loans have stayed at healthy levels following several rounds of countercyclical macro-prudential measures introduced by the HKMA since 2009. For personal loans to wealth management customers secured by financial assets, the HKMA requires banks to adopt prudent and effective credit risk management measures on this type of business. Such measures include imposing a cap on LTV ratios for financial assets pledged as collateral, issuing prompt margin calls and adopting forced liquidation mechanisms.

The HKMA also requires banks to adopt prudent underwriting standards for credit card advance and unsecured personal loan businesses. In reviewing credit applications, banks should understand borrowers' credit and financial conditions and carefully assess their repayment ability. As for post-lending, banks should implement effective monitoring that includes regular assessment of the asset quality of the loan portfolios.

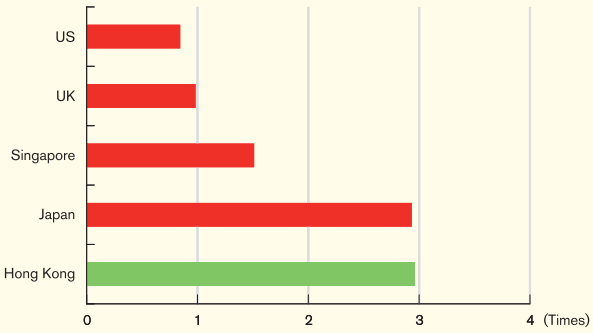
Chart 5.14
Household net worth-to-liabilities ratio for selected economies



Note: Japan and Hong Kong figures refer to those at end-2020, while figures for other economies refer to those at end-2021.

Sources: Statistical agencies or central banks of selected economies, and HKMA staff estimates.

Chart 5.15
Safe assets-to-liabilities ratio for selected economies

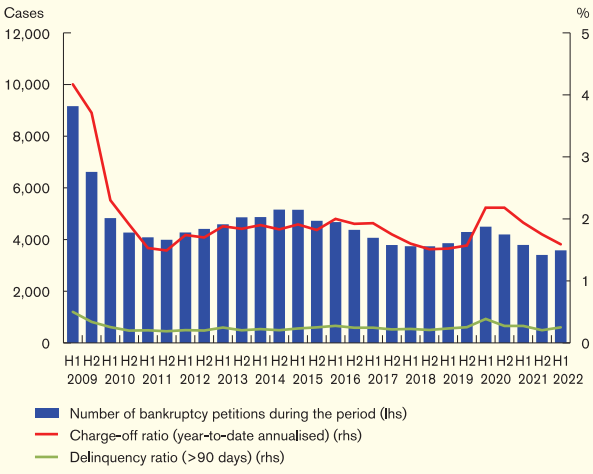


Note: Safe assets comprise deposits, as well as currencies if data is available. In the case of Hong Kong, safe assets refer to deposits only. Japan and Hong Kong figures refer to those at end-2020, while figures for other economies refer to those at end-2021.

Sources: Statistical agencies or central banks of selected economies, and HKMA staff estimates.

For unsecured household exposure, the associated credit risk remained contained during the review period. Despite a notable pick up in local unemployment in the first half of 2022, the increase in the number of bankruptcy petitions during the same period has been modest (Chart 5.16). The year-to-date annualised credit card charge-off ratio decreased to 1.59% in the second quarter of 2022 from 1.75% in the fourth quarter of 2021, while the delinquency ratio rose slightly to 0.25% in the same period.

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

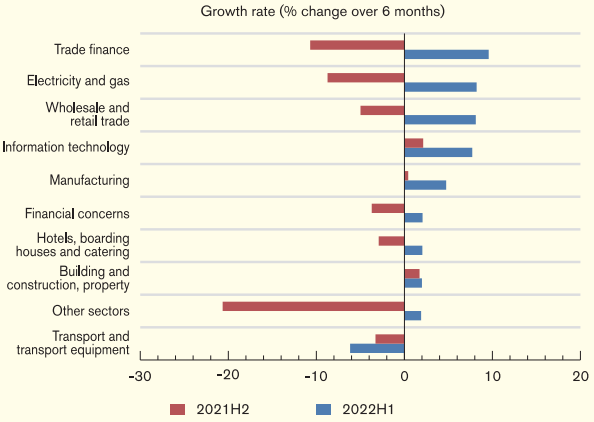


Sources: Official Receiver's Office and HKMA.

Corporate exposure[54]

Domestic corporate loans rebounded by 3.0% on a half-yearly basis during the first six months of 2022, after decreasing by 3.5% (excluding IPO-related loans straddled at end-June 2021) in the second half of 2021. Except for loans to transportation sector, faster loan growth was observed in most of the economic sectors, compared with the preceding six months (Chart 5.17).

Chart 5.17
Growth in domestic corporate loans by selected sector



Source: HKMA.

Since the COVID-19 pandemic, the HKMA, together with the banking sector, has implemented various support measures with the aim of maintaining a stable flow of bank credits to support corporates (especially small and medium-sized enterprises (SMEs)) and individuals in need. Box 4 analyses whether, and to what extent, bank lending in Hong Kong has been supported by these measures, with a particular focus on the two major support measures: (i) the release of the Countercyclical Capital Buffer (CCyB) and (ii) the SME Financing Guarantee Scheme (SFGS). The findings suggest that not only are these measures found to be effective in supporting lending in times of stress, the complementary roles between measures that are broad-based (e.g. CCyB release) and targeted (e.g. SFGS) can also enhance the overall effectiveness of policy measures. This supports the view that a combination of different policy measures should be deployed to maintain stable flows of credit during crisis periods.

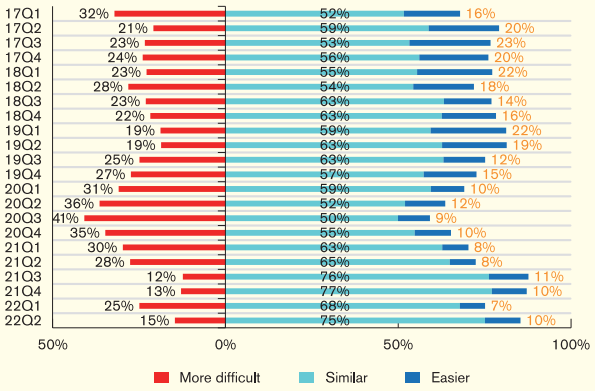
The demand-side survey on the credit conditions of SMEs showed that SMEs' perception improved in the second quarter of 2022, with 15% of the respondents perceiving credit approval as "more difficult" relative to six months ago, significantly lower than the 25% registered in the previous quarter (Chart 5.18). Of the respondents with existing credit lines, 7% indicated a tighter stance by banks in the second quarter, similar to 8% registered in the previous quarter (Chart 5.19).

In light of the continued challenges facing SMEs, the HKMA announced in September 2022 an extension of the Pre-approved Principal Payment Holiday Scheme (the Scheme) to the end of January 2023. At the same time, the Scheme offered an option to corporates that are financially capable and willing to resume principal repayment gradually, to repay 20% of the original principal repayment amount over a period of one year on a voluntary basis. By the end of July 2022, over 98,000 credit relief cases had been granted to corporate customers under the Scheme and other initiatives implemented by banks during the pandemic, involving an aggregate amount of over HK$1 trillion. In addition, The Hong Kong Mortgage Corporation Limited has extended the maximum duration of principal moratorium for the 80% Guarantee Product, the 90% Guarantee Product and the Special 100% Loan Guarantee of the SFGS to a total of 36 months. An option for borrowers to resume partial principal repayment for one year was provided, allowing borrowers to resume normal repayment gradually if they are willing and capable. By the end of July 2022, over 53,000 applications involving around HK$99 billion in loans had been approved under the Special 100% Loan Guarantee. With the overarching objective of maintaining banking

[54] Excluding interbank exposure. At the end of June 2022, the share of corporate loans in domestic lending was 65.9%.

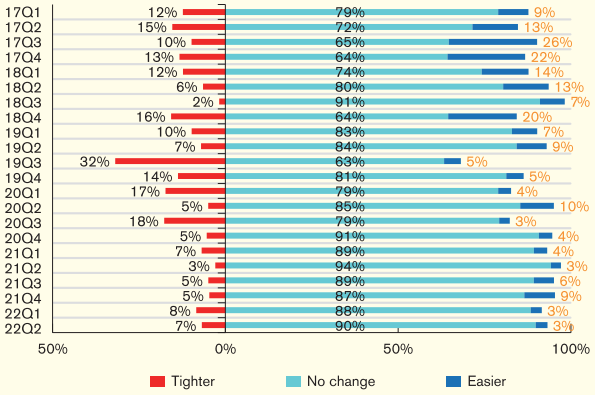
stability, the HKMA will from time to time review the case for further extension of the various relief measures.

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.

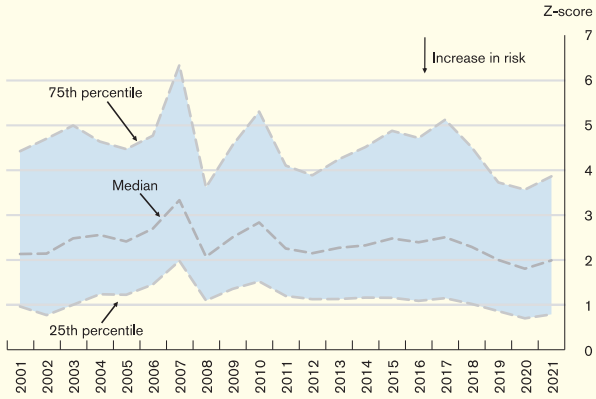
Chart 5.19
SMEs' reported change in banks' stance on existing credit lines



Note: The data covers only respondents with existing credit lines.
Source: HKMA.

The robust economic recovery in 2021 had provided a breathing space for many corporates to recover their financial health. Based on accounting data of listed non-financial corporates in Hong Kong, the Altman's Z-score (a default risk measure for non-financial corporates) saw an across-the-board increase during 2021, suggesting lower default risks for these corporates (Chart 5.20). Such an improvement can, in part, be due to a notable recovery in corporates' debt servicing abilities, as indicated by the rise in weighted average interest rate coverage ratios for both local and non-local firms (Chart 5.21).

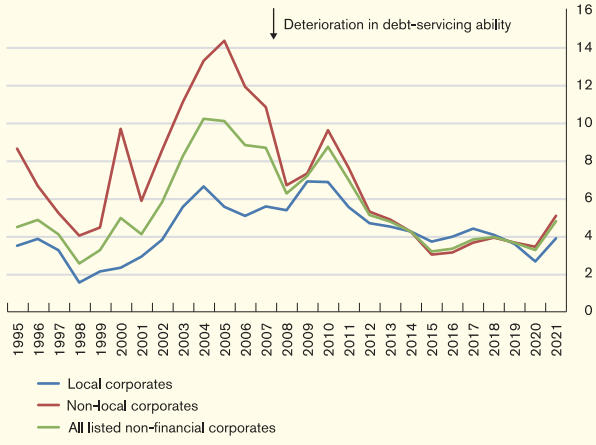
Chart 5.20
Altman's Z-score of listed non-financial corporates in Hong Kong



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 2022.

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

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

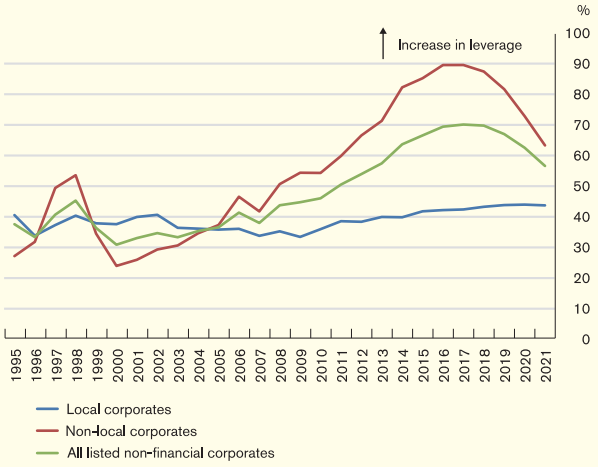


Notes:
1. Weighted average figures.
2. The ICR is calculated by dividing the earnings before interest and tax (EBIT) by total interest expenses. A lower value indicates deterioration of debt servicing ability.
3. All non-financial corporates listed on the Hong Kong Stock Exchange are selected. Local 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 2022.

Source: HKMA staff estimates based on data from Bloomberg.

Meanwhile, the weighted average debt-to-equity ratio (a common measure of corporate leverage) also decreased modestly for the listed non-financial corporates in Hong Kong (Chart 5.22). The decline was mainly driven by non-local corporates (the red line in Chart 5.22), whereas leverage for local firms was largely stable (the blue line in Chart 5.22).

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 2022.

Source: HKMA staff estimates based on data from Bloomberg.

Nevertheless, due to the time-lagging nature of accounting data, the adverse effects of the fifth wave of the local COVID-19 outbreak and supply chain disruptions that occurred in the first half of 2022 have not been reflected in corporates' fundamentals and thus default risk. Moreover, in view of the rapid increase in US interest rates, the expectation of a higher domestic interest rate environment ahead could further weigh on the loan repayment abilities for corporates. Banks should stay alert to the credit risk of their corporate exposures.

Mainland-related lending and non-bank exposures

The banking sector's total Mainland-related lending increased by 1.7% to HK$4,806 billion (15.7% of total assets) at the end of June 2022, from HK$4,725 billion (15.8% of total assets) at the end of December 2021 (Table 5.C). Other non-bank exposures fell by 2.6% to HK$1,936 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK$ bn	Sep 2021	Dec 2021	Mar 2022	Jun 2022
Mainland-related loans	4,918	4,725	4,881	4,806
Mainland-related loans excluding trade finance	4,511	4,410	4,495	4,429
Trade finance	407	315	385	377
By type of AIs:				
Overseas incorporated AIs	1,824	1,678	1,771	1,719
Locally incorporated AIs*	2,233	2,172	2,208	2,231
Mainland banking subsidiaries of locally incorporated AIs	861	875	901	855
By type of borrowers:				
Mainland state-owned entities	2,010	1,846	1,961	1,955
Mainland private entities	1,484	1,473	1,500	1,475
Non-Mainland entities	1,425	1,405	1,419	1,375

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

Source: HKMA.

Table 5.D
Other non-bank exposures

HK$ bn	Sep 2021	Dec 2021	Mar 2022	Jun 2022
Negotiable debt instruments and other on-balance sheet exposures	1,481	1,497	1,481	1,424
Off-balance sheet exposures	526	490	514	512
Total	**2,006**	**1,987**	**1,995**	**1,936**

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

Source: HKMA.

The gross CLR of Mainland-related lending of all AIs[55] increased to 1.50% in June 2022, compared with 0.86% at the end of 2021.

In view of the economic headwinds facing the Mainland economy arising from recurring COVID-19 outbreaks in various provinces, and the property market downturn, banks should continue to stay attentive to the credit risk management of their Mainland-related exposures.

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

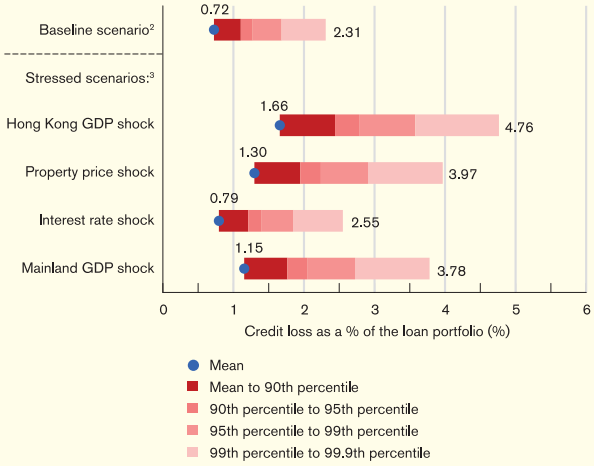
Macro stress testing of credit risk[56]

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 severe macroeconomic shocks similar to those experienced during the Asian financial crisis. Chart 5.23 presents a simulated future credit loss rate of retail banks in the second quarter of 2024 under four specific macroeconomic shocks[57] using information up to the second quarter of 2022.

In stressed scenarios, the expected average credit losses two years after different macroeconomic shocks are estimated to be moderate, ranging from 0.79% (Interest rate shock) to 1.66% (Hong Kong GDP shock).

Taking into account tail risk, banks' credit losses (at the confidence level of 99.9%) under the stress scenarios range from 2.55% (Interest rate shock) to 4.76% (Hong Kong GDP shock), which are material but not systemically significant. In any case, the probability of such extreme scenarios actually occurring is rather remote, given that Hong Kong has already experienced a severe economic downturn during the first half of 2022, and the chance of a further sharp fall in GDP from such a low base is very small.[58]

Chart 5.23
The mean and value-at-risk statistics of simulated credit loss distributions[1]



Notes:

1. The assessments assume the economic conditions in Q2 2022 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 Q3 2022 to Q2 2023.

   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 Q3 2022 to Q2 2023.

   Interest rate shock: A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. Q3 2022), followed by no changes in the second and third quarters, and another rise of 300 basis points in the fourth quarter (i.e. Q2 2023).

   Mainland GDP shock: An average year-on-year real GDP growth rate of 2% for the four consecutive quarters starting from Q3 2022.

Source: HKMA staff estimates.

5.4 Systemic risk

The fifth wave of local COVID-19 infections during the first half of 2022 has adversely affected the economic conditions in Hong Kong. However, partly reflecting the policy effects of various relief measures that have been extended or enhanced by the public sector, systemic risks in the Hong Kong banking sector remained contained during the review period.

Nevertheless, global economic prospects remained highly uncertain due to various downside risk factors including the future pace of US interest rate hikes as well as the lingering geopolitical risk arising from the Russia-Ukraine situation. This, coupled with the economic uncertainty arising from the evolving local epidemic situation, could pose challenges to banks in Hong Kong on various fronts.

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 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.

58 Under the Hong Kong GDP shock scenario, where a similar extreme shock to that experienced during the Asian financial crisis is assumed, there would be a chance of less than 0.1% that the loan loss would be higher than that following the Asian financial crisis (i.e. around 4.5%).

Indeed, the uncertainty surrounding the subsequent pace and magnitude of US policy rate rises is one key risk factor to monitor. The more persistent inflationary pressure in the US has raised concerns over the risk that the Fed has to raise interest rates to a highly restrictive level to anchor inflation expectations.[59] Should such an event occur, it could heighten the risk of significant capital outflows in the region on the back of a sharp tightening in global financial condition. This in turn could trigger abrupt rises in interest rates in the region.

While higher interest rates may benefit banks' NIMs, the resulting tighter financial condition would weigh on the debt repayment abilities of borrowers (particularly those highly leveraged) and affect the credit quality of bank loans. Banks should carefully assess the potential impact on the asset quality of their loan portfolios in the event of sharp rises in interest rates.

On the domestic front, while the local epidemic situation showed signs of stabilisation in the second quarter, the business environment and economic conditions remained challenging due to lingering uncertainty over future local epidemic development. This may erode business confidence and potentially delay recovery for corporates. Banks should be mindful of the potential impact of the ongoing development of the local epidemic situation on the financial fundamentals of their corporate borrowers.

Geopolitical risks, particularly the lingering Russia-Ukraine conflict, also warrant close monitoring. While the direct impact of the Russia-Ukraine conflict on banks should be mild given the limited direct exposures of Hong Kong banks to the two jurisdictions, the indirect exposures via lending to borrowers who have significant business linkages to Russia or Ukraine could be a source of losses. In addition, a prolonged or further escalation in the conflict could intensify supply chain disruptions and aggravate uncertainties in business sentiment, further amplifying the adverse impacts of aforementioned downside risk factors.

That said, the strong capital and liquidity positions of the Hong Kong banking sector should provide strong buffers to withstand shocks arising from these risk factors.

The countercyclical capital buffer 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. This buffer can be deployed in times of a downturn, allowing banks to continue providing credit to support the real economy. The latest applicable jurisdictional CCyB rate for Hong Kong, announced on 2 August 2022, is 1.0%.[60]

In setting the CCyB, 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 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)[61]. 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

[59] For more backgrounds about the latest inflationary pressures in major advanced economies, please read Chapter 2.1.

[60] For details, see the Announcement of the CCyB to AIs on 2 August 2022 (https://www.hkma.gov.hk/eng/key-functions/banking/banking-legislation-policies-and-standards-implementation/countercyclical-capital-buffer-ccyb/).

[61] 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.

("Comprehensive Reference Indicators") and all relevant information available in addition to the indicative buffer guide [62].

In the latest assessment based on the first quarter data of 2022, the indicative buffer guide signals a CCyB of 0%. The projection, based on all available data at the decision date, suggests the indicative buffer guide is likely to continue to signal a similar level of CCyB when all relevant data for the second quarter of 2022 becomes available.

The information drawn from the series of Comprehensive Reference Indicators, along with all relevant information available at the time of the decision in July 2022, suggests that the latest economic indicators point to a stabilisation of economic activities in Hong Kong in the second quarter of 2022, but uncertainties about the global and domestic economic environment have remained high. Therefore, the Monetary Authority considers that it is appropriate to keep the CCyB unchanged at the current level (i.e. 1.0%) and continue to monitor the situation closely.

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

	28-Jan-22	5-May-22	2-Aug-22
Announced CCyB rate	1.0%	1.0%	1.0%
Date effective	28/01/2022	05/05/2022	02/08/2022
Indicative buffer guide	1.6%	1.2%	0.0%
Basel Common Reference Guide	2.5%	2.5%	2.5%
Property Buffer Guide	0.8%	0.5%	0.0%
Composite CCyB Guide	1.6%	1.2%	0.0%
Indicative CCyB Ceiling	None	None	None
Primary gap indicators			
Credit/GDP gap	10.7%	11.2%	19.8%
Property price/rent gap	4.7%	3.6%	1.7%
Primary stress indicators			
3-month HIBOR spread (percentage points)	0.08%	0.32%	0.59%
Quarterly change in classified loan ratio (percentage points)	-0.03%	0.05%	0.10%

Note: The values of all CCyB guides, the Indicative CCyB Ceiling and their respective input variables are based on public data available prior to the corresponding review/ announcement date, and may not be the most recent available as of the end of each quarter (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 the end of the quarter) is shown at the top of the column.

Source: HKMA.

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

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

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

	Jun 2021	Mar 2022	Jun 2022
Interest rates			
1-month HIBOR fixing[2] (quarterly average)	0.09	0.20	0.31
3-month HIBOR fixing (quarterly average)	0.18	0.41	0.88
BLR[3] and 1-month HIBOR fixing spread (quarterly average)	4.91	4.80	4.69
BLR and 3-month HIBOR fixing spread (quarterly average)	4.82	4.59	4.12
Composite interest rate[4]	0.18	0.24	0.47
		All AIs	
Balance sheet developments[5]			
Total deposits	+3.4	+1.1	-0.7
Hong Kong dollar	+4.8	+2.2	+0.1
Foreign currency	+2.0	+0.0	-1.5
Total loans	+4.3	+1.2	-0.4
Domestic lending[6]	+5.9	+2.0	+0.1
Loans for use outside Hong Kong[7]	+0.3	-0.6	-1.7
Negotiable instruments			
Negotiable certificates of deposit (NCDs) issued	-4.5	-9.7	+8.1
Negotiable debt instruments held (excluding NCDs)	+2.5	-0.5	-1.2
Asset quality			
As a percentage of total loans[8]			
Pass loans	97.66	97.37	97.11
Special mention loans	1.48	1.66	1.79
Classified loans[9] (gross)	0.86	0.98	1.10
Classified loans (net)[10]	0.47	0.56	0.63
Overdue > 3 months and rescheduled loans	0.59	0.59	0.66
Classified loan ratio (gross) of Mainland related lending[11]	0.84	1.15	1.50
Liquidity ratios (consolidated)			
Liquidity Coverage Ratio — applicable to category 1 institutions (quarterly average)	154.0	155.0	154.9
Liquidity Maintenance Ratio — applicable to category 2 institutions (quarterly average)	58.1	58.7	58.4
Net Stable Funding Ratio — applicable to category 1 institutions	132.6	134.3	134.1
Core Funding Ratio — applicable to category 2A institutions	142.7	148.2	147.7
		Retail banks	
Profitability			
Loan impairment charges as a percentage of average total assets (year-to-date annualised)	0.05	0.13	0.13
Net interest margin (year-to-date annualised)	0.98	0.98	1.03
Cost-to-income ratio (year-to-date)	51.9	54.7	53.9
		Surveyed institutions	
Asset quality			
Delinquency ratio of residential mortgage loans	0.04	0.04	0.05
Credit card lending			
Delinquency ratio	0.27	0.26	0.25
Charge-off ratio — quarterly annualised	1.87	1.50	1.88
— year-to-date annualised	1.94	1.50	1.59
		All locally incorporated AIs	
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	15.9	15.8	15.8
Tier 1 capital ratio	17.8	17.8	17.7
Total capital ratio	19.8	19.7	19.8
Leverage ratio	7.9	7.7	7.7

Notes:
1. Figures are related to Hong Kong offices only except where otherwise stated.
2. The Hong Kong Interbank Offered Rates are released by the Hong Kong Association of Banks.
3. With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
4. The composite interest rate is a weighted average interest rate of all Hong Kong dollar interest-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
The effects of COVID-19 support measures on bank lending: Lessons from the release of CCyB and loan guarantee schemes in Hong Kong

Introduction[63]

In response to the economic fallout caused by the COVID-19 pandemic, a wide range of policy measures have been implemented on an almost unprecedented scale in many jurisdictions to support stable flows of credit globally. In Hong Kong, the HKMA, together with the banking sector, has also introduced a host of measures to support bank lending towards the domestic economy.[64] While these measures have so far shown to help limit the economic fallout of the COVID-19 shock, to what extent bank lending is responsive to the measures, and whether a combination of measures may enhance the overall effectiveness, are important policy questions to be answered.

Against this background, this box sheds light on these issues by assessing the effects of two major support measures on bank lending in Hong Kong: (i) the release of the CCyB and (ii) the SFGS. In particular, we attempt to identify these effects by employing a difference-in-differences approach on a panel of 17 locally incorporated licensed banks in Hong Kong over the period between the first quarter of 2018 and the third quarter of 2021.

Overview of the two measures

We first provide a brief overview of the two policy measures considered in this box. Their roles in supporting bank lending will be discussed in the next section.

CCyB is a macro-prudential measure designed to accumulate additional bank capital buffer that can be released in subsequent downturns to absorb losses and support credit supply to the real economy. In view of the deteriorating economic environment in late 2019 and also in view of the COVID-19 outbreak in early 2020, the HKMA reduced the Hong Kong jurisdictional CCyB rate in two steps from 2.5% to 1% between October 2019 and March 2020.[65]

The SFGS is a series of ongoing financing guarantee schemes managed by the Government-owned Hong Kong Mortgage Corporation Limited, devoted to assisting SMEs and non-listed companies to obtain credit. In response to the crisis, the 90% guarantee coverage scheme (SFGS90) and the special 100% loan guarantee scheme (SFGS100) were introduced. SFGS100 particularly aimed at directing banks' lending to SMEs that were hit hard by the pandemic. In this box, we will mainly focus on the effects of SGFS100 due to its lion share among new guaranteed lending.[66]

[63] For details, we refer readers to Wong et al. (2022): "The effects of Covid-19 support measures on bank lending: Lessons from the release of CCyB and loan guarantee schemes in Hong Kong", *HKMA Research Memorandum* 03/2022.

[64] The HKMA webpage (https://www.hkma.gov.hk/eng/key-functions/banking/banking-regulatory-and-supervisory-regime/riding-out-the-covid-19-challenge/) provides an overview of the various support measures in Hong Kong. In general, these measures can be broadly categorised into measures that strengthen banks' lending capacity (e.g. release of the CCyB, reducing Regulatory Reserves, launching principal payment holiday scheme for existing loans); while another group of measures was to incentivise banks to lend to targeted borrowers (e.g. SMEs hard-hit by the pandemic) (e.g. the SFGS).

[65] The Hong Kong jurisdictional CCyB rate was reduced from 2.5% to 2% on 14 October 2019, and was further lowered to 1% on 16 March 2020. It is estimated that the two rounds of CCyB reduction released up to HK $800 billion of lending capacity.

[66] In the following, we will interchange the use of the terms SFGS and SFGS100.

Empirical analyses and key findings

Our empirical analyses comprise three parts. First, we assess whether specific balance sheet constraints of banks have reduced their lending by a larger extent (or increase by a smaller extent) relative to their peers after the outbreak of the pandemic. The finding is important as it will inform whether the policy measures taken by the HKMA, such as the CCyB release, have targeted the banks' pain points. It also sets the stage for examining the effectiveness of the CCyB release in the second part of the analysis. Lastly, we examine the effect of the SFGS and assess whether it could serve as an effective complementary support measure in directing bank lending towards hard-hit borrowers.

I. Identifying constraining factors on bank lending in Hong Kong during the crisis

We first assess whether specific balance sheet factors have constrained bank lending during the crisis. Specifically, we conjecture that banks with lower credit loss absorbing capacity (as measured by a lower capital buffer ratio) or thinner liquidity buffers (as measured by a lower liquid asset ratio) before the crisis would tend to curtail lending by more than their peers during the crisis. This can be in part driven by their concern over a deterioration in credit and liquidity risks. To test this empirically, a difference-in-differences (DID) regression model[67] is adopted to compare the loan growth of relatively more constrained banks with their peers for each exposure variable. Table B4.1 summarises key characteristics of the model, including the definitions of the exposure variable for each of the two constraining factors.

Table B4.1
Key characteristics of the DID model

Model for identifying bank balance sheet constraints

$\Delta y_{i,t} = \beta_1 Post_t \times Constrained(k)_i$ + *control variables + bank fixed effects + time fixed effects + error term* (1)

For each bank balance sheet factor *k* below:

$Constrained(k)_i$ = 1 if the average of bank *i*'s corresponding exposure variable between 2018Q3 and 2019Q2 is below the lower quartile.

Factor *k*	Exposure variable
Capital buffer ratio ($L.capbuffer_i$)	Banks' Common Equity Tier-1 Capital ratio minus the bank-specific supervisory triggering ratio level.
Liquid asset ratio ($L.liqbuffer_i$)	Banks' liquid asset holding over liability.

$\Delta y_{i,t}$ is the year-on-year growth rate of total lending of the i^{th} bank in quarter t. $Post_t$ is a dummy variable for separating the pre- and post-crisis periods, with a value of one starting from the fourth quarter of 2019[68] and zero otherwise. The model also includes bank fixed effects and various bank balance sheet variables to control for bank heterogeneity.[69] It also includes time fixed effects to capture the effect of other time-varying common factors.

The parameter β_1 here reveals whether and to what extent average lending growth of the constrained banks group may differ from their peers during the crisis.[70] Consistent with our conjectures, we broadly find negative and statistically significant coefficients for β_1, when either capital or liquidity buffer is taken as the constraining factor. These findings are also consistent with our observations in Chart B4.1, which presents the average lending volume trends between constrained and unconstrained banks over the estimation periods (with capital and liquidity buffers being the constraining factors in panel A and panel B respectively).

67 The DID model assumes and estimates that, during crisis, the average lending responses for the treatment group (i.e. relatively more constrained banks) would be different from the control group (peer banks).

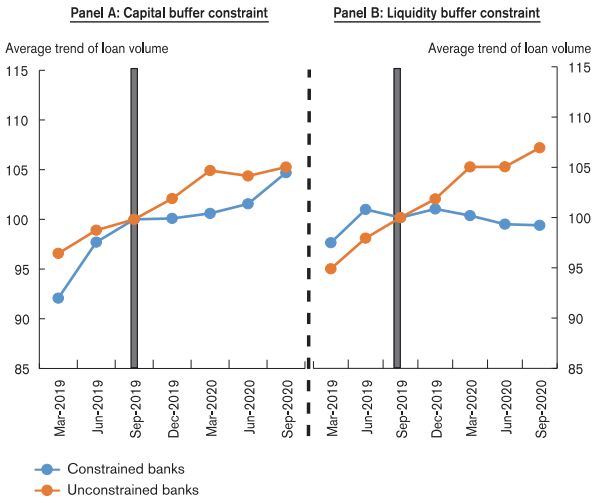
68 We define the crisis period one quarter earlier than the global COVID-19 pandemic in the first quarter of 2020, as the Hong Kong economy was already facing economic recession in the fourth quarter of 2019.

69 The control variables include bank size, non-performing ratio, liquid asset ratio, return on assets, and loan-to-asset ratio. They remain the same also for Equation (2).

70 It should be noted that the β_1 in Equation (1) absorbed both the effect of the balance sheet constraint factor k during the crisis and the policy effects of support measures. We will further disentangle the two effects in Equation (2).

Taken together, the analysis finds that those banks with relatively thinner capital buffers, or lower liquid asset ratios, than their peers before the crisis may be subject to larger lending constraints during the crisis period, relative to other banks.

Chart B4.1
Average lending trend between constrained and unconstrained banks across time



Notes:
1. In panel A and panel B, the balance sheet factor for identifying the lower quartile constrained banks group are capital buffer ratio and liquid buffer ratio respectively.
2. We first index each banks' loan volume using 2019Q3 as the base (i.e. 2019Q3 = 100 for each bank) and then calculate average value of the individual banks' loan volume across time for the constrained and the unconstrained groups of banks separately.

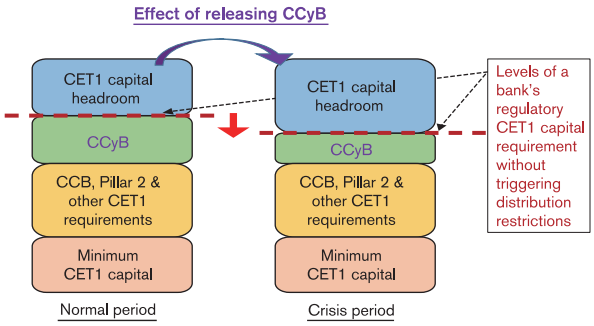
Source: HKMA staff estimates.

II. Assessing the policy effect of CCyB release

Given the above findings, a follow-up question is whether the support measures (such as the CCyB release) have helped mitigate banks' lending constraints. In particular, the release of CCyB should mitigate the capital constraint faced by banks, especially those with a relatively thinner capital buffer before the crisis.[71]

The immediate effect of CCyB release on bank's CET1 capital holding is graphically illustrated in Chart B4.2. In essence, the release of CCyB requirement effectively leads to a lower regulatory capital requirement faced by a bank (i.e. a lowered red dotted line). As such, it would shift a particular amount of capital sitting in banks' balance sheets from being a "regulatory capital requirement" (i.e. the green box becomes smaller after the CCyB release) to capital headroom that banks can dip into without triggering distribution restrictions (i.e. becomes a larger blue box). The release of CCyB thus provides banks with additional capital headroom and reduces the risk of falling below regulatory capital requirements which may result in costly supervisory consequences (such as dividends distribution restrictions) in the future. This should particularly address the concerns of those banks with a relatively thin capital buffer before entering the crisis, and therefore help support the continued provision of credit by these banks.

Chart B4.2
A graphical illustration for the effect of CCyB release on a bank's CET1 capital position



Note: CET1 and CCB stand for Common Equity Tier-1 and Capital Conservation Buffer respectively. Other requirement includes the higher loss absorbency requirement for designated systemically important AIs.

Given the period of releasing CCyB almost coincided with the crisis period, we therefore follow Saporta (2021) to identify the effect of CCyB release by exploiting the cross-sectional variations in the pass-through of a change in the CCyB rate in Hong Kong among banks.[72] Under the CCyB framework, the extent of capital release to a bank from lowering the CCyB rate in a particular jurisdiction is calculated based on the bank's private sector credit exposures (in

[71] In the research memorandum version, based on a similar approach, we do not find strong evidence that CCyB release helped mitigate banks' liquidity constraints of banks.

[72] One advantage of such approach is that it allows us to disentangle the effect of CCyB release from the effect of the capital-constrained factor during the crisis despite the coinciding time period. See Saporta (2021), "Emerging prudential lessons from COVID Stress", Speech presented at Bank of England Webinar on 21 July 2021, The Bank of England.

risk-weighted amount) in that jurisdiction. Therefore, when the CCyB rate is lowered in Hong Kong, a bank with a higher share of credit exposure to Hong Kong over its total credit exposure to all jurisdictions will have a larger reduction in the capital requirements than its peers.[73]

Accordingly, we construct a new variable, $HKRWA_{i,19Q3}$, that measures the share of bank i's Hong Kong risk-weighted assets (RWA) for private sector credit exposures over its total credit RWA to all jurisdictions as of the third quarter of 2019 (i.e. before the first release of CCyB in Hong Kong). We then modify Equation (1) to include this exposure variable for CCyB release as the following model:

$$\Delta y_{i,t} = \beta_1 Post_t \times L.capbuffer_i + \beta_2 Post_t \times HKRWA_{i,19Q3} + \beta_3 Post_t \times L.capbuffer_i \times HKRWA_{i,19Q3} + control\ variables + bank\ fixed\ effects + time\ fixed\ effects + error\ term \quad (2)$$

The parameters of interest here are β_2 and β_3. A positive β_2, if found, would suggest that banks more exposed to CCyB release tend to lend relatively more than other banks during the crisis period, thus achieving its intended policy effect; while a positive β_3 would imply that the policy effect tends to be stronger for relatively capital constrained banks than other peers.

As one key objective of the CCyB release is to support the domestic real economy, we will examine the policy effects on domestic lending to non-financial sectors (henceforth referred to as domestic loans), and also on domestic corporate loans. The estimation results are presented in Table B4.2. Three key findings are worth highlighting:

(i) Focusing on domestic loans (Column 1), there is evidence supporting the intended policy effect from CCyB release, as banks with higher $HKRWA_{i,19Q3}$ tend to provide more domestic loans than their peers during the crisis (i.e. positive and significant β_2).

(ii) For domestic corporate loans, there is strong evidence that banks with relatively thinner capital headroom before the crisis tend to have lower growth in domestic corporate loans during the crisis (i.e. negative and significant estimated β_1 in Column 2). More importantly, the CCyB release does help mitigate the capital constraints of these banks, thereby supporting their lending to domestic corporates (i.e. positive and significant β_3).

(iii) As shown in Columns 3 and 4, capital constrained banks tend to deploy the extra capital headroom generated from the release of CCyB to mainly support less risky corporate loans (i.e. lending to non-hard-hit economic sectors) during the crisis period. By contrast, the results were not statistically significant for hard-hit sector loans. This probably reflected banks' concerns over the uncertainty of credit risks amid the crisis.

Table B4.2
Estimation results on the effectiveness of CCyB release on domestic lending

	(1)	(2)	(3)	(4)
Year-on-year growth $\Delta y_{i,t}$	Domestic loans	Corporate loans	Non-hard-hit sectors	Hard-hit sectors
*Post * L.capbuffer* (β_1)	-0.047	-0.413**	-0.440**	-0.080
	(0.095)	(0.176)	(0.1716)	(0.391)
*Post * HKRWA* (β_2)	0.125*	-0.0007	0.179	-0.345**
	(0.071)	(0.111)	(0.134)	(0.147)
*Post *HKRWA* L.capbuffer* (β_3)	0.083	0.576**	0.627***	0.108
	(0.124)	(0.227)	(0.222)	(0.493)
Bank Controls	Yes	Yes	Yes	Yes
Bank fixed effect	Yes	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes	Yes

Notes:
1. Hard-hit economic sectors include wholesale and retail, trading, transportation, hotel, accommodation and food services sectors.
2. Robust standard errors are reported in parentheses. ***, **, * denote the estimated coefficients being significant at 1%, 5% and 10% levels respectively.

[73] Technically, we should also take into account the change in jurisdictional CCyB in other jurisdictions that banks were exposed at the same time. However, as our sampled banks' exposures to those other jurisdictions that have lowered their CCyB around the same time were not significant, we mainly focused on changes in the Hong Kong jurisdictional CCyB in the analysis.

III. Assessing the policy effect of SFGS

As mentioned earlier, SFGS was introduced to incentivise bank lending towards firms (particularly SMEs) that were adversely affected by the pandemic, in order to provide additional financing support to alleviate their cash flow pressures and financial burdens.

In theory, the provision of government guarantees to the approved credit facilities would reduce the credit risk of related loans faced by banks, depending on the guarantee coverage. Thus, banks should be less concerned about extending loans to borrowers from the hard-hit sectors if they are covered by loan guarantee schemes. Therefore, we posit that banks that are more exposed to the SFGS would have more incentives to lend more towards borrowers from the hard-hit sectors (in the form of guaranteed loan) than other banks during the crisis.

To examine the policy effect of the SFGS, a DID model (similar to equation 1) is employed which examines the differences in lending response to hard-hit sectors between banks that were more exposed to the SFGS (i.e. denoted by H_SFGS_i) and other banks.[74]

The estimation results are reported in Table B4.3. It is found that banks which were more exposed to SFGS tended to attain a higher year-on-year growth for loans to hard-hit sectors by 8 percentage points (ppts) than other banks during the crisis (Column 1). Consistently, the share of hard-hit loans to total corporate loans of these more exposed banks is estimated to rise by around 1.7 ppts relative to that of other banks (Column 2). These results show that credit flows to hard-hit sectors have been well supported by the SFGS, which played a complementary role to the CCyB release by incentivising bank lending more towards these sectors.

Table B4.3
Estimation results on the effect of SFGS on banks' lending towards hard-hit sectors

	(1)	(2)
Variables	Hard-hit sector loan growth (year-on-year growth)	Hard-hit sector loan share
*Post * H_SFGS*$_i$ (β_1)	0.080**	0.017***
	(0.040)	(0.007)
Bank Controls	Yes	Yes
Bank fixed effect	Yes	Yes
Time fixed effect	Yes	Yes

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

Conclusion

There are three important policy implications learnt from the analysis. First, the release of the CCyB is found to be effective in supporting bank lending in times of stress, thus achieving its policy objective as a countercyclical tool. Secondly, Hong Kong's experience highlights the benefit of maintaining an adequate level of releasable capital buffer to withstand unexpected system-wide shocks. This supports the view that there may be a need to set a positive neutral rate of CCyB even in periods without excessive credit growth. Finally, the findings show the complementary roles between measures that are broad-based (e.g. CCyB release) and targeted (e.g. SFGS) in enhancing the overall effectiveness of policy measures. This echoes the growing view that a combination of different policy measures should be considered to maintain stable flows of credit in times of stress.

[74] Specifically, we modify equation (1) by replacing $\beta_1 Post_t \times Constrained(k)_i$ with $\beta_1 Post_t \times H\_SFGS_i$ for differentiating more SFGS-exposed banks from other banks. H_SFGS_i is a dummy variable with value one if bank *i*'s share of approved new SFGS loans to the outstanding corporate loans amount is larger than or equal to the upper quantile as of the second quarter of 2020.

Glossary of terms

Aggregate Balance
The sum of balances in the clearing accounts and reserve accounts kept with the central bank. In Hong Kong, this refers to the sum of the balances in the clearing accounts kept with the HKMA. The Aggregate Balance is a part of the Monetary Base.

Authorized Institution (AI)
An institution authorized under the Banking Ordinance to carry on the business of taking deposits. Hong Kong maintains a Three-tier Banking System, which comprises licensed banks, restricted licence banks and deposit-taking companies.

Best Lending Rate
A benchmark interest rate that banks use to price loans. In Hong Kong, the Best Lending Rate is used as a base for quoting interest rates on mortgage loans.

Certificates of Indebtedness (CIs)
Certificates issued by the Financial Secretary under the Exchange Fund Ordinance, to be held by note-issuing banks as cover for the banknotes they issue.

Composite Consumer Price Index (CCPI)
The main consumer price index (CPI) for Hong Kong. The Census and Statistics Department compiles three separate CPI series relating to households in different expenditure ranges. The CPI(A) relates to about 50% of households in the relatively low expenditure range; the CPI(B) relates to the next 30% of households in the medium expenditure range; and the CPI(C) relates to the next 10% of households in the relatively high expenditure range. The Composite CPI is compiled based on the aggregate expenditure pattern of all of the above households taken together.

Composite Interest Rate
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. Data from retail banks, which account for the majority of the Hong Kong dollar deposits in the banking sector, are used in the calculation. It should be noted that the composite interest rate represents only average interest expenses. There are various other costs involved in the making of a loan, such as operating costs (e.g. staff and rental expenses), credit cost and hedging cost, which are not covered by the composite interest rate.

Convertibility Undertaking (CU)
An undertaking by a central bank or Currency Board to convert domestic currency into foreign currency and vice versa at a fixed exchange rate. In Hong Kong, the HKMA operates Convertibility Undertakings on both the strong side and the weak side of the Linked Rate of 7.80. Under the strong-side Convertibility

Undertaking, the HKMA undertakes to buy US dollars from licensed banks at 7.75. Under the weak-side Convertibility Undertaking, the HKMA undertakes to sell US dollars at 7.85. Within the Convertibility Zone between 7.75 and 7.85, the HKMA may choose to conduct market operations consistent with Currency Board principles with the aim of promoting the smooth functioning of the money and foreign exchange markets.

Convertibility Zone

The Hong Kong dollar-US dollar exchange rate band, defined by the levels of the strong- and weak-side Convertibility Undertakings, within which the HKMA may choose to conduct market operations consistent with Currency Board principles.

Exchange Fund Bills and Notes (EFBNs)

Debt instruments issued by the HKMA for the account of the Exchange Fund. These instruments are fully backed by the foreign reserves. The HKMA has undertaken that new Exchange Fund paper will only be issued when there is an inflow of funds, thus enabling the additional paper to be fully backed by the foreign reserves. Since 1 April 1999, interest payments on Exchange Fund paper have been allowed to expand the Monetary Base. Additional Exchange Fund paper is issued to absorb such interest payments. This is consistent with the Currency Board discipline since interest payments on Exchange Fund paper are backed by interest income on the US dollar assets backing the Monetary Base.

Monetary Base

A part of the monetary liabilities of a central bank. The Monetary Base is defined, at the minimum, as the sum of the currency in circulation (banknotes and coins) and the balance of the banking system held with the central bank (the reserve balance or the clearing balance). In Hong Kong, the Monetary Base comprises Certificates of Indebtedness (for backing the banknotes issued by the note-issuing banks), government-issued currency in circulation, the sum of the balances of the clearing accounts kept with the HKMA (the Aggregate Balance), and Exchange Fund Bills and Notes.

Money supply

The total stock of money available in the economy. Hong Kong has three measures of money supply: Money Supply definition 1 (M1) is defined as the sum of legal tender notes and coins held by the public plus customers' demand deposits placed with licensed banks. Money Supply definition 2 (M2) is defined as M1 plus customers' savings and time deposits with licensed banks plus negotiable certificates of deposit (NCDs) issued by licensed banks held outside the banking sector. Money Supply definition 3 (M3) is defined as M2 plus customers' deposits with restricted licence banks and deposit-taking companies plus NCDs issued by these institutions held outside the banking sector.

Nominal and Real Effective Exchange Rate (NEER and REER)

An indicator of the overall exchange rate value of the Hong Kong dollar against a basket of currencies of Hong Kong's principal trading partners. The nominal effective exchange rate (NEER) is a weighted average of the exchange rates between Hong Kong and its principal trading partners. The real effective exchange rate (REER) is obtained by adjusting the NEER for relative movements in the seasonally adjusted consumer price indices of those selected trading partners.

Abbreviations

1m moving average	One-month moving average
3m moving average	Three-month moving average
3m-on-3m	Three-month-on-three-month
AB	Aggregate Balance
AEs	Advanced economies
AIs	Authorized institutions
ASEAN	Association of Southeast Asian Nations
AutoML	Automated machine learning
AUC	Area under the curve of receiver operating characteritic
BAU	Business-as-usual
BIS	Bank for International Settlements
bn	Billion
BLR	Best lending rate
bps	basis points
CAR	Capital Adequacy Ratio
CBIRC	China Banking and Insurance Regulatory Commission
CPI	Consumer Price Index
CCPI	Composite Consumer Price Index
CCyB	Countercyclical capital buffer
CDs	Certificates of deposits
CET1	Common equity tier-one
CFR	Core Funding Ratio
CIs	Certificates of Indebtedness
CLR	Classified Loan Ratio
CMU	Central Moneymarkets Unit
CN	Mainland China
CNH	Offshore renminbi in Hong Kong
CNY	Onshore renminbi
COVID-19	Coronavirus Disease 2019
CRST	Climate Risk Stress Test
C&SD	Census and Statistics Department

CU	Convertibility Undertaking
CVS	Consumption Voucher Scheme
DI	Direct investment
DID	Difference-in-differences
DSR	Debt-servicing ratio
DTD	Distance-to-default
EBIT	Earnings before interest and tax
EBITDA	Earnings before interest, taxes, depreciation and amortization
ECB	European Central Bank
EFBNs	Exchange Fund Bills and Notes
EM	Emerging-market
EMEAD	Executive's Meeting of East Asia-Pacific Central Banks
EMEs	Emerging Market Economies
EPS	Earnings per share
ESG	Environmental, Social and Governance
ETFs	Exchange traded funds
EU	European Union
EUR	Euro
Fed	Federal Reserve
FI	Financial Institution
FOMC	Federal Open Market Committee
FX	Foreign exchange
GBP	British Pound Sterling
GDP	Gross Domestic Product
GDR	Granular data reporting
GHG	Greenhouse gas
GICS	Global Industry Classification Standard
HIBOR	Hong Kong Interbank Offered Rate
HK	Hong Kong
HKD	Hong Kong dollar
HKEX	The Hong Kong Exchanges and Clearing Limited
HKFRS	Hong Kong Financial Reporting Standard
HKMA	Hong Kong Monetary Authority
HKMC	Hong Kong Mortgage Corporation
HKPC	Hong Kong Productivity Council

HK$M3	Hong Kong dollar broad money supply
HSCEI	Hang Seng China Enterprises Index
HSI	Hang Seng Index
ICR	Interest Coverage Ratio
ICSD	International Central Securities Depository
ID	Indonesia
IFC	International Finance Corporation
IIF	Institute of International Finance
IPO	Initial Public Offering
IRRBB	Interest rate risk in the banking book
IT	Information technology
JPY	Japanese Yen
KR	South Korea
LCR	Liquidity Coverage Ratio
LIBOR	London Interbank Offered Rate
LERS	Linked Exchange Rate System
lhs	Left-hand side
LMR	Liquidity Maintenance Ratio
LPR	Loan Prime Rate
LR	Leverage Ratio
LTD	Loan-to-deposit
LTV	Loan-to-value
MLF	Medium-term Lending Facility
mn	Million
MDBs	Multilateral Development Banks
MIP	Mortgage Insurance Programme
MRF	Mutual Recognition of Funds
MY	Malaysia
MSCI	Morgan Stanley Capital International
NASDAQ	National Association of Securities Dealers Automated Quotations
NBER	National Bureau of Economic Research
NBS	National Bureau of Statistics
NCD	Negotiable certificate of deposit
NEER	Nominal effective exchange rate
NFCs	Non-financial corporates

NIM	Net interest margin
NGFS	Network of Central Banks and Supervisors for Greening the Financial System
NPL	Non-performing loan
NSFR	Net Stable Funding Ratio
OFCD	Organisation for Economic Corporation and Development
PH	The Philippines
OEFs	Open-ended funds
OIS	Overnight indexed swap
OTC	Over-the-counter
p.a.	Per annum
P2P	Peer-to-peer
PBoC	People's Bank of China
PD	Probability of default
PMI	Purchasing Managers' Index
ppt	percentage point
qoq	Quarter-on-quarter
qoqa	Quarter-on-quarter annualised
R&VD	Rating and Valuation Department
REER	Real effective exchange rate
Repo	Repurchase operation
rhs	Right-hand side
RMB	Renminbi
RML	Residential mortgage loan
ROA	Return on assets
ROE	Return on equity
RRR	Required reserve ratio
RTGS	Real Time Gross Settlement
RWA	Risk-weighted assets
SDR	Special Drawing Rights
SFGS	SME Financing Guarantee Scheme
SG	Singapore
SHIBOR	Shanghai Interbank Offered Rate
SKEW	Chicago Board Options Exchange Skew Index
SMEs	Small and medium-sized enterprises

SOEs	State-owned enterprises
SPM	Supervisory Policy Manual
SWIFTs	Society for Worldwide Interbank Financial Telecommunication
S&P 500	Standard & Poor's 500 Index
TH	Thailand
th	Thousands
tn	trillion
TNA	Total net assets
TWI	Trade Weighted Index
UK	United Kingdom
US	United States
USD	US dollar
VAR	Vector Autoregression
VHSI	HSI Volatility Index
VIX	Chicago Board Options Exchange Market Volatility Index
wk	Week
WMP	Wealth management product
yoy	Year-on-year

Full text of this Report is available on the
HKMA website at **www.hkma.gov.hk.**

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