



HONG KONG MONETARY AUTHORITY
香港金融管理局

HALF-YEARLY MONETARY AND FINANCIAL STABILITY REPORT

March 2022

This Report reviews statistical information between the end of August 2021 and the end of February 2022.

Half-Yearly Monetary and Financial Stability Report

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Glossary of terms

Abbreviations

1. Summary and overview

The global economy entered 2022 on a soft footing but inflationary pressure continued to build, particularly in the US. Looking ahead, the global economic outlook is subject to significant uncertainty, including the risk of a major virus outbreak as well as stronger-than-expected monetary policy tightening if US inflation proves more persistent and broad-based than expected. Any aggressive tightening of monetary policy by the US Federal Reserve (Fed), and hence global financial conditions, would weigh on the recovery of the more fragile emerging market economies (EMEs). More recently, the outbreak of military conflict between Russia and Ukraine could entail significant spillovers to the global economy through trade and financial channels and could complicate the global monetary policy outlook.

The Hong Kong dollar exchange rate softened during the review period while continuing to trade in a smooth and orderly manner. With total deposits increasing moderately during the period, there was no notable sign of outflows from the Hong Kong banking system. For 2021 as a whole, total bank credit recorded accelerated growth. Meanwhile, the residential property market has softened somewhat since mid-2021.

In the near term, the rapid spread of the Omicron variant could threaten the ongoing economic recovery. This, coupled with risks of a faster-than-expected pace of US monetary policy normalisation, will likely pose challenges to banks' credit risk management. Banks should remain vigilant and carefully assess the impacts of these risk factors on the asset quality of their loan portfolios.

The external environment

The global economy entered 2022 on a soft note with slowing momentum since late 2021, due to the spread of the highly contagious Omicron variant that led to increased mobility restrictions worldwide, as well as persistent supply bottlenecks that continued to weigh on production. Meanwhile, global inflationary pressure continued to build and has broadened out across a wide range of goods and services in major advanced economies (AEs), particularly the US, amid demand-supply imbalances and labour shortages. More recently, surging commodity

prices and heightened financial market volatility amid the military conflict between Russia and Ukraine threaten to put further upward pressure on global inflation, and lead to an undesirable tightening of global financial conditions that could complicate the global monetary policy outlook.

Looking ahead, the global economic outlook is subject to significant uncertainty. In the near term, renewed lockdowns and a deterioration in supply bottlenecks cannot be ruled out in the event of a major virus outbreak. Amid growing risks that US inflation could prove more

persistent and broad-based than expected, the Fed has turned hawkish, accelerating the timetable for tapering asset purchases and rate hikes, as well as initiating discussions on balance sheet reduction. In the event the Fed has to tighten monetary policy aggressively, global financial conditions may also tighten, resulting in a deterioration in the debt-servicing ability of borrowers, and disruptive capital outflows that would weigh on the recovery of the more fragile EMEs. More recently, the military conflict between Russia and Ukraine could risk driving up global commodity prices durably, aggravating shortages in industrial supplies and fuelling financial market volatility. Relatedly, higher market volatility could also trigger redemption pressure on open-ended funds (OEFs), increasing their liquidity risk. Box 1 studies whether swing pricing, a liquidity management tool for OEFs, could reduce OEFs' liquidity risk in times of market stress, and discusses potential limitations of this tool.

In emerging Asia,¹ economic recovery continued in the second half of 2021, though the re-imposition of stringent containment measures in Southeast Asian economies dented their momentum in the third quarter while the regional technology goods exporters (i.e. South Korea and Singapore) continued to benefit from strong global demand. Although market consensus points to a broader-based recovery in emerging Asia in 2022, the region's near-term economic outlook is facing multiple headwinds. First, worries over possible new virus variants lingered, especially for regional economies with lower vaccination rates and tight public hygiene resources. Second, the imminent Fed policy normalisation could trigger capital outflows and currency depreciation pressures in the region, and economies that still need to maintain an accommodative monetary policy will face the difficult trade-off between containing outflow pressures on one hand and supporting growth on

the other. Third, the trade growth outlook is clouded by the slowdown in major economies as well as the potential shift in demand away from goods towards services amid the gradual re-opening of the global economy. Fourth, the Russia-Ukraine conflict has raised commodity prices which would feed through to the region's inflation while at the same time dragging consumption. These, together with the rise in global economic uncertainty, would complicate the monetary policy normalisation in the region. In particular, regional economies with weak growth momentum and energy-sensitive inflation would face more difficult trade-offs. To rebuild a more sustainable and resilient growth model in the long run, investors need to put more weight on environmental, social and governance factors in their investment metrics. Box 2 studies whether stock returns are sensitive to changes in perceived climate risks, and how such sensitivity is affected by firms' environmental performance.

In Mainland China, economic growth moderated in the second half of 2021 amid new waves of COVID-19 outbreaks, the power crunch, as well as tightening measures applied to the property market. Going forward, the Mainland economy may continue to face downward pressures in the near term, stemming from the ongoing property market downturn and Omicron outbreaks. As a result, Mainland authorities have set growth stabilisation as the top priority for this year, and a series of fiscal and monetary supportive measures have been introduced. Meanwhile, the total amount of onshore bond defaults decreased in the second half of 2021, along with reduced defaults of state-owned enterprises (SOEs). Box 3 discusses whether SOE bond pricing had improved in recent years amid increased SOE defaults. The overall risk in the banking sector remained manageable as Mainland banks, especially systemically important banks, have limited exposures to developer loans, as well as relatively low non-performing loan (NPL) ratios and high loan loss provisions.

¹ In this report, emerging Asia refers to the following six economies: Indonesia, Malaysia, the Philippines, Singapore, South Korea and Thailand.

The domestic economy

Hong Kong's economic recovery continued in the second half of 2021, albeit at a moderated pace compared to the first half. Sequentially, the seasonally-adjusted real gross domestic product (GDP) grew mildly as merchandise exports and private consumption were supported by sustained global economic recovery, improved local labour market conditions and the boost from the Government's Consumption Voucher Scheme. Year on year, the economy expanded by 5.1% in the second half of 2021 compared to 7.8% in the first half. For 2021 as a whole, the economy resumed positive annual growth of 6.4% for the first time since 2019.

Stepping into 2022, a new wave of local infections and the resultant tightening of social distancing measures have exerted pressure on domestic economic activities. In response, the Government introduced the fifth and sixth rounds of the Anti-epidemic Fund and additional countercyclical measures under the 2022/23 Budget to help support the economy.² To provide cash flow support, the 100% Personal Loan Guarantee Scheme and various guarantee products under the SME Financing Guarantee Scheme (SFGS) have been enhanced through higher maximum loan amounts and longer application and repayment periods. The HKMA, together with the banking sector, also extended the Pre-approved Principal Payment Holiday Scheme to the end of October 2022.³ The Scheme will also offer a one-year partial principal repayment option to the customers and the arrangement is also applicable to loans under SFGS.

For 2022 as a whole, Hong Kong's economic recovery is expected to continue, although at a slower pace compared to 2021, partly reflecting moderating global growth amid the lingering pandemic and a less favourable base effect. Specifically, Hong Kong's exports of goods will continue to benefit from the global economic expansion. The various capital works and infrastructure projects to be taken forward by the Government will also lend support to the economy. The Government forecasts real GDP growth for 2022 in the range between 2.0% and 3.5%, and the growth estimates by international organisations and private sector analysts average 1.6%. That said, the strength and speed of the economic recovery are subject to a number of uncertainties and risks as discussed above, especially those surrounding the pandemic and the US monetary policy normalisation path.

Alongside the economic recovery, the labour market further improved in the second half of 2021, with the seasonally-adjusted unemployment rate declining to 3.9% at year-end. Total employment also rebounded, albeit still below its pre-pandemic level. In early 2022, official data show that pressures on the labour market re-surfaced amid the new wave of local infections. Additionally, fewer new vacancies have become available, as suggested by the declining number of online job advertisements. In the near term, the new wave of local infections and the tightening of anti-epidemic restrictions will exert further pressures on the local labour market (especially the contact-intensive sectors). Further out, labour market conditions will depend on the epidemic situation and the pace of the domestic economic recovery.

Local inflationary pressures have generally increased in recent months, but remained moderate. Year on year, the underlying consumer price inflation edged up to 1.1% and 1.2% in the third and fourth quarters of 2021

² These measures include, among others, a one-off provision of HK\$10,000 electronic consumption vouchers to each eligible resident and tax deduction for domestic rental expenses. The Government estimates that these countercyclical measures, together with the spending in infrastructure projects and other items, will boost economic growth by around 3 percentage points.

³ The HKMA also announced on 11 January 2022 a further 90-day repayment deferment for trade facilities under the Pre-approved Principal Payment Holiday Scheme.

respectively, and stayed at 1.2% in January 2022.⁴ Inflation momentum, as measured by the annualised three-month-on-three-month underlying inflation rate, also picked up in recent months, in part driven by the rise in prices of dining out and some energy-related items. For the outlook, alongside rising import prices and the pandemic-induced logistic disruptions, local inflation is expected to edge up in the near term, but should stay broadly in check due to soft rentals and mild local labour cost pressures. Market consensus forecasts the headline inflation rate for 2022 to reach 2.4%. The Government projects the headline inflation rate to be 2.1% and the underlying inflation rate to be 2.0% in 2022.

Monetary conditions and capital flows

The Hong Kong dollar has eased gradually against the US dollar since September 2021, amid risk-off sentiment in the local stock market. While the Hong Kong dollar slightly rebounded once in October, it lost momentum due to lackluster net buying interest from the southbound Stock Connects, as well as the expectation of a stronger US dollar fueled by the Fed's upcoming monetary policy normalisation. Overall, the Hong Kong dollar remained in the strong side of the Convertibility Zone for most of the time and continued to trade in a smooth and orderly manner. With total deposits increasing moderately during the review period, there was no notable sign of outflows from the Hong Kong banking system.

Hong Kong's interbank market also continued to trade in a smooth and orderly manner. With ample interbank liquidity, Hong Kong Interbank Offered Rates stayed low during the period. The average lending rate for new mortgages increased slightly from 1.48 in July 2021 to 1.56% in

January 2022. The Best Lending Rates of major retail banks stayed unchanged between 5.00% and 5.50%.

The offshore renminbi banking business continued to flourish. In particular, Hong Kong's offshore renminbi (CNH) liquidity pool witnessed steady growth, with the total outstanding amount of renminbi customer deposits and certificates of deposit rising to RMB1,113.5 billion at the end of January 2022. While the outstanding amount of renminbi loans decreased, renminbi trade settlement continued to expand steadily. The average turnover of the renminbi Real Time Gross Settlement system in 2021 rose to RMB1,522.6 billion. Looking ahead, with Hong Kong's efficient financial infrastructure and the two-way Stock, Bond and Cross-boundary Wealth Management Connects, Hong Kong's offshore renminbi business is expected to benefit from the continuing liberalisation of the Mainland's capital account, rising demand for renminbi assets from international investors, as well as deepening regional economic and financial cooperation under the Belt and Road and the Guangdong-Hong Kong-Macao Greater Bay Area initiatives.

Asset market

On the back of global economic recovery and strong corporate earnings supported by government stimulus from monetary and fiscal policies, major equity markets continued to rally in the final quarter of 2021, resulting in the MSCI World Index hitting an all-time high of 3,262 points on 4 January 2022. However, major equity markets have consolidated since January 2022 due to rising concerns over the tightening stance of major central banks in advanced economies amid the surging inflation risk, sharp rise in commodity prices and the escalating Russian-Ukraine conflict.

⁴ Inclusive of the effects of the Government's relevant one-off relief measures, the year-on-year headline inflation rate was 2.3% and 2.0% in the third and fourth quarters of 2021, higher than an average of 1.6% in the first and second quarters of 2021.

In contrast to the continued rally in major equity markets, the Hong Kong stock market remained subdued in the final quarter of 2021, mainly affected by sharp declines in the technology stocks. After staging a rebound in early 2022, the development of pandemic situation in Hong Kong and the escalating Russian-Ukraine conflict sent the Hang Seng Index (HSI) to around 2-year low of 22,713 at the end of February.

Supported by steady issuances, both the Hong Kong dollar and CNH debt markets continued to grow in the second half of 2021. In tandem with the rise of the 10-year US Treasury yield amid accelerated inflation in the US, both sovereign and non-sovereign Hong Kong dollar bond yields increased in the review period. Supported by ample global liquidity and the introduction of two new fee waivers for Hong Kong-listed fixed income exchange traded funds and money market exchange traded funds, Hong Kong has continued to record bond fund inflows since September 2021.

For the near term, both the local equity and debt markets will remain susceptible to uncertainties surrounding the sustainability of the global economic recovery, the development of the pandemic under the rapid spread of the Omicron variant, rising energy prices, the monetary policies of major central banks in response to the resurgent inflation rate, as well as the escalating Russian-Ukraine conflict. For the CNH debt market, while the valuation of renminbi fixed-income assets will benefit from the prospective monetary policy divergence between the Mainland and other major advanced economies, the concerns over the rising renminbi bond defaults may still linger, which could dampen investors' demand. In the medium term, local debt market development is supported by a number of policy initiatives including the southbound Bond Connect and further possible issuance of renminbi municipal government bonds in Hong Kong.

The residential property market has softened somewhat since mid-2021, due in part to weakened asset market sentiment and the new wave of local infections. Transaction volume tapered off from a high recorded in the first half of 2021. After reaching a recent peak in September 2021, secondary-market housing prices also moderated by 1.2% in the final quarter. For 2021 as a whole, housing prices still rose by 3.6% thanks to the visible increase in prices in the first half of the year. In early 2022, recent market data show that the housing market continued to soften.

In the current challenging economic environment, 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 potential interest rate or property market shocks. Box 4 investigates the prevalence of residential mortgage loans offered by non-bank institutions using transactional big data, and discusses the related policy implications.

Looking ahead, the residential property market is subject to a number of uncertainties and risks as discussed previously. Domestically, the new wave of local infections and the re-tightening of social distancing measures could drag on the economic recovery and dampen the housing demand. Externally, the uncertainty over the Fed's policy interest rate outlook will continue to affect 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.⁵

The non-residential property market showed signs of stabilisation in the second half of 2021 following some improvement in the first half.

⁵ According to the Rating and Valuation Department's projections, on average more than 22,000 private residential flats a year will be completed in 2022–2023, higher than the annual average of the past five years.

However, while prices and rentals of industrial properties have generally risen to their pre-pandemic peaks, those of retail and office spaces are still below their peaks. The outlook for the non-residential property market will hinge on developments in the latest infection wave, as well as the evolving economic environment. For example, amid the new wave of local infections, tighter social distancing measures and the resultant weaker business sentiment could suppress the demand for commercial properties, especially office space in view of greater supply in the coming years. On the other hand, a resumption of quarantine-free travel with the Mainland may bode well for the non-residential property market.

Banking sector performance

Retail banks registered thinner profits in the second half of 2021 due to lower net-interest and non-interest incomes and higher operating expenses. The aggregate pre-tax operating profits of retail banks fell by 16.1% in the second half of 2021, compared with the same period in 2020. As a result, the return on assets fell to 0.50% in the second half of 2021 compared with 0.61% in the same period of 2020.

The robust capital and liquidity positions of the banking sector continue to provide strong buffers for banks to withstand shocks. The consolidated total capital ratio of locally incorporated authorized institutions (AIs) stood at a high 20.2% at the end of 2021, 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 also remained at high levels of 151.9% and 59.1% respectively in the fourth quarter of 2021. The latest Net Stable Funding Ratio of banks also stayed at levels well exceeding their statutory minimum requirements.

Bank credit recorded a decrease in the second half of 2021, mainly due to the high base effect arising from initial public offering (IPO)-related loans straddled at the end of June. Nonetheless, for 2021 as a whole, total credit of the banking sector still recorded an annual growth rate of 3.8%, accelerating from 1.2% in 2020. On a half-yearly basis, total loans and advances of all AIs decreased by 3.1% in the second half of 2021 (Chart 5.12). Excluding the IPO-related loans straddled at the end of June 2021, total loans and advances edged down slightly by 0.6% during the same period. This slight decline (excluding IPO-related loans) was driven by a mild decrease in domestic lending (comprising loans for use in Hong Kong and trade financing), while loans for use outside Hong Kong stayed largely the same. Classified loan ratios slightly increased in the second half of 2021, but remained at low levels by both historical and international standards.

From a longer term perspective, climate-related risks will likely have significant implications for financial stability. With the aim of strengthening our systemic risk analysis on climate-related issues, Box 5 develops a top-down analytical framework to assess the financial impacts of climate-related risks on non-financial corporates listed in Hong Kong based on reference climate scenarios by the Network of Central Banks and Supervisors for Greening the Financial System. An important finding is that the longer-term impact of climate transition risks on firms' default risks will be significantly smaller in the "orderly transition" scenario than in the "disorderly transition" scenario. Also, the impact of physical risks under these two scenarios is found to be lower than the "no action" scenario. Together, these results support the notion there are clear benefits to taking climate action and acting early.

In the near term, the rapid spread of the Omicron variant could threaten the economic recovery. This, coupled with risks of a faster-than-expected pace of US monetary policy normalisation and the possible downside risks to the global economy from the escalating Russian-Ukraine geopolitical tensions, will likely pose challenges to banks' credit risk management. Banks should remain vigilant and carefully assess the impacts of these risk factors on the asset quality of 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

As new COVID-19 variants (Delta and Omicron) spread rapidly worldwide and production bottlenecks persisted, the global economy slowed notably in late 2021 and entered 2022 with weaker momentum. Global inflationary pressures continued to build and has broadened out across a wide range of goods and services in major AEs, particularly the US. Rising inflation concerns have induced a more hawkish stance in the Fed's monetary policy, heightening the risk that a premature tightening of global financial conditions could pose headwinds to the currently elevated asset valuations, and to EMEs which are generally still lagging in terms of recovery. More recently, the Russia-Ukraine conflict reinforced some of these risks by raising energy and other commodity prices, as well as inducing volatility in global financial markets.

In emerging Asia, economic recovery continued in the second half of 2021 despite the Delta variant infection wave, with the tech exporters continuing to outperform other economies in the region. While the Omicron variant is unlikely to derail the region's recovery, uncertainties associated with any new virus variants will continue to cloud the regional economic outlook. In addition, the Fed's policy normalisation will risk triggering a regional asset price correction, while the slower growth in the major economies may also drag down growth in goods exports of the region. Meanwhile, the Russia-Ukraine conflict would complicate the monetary policy normalisation in the region by raising commodity prices and inflationary pressures on one hand, while dragging consumption and raising global economic uncertainty on the other hand.

In Mainland China, economic growth slowed in the second half of 2021 amid new waves of COVID-19 outbreaks, the power crunch, and tightening measures applied to the property market. Looking ahead, the Mainland economy may continue to face downward pressures stemming from the property market downturn and the Omicron outbreaks. In view of this, the government set growth stabilisation as the top priority for this year, with macroeconomic policies becoming more supportive.

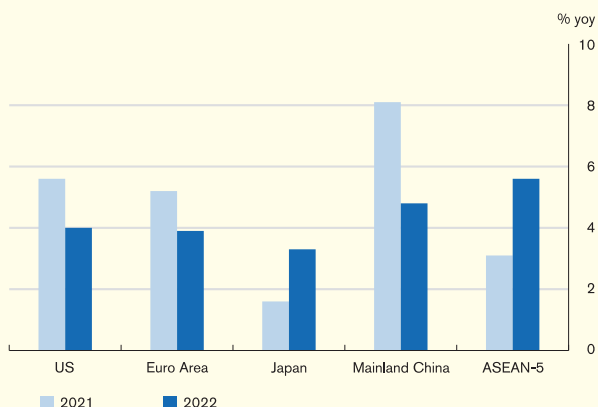
2.1 External environment

Global economic recovery slowed notably in the final quarter of 2021 as Omicron, a highly contagious variant, compounded the spread of the Delta variant, bringing new waves of infections and increased mobility restrictions

worldwide. In addition, supply chain issues (e.g. shipping bottlenecks and shortages of key production inputs such as semiconductors) continued to weigh on production. Going into 2022, the International Monetary Fund (IMF) projected in January that global GDP growth would decelerate from 5.9% in 2021 to 4.4% in

2022, reflecting the continued drag from the pandemic and supply constraints, reduced policy support in the US and other major AEs, as well as slowing growth momentum in Mainland China which offsets the expected growth rebound elsewhere in Asia (Chart 2.1).

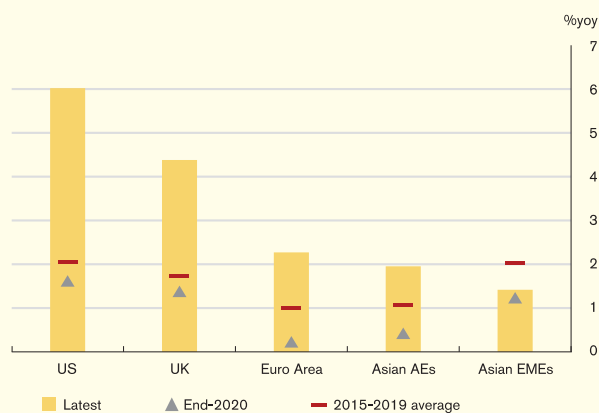
Chart 2.1
IMF's real GDP growth projections



Note: ASEAN-5 refers to Indonesia, Malaysia, the Philippines, Thailand and Vietnam.
Source: IMF.

Compounding the global growth slowdown, inflationary pressures continued to build across the board during the review period. Core inflation, which excludes food and energy prices, rose prominently in AEs, notably the US where policy stimulus since the pandemic has been more forceful, and inflationary pressures have broadened out across a wide range of goods and services amid supply bottlenecks, pent-up demand and labour shortages (Chart 2.2). Furthermore, the recent military conflict between Russia and Ukraine pushed up a wide range of commodity prices and could threaten to exacerbate the already-heightened global inflationary pressures.

Chart 2.2
Core consumer price index (CPI) rate in selected economies

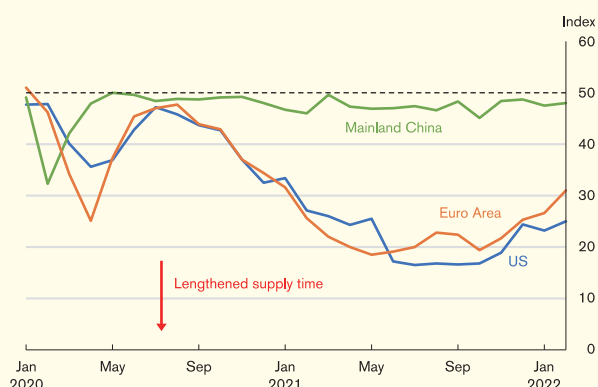


Notes:

- (1) Latest data refers to January 2022 for the US, UK and Euro Area, and December 2021 for the rest.
 - (2) "Asian AEs" includes Australia, New Zealand, Japan, South Korea, Hong Kong and Singapore.
 - (3) "Asian EMEs" includes Mainland China, Indonesia, Malaysia, the Philippines and Thailand.
- Source: CEIC.

Looking ahead, the global economic outlook is subject to significant uncertainty and risks are tilted to the downside, depending on the pandemic development and the associated supply chain disruptions, the evolving implications of geopolitical tensions for global trade, inflation, and financial market sentiments, as well as major central banks' policy responses to inflation. On the pandemic front, most governments have so far responded to the recent surge of Omicron cases with targeted measures, focusing on curtailing high-risk activities, encouraging remote working and promoting vaccination. Compared with previous lockdowns, these less draconian measures should help limit disruptions to supply chains, which have shown tentative signs of improvement since late 2021 (Chart 2.3). That said, in case of a major virus outbreak, renewed lockdowns and deteriorated supply bottlenecks cannot be ruled out.

Chart 2.3
Purchasing Managers' Index – Subindex on suppliers' delivery times



Source: IHS Markit.

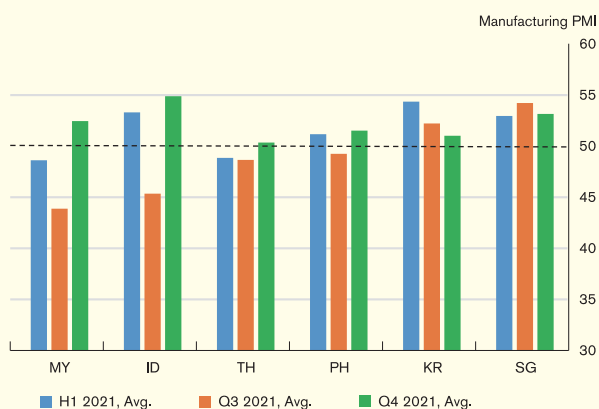
Provided that the pandemic remains under control, supply bottlenecks can be expected to dissipate gradually, offering some relief to goods inflation. However, several developments could render the current spell of global inflation more persistent than expected, including the risk of increases in commodity prices amid the military conflict between Russia and Ukraine and sanctions imposed on Russian energy import, the lagged feed-through of high input costs to prices of final products, earlier strong gains in global residential property prices that could translate into future higher rental costs, upside risks to wage growth amid tight labour markets, and rising inflation expectations.

In particular, with US inflation running at its fastest pace in decades, the Fed pivoted to a more hawkish policy stance at its December 2021 Federal Open Market Committee meeting, by no longer characterising high inflation as “transitory”, doubling the monthly pace of reduction in asset purchases from US\$15 billion to US\$30 billion with a view to concluding the asset purchase programme by March 2022, and initiating a discussion about balance sheet reduction. Indeed, recent market pricing suggested that there could be multiple Fed rate hikes in 2022. In contrast, the European Central Bank may face a more significant trade-off given the region’s greater trade and financial exposures to Russia and Ukraine.

Against this backdrop, and with the global debt level and asset valuations remaining elevated after a prolonged period of accommodative policies, a faster-than-expected Fed policy tightening in case of persistent inflation pressures could risk aggravating borrowers’ debt servicing ability and triggering financial market volatility. More recently, signs of US dollar shortage, including higher cross currency swap spreads, have emerged amidst growing risk-off sentiment alongside escalating geopolitical tensions in eastern Europe. Under this scenario of premature tightening of global financial conditions, EMEs with weaker fundamentals and those still suffering from the pandemic could be vulnerable to renewed growth slowdowns, currency depreciation and capital outflow pressures. Relatedly, higher market volatility could also trigger redemption pressure on open-ended funds (OEFs), increasing their liquidity risk. Box 1 studies whether swing pricing, a liquidity management tool for OEFs, could reduce OEFs’ liquidity risk in times of market stress, and discusses potential limitations of this tool.

In emerging Asia, economic recovery continued in the second half of 2021, although the spread of the Delta variant dented the growth momentum in the third quarter, especially in some Southeast Asian economies (Chart 2.4). This further widened the unevenness in the recovery between the Southeast Asian economies and regional technology goods exporters (i.e. South Korea and Singapore) which continued to benefit from the strong global demand for technology products. Inflationary pressures remained subdued in many emerging Asian economies, as economic activities remained generally weak.

Chart 2.4
Manufacturing PMI



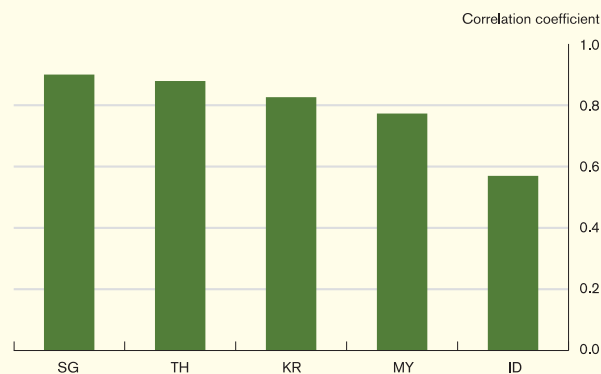
Sources: CEIC and HKMA staff calculations.

While the market consensus points to a broad-based recovery in emerging Asia in 2022, the region's near-term economic outlook is facing multiple headwinds:

First, while the economic impact of the spread of the Omicron variant in the region since late 2021 may be smaller than the previous infection waves, the region will continue to be concerned about the emergence of new COVID-19 variants, given that some regional economies' vaccination rates are still lagging behind and public hygiene resources may be tight.

Second, the Fed's policy normalisation may trigger capital outflow and depreciation pressures in the region. Those economies needing to maintain an accommodative monetary policy stance to support growth will face a difficult trade-off between containing capital outflow pressures on one hand and supporting growth on the other. At the long-end of the yield curve, the risk of a sudden surge in US long-term yields would also risk spilling over to the region's long-term bond yields as they were highly correlated in the past (Chart 2.5), raising the risk of an asset market correction in the region.

Chart 2.5
Correlation between Asia's 10-year sovereign bond yields and the corresponding US Treasury bond yields

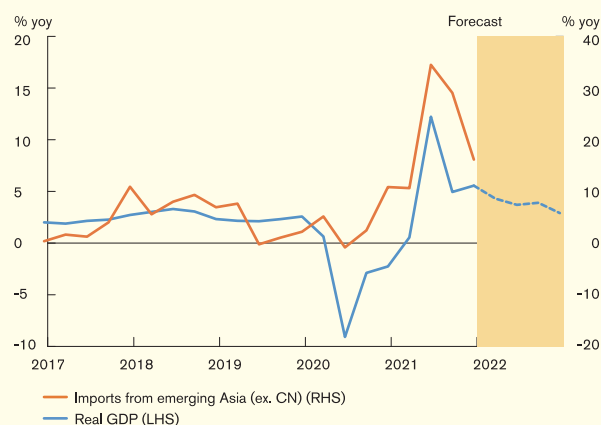


Note: Daily 10-year sovereign bond yields between 2011 and early December 2021 are detrended by the HP filter. The percentage deviations from the HP filter-implied trends (i.e. the yield gap) are used to calculate the correlation. The correlation coefficients are calculated by using the daily yield gap between December 2020 and December 2021 to reflect the latest situations.

Sources: Bloomberg and HKMA staff estimates.

Third, the region's goods trade outlook is clouded by the slowdown in the major economies and the potential shift in demand away from goods and towards services, amid the gradual re-opening of the global economy. This may weaken the region's export growth.

Chart 2.6
US: Imports from emerging Asia and real GDP



Notes: Actual data for imports and real GDP is used up to Q4 2021. Real GDP consensus forecast as of January 2022.

Sources: CEIC and Bloomberg.

Fourth, although the region has limited trade and financial linkages with Russia and Ukraine, the conflict has raised commodity prices which would feed through to the region's inflation while at the same time dragging consumption. These, together with the rise in global economic uncertainty, would complicate the monetary policy normalisation in the region. In particular, regional economies with weak growth momentum and energy-sensitive inflation would face more difficult trade-offs.

The pandemic also serves as a wake-up call to regional economies for the need to rebuild a more sustainable and resilient growth model in the long term, to better prepare for other high-impact risks such as climate change. To achieve this, it is necessary for investors to put more weight on environmental, social and governance (ESG) factors in their investment benchmark. Box 2 studies whether stock returns are sensitive to changes in perceived climate risks, and how such sensitivity is affected by firms' environmental performance.

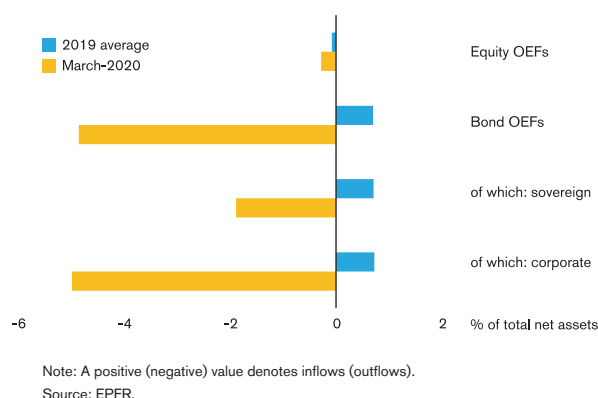
Box 1

Does swing pricing reduce investment funds' liquidity risk in times of market stress? – Evidence from the March-2020 episode

Introduction⁶

The COVID-19 pandemic led to a huge shock to the global financial market in March-2020. During the market turmoil, some open-ended funds (OEFs) suffered from significant outflows (Chart B1.1), which added pressure to their liquidity management.

Chart B1.1
Outflows from selected OEFs during the March-2020 episode



Apart from investors' liquidity demand, the significant outflows could also be driven by investors' incentive to take first-mover advantage (FMA) and redeem before others to avoid bearing the costs of redemptions, which could surge under stressed market conditions. To restrain outflows driven by FMA, some OEFs have adopted swing pricing, an OEF pricing rule that reduces investors' FMA. Although many OEFs used swing pricing in this episode⁷, whether it was effective in reducing OEFs' outflows has not been studied empirically.

Against such background, this box examines empirically whether swing pricing was able to reduce the OEFs' outflows and thus liquidity risk in the March-2020 episode. This box also identifies factors that may limit the effectiveness of swing pricing in times of market stress. Based on the assessment, we draw potential policy implications for financial stability.

What is first-mover advantage? How can swing pricing reduce it?

FMA refers to investors' attempts to pass on the cost of redemptions to remaining investors by redeeming before others. FMA mainly exists in OEFs adopting the traditional pricing rule, where the costs of investors' subscriptions and redemptions (e.g. transactions costs arising from portfolio adjustments) are reflected in the OEF price after the transactions have been made. Under this pricing mechanism, investors who redeem shares first do not have to bear these transaction costs. This creates incentive for them to redeem before others, especially when large redemption costs are anticipated. Thus, FMA is more pronounced in times of market stress as the redemption costs are expected to rise. This magnifies the redemption pressure and liquidity risk faced by OEFs.

Swing pricing, an alternative OEF pricing rule, has become more popular in the past decade as it can help reduce investors' FMA. When large net redemptions occur the swing pricing rule adjusts OEF's price down by the expected costs of redemptions, such that redeeming investors will bear the cost of redemptions themselves. Compared to the traditional pricing rule, this lowers their FMA and thus redemption incentives. As a result, the redemption pressure of OEFs could be reduced.

⁶ Wu, Wong and Fong (2022), "Does swing pricing reduce investment funds' liquidity risk in times of market stress? – Evidence from the March-2020 episode," *HKIMR working paper*, forthcoming.

⁷ A survey carried out by Investment Company Institute finds that 60% of the surveyed OEFs have used swing pricing in March-2020 for liquidity management, followed by temporary borrowing (6%).

Methodology and Data

We assess the effectiveness of swing pricing in the March-2020 episode using a matched sample of European OEFs that use swing pricing (“swing” OEFs) and those that cannot use swing pricing based on the country of domicile (“swing-ineligible” OEFs). Specifically, we test whether the “swing” OEFs suffered from smaller outflows than “swing-ineligible” OEFs during the March-2020 episode. We conduct the empirical test by using a panel data regression model that tries to explain OEFs’ net flows by various potential determinants, including whether or not OEFs adopt swing pricing. The monthly data sample, retrieved from Morningstar Direct⁸, covers the period from January 2012 to December 2020.

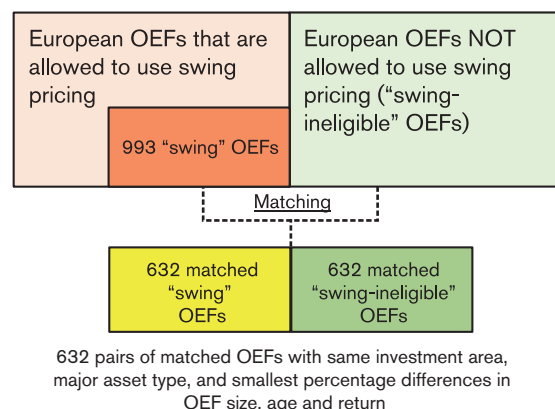
Chart B1.2 illustrates how the matched sample of “swing” and “swing-ineligible” OEFs is formed. First, among European OEFs that are allowed to use swing pricing (i.e. the light orange portion in Chart B1.2), “swing” OEFs are defined as those OEFs which the daily “actual” price (i.e. price adjusted by swing pricing and traded by investors) is different from the daily “unswung” price (i.e. price without swing pricing adjustment and not traded in practice) at least once in the sample period⁹. A total of 993 “swing” OEFs (i.e. the dark orange portion) are identified accordingly.

We then match individual “swing” and “swing-ineligible” OEFs that have the same investment area and major asset type, and the smallest percentage differences in terms of size, age and returns. This matching procedure helps ensure that the estimated impact of swing pricing is not driven by differences in other characteristics of “swing” and “swing-ineligible” OEFs. A total of 632 “swing” and 632 “swing-ineligible” OEFs are

thus matched (the yellow and dark green portion in Chart B1.2 respectively) and used in the regression analysis¹⁰.

Chart B1.2

Sample of “swing” and “swing-ineligible” OEFs



Did swing pricing reduce OEFs liquidity risk during the March-2020 episode?

We find that swing pricing significantly reduced outflows from “swing” OEFs during the March-2020 episode. Specifically, the left part of Chart B1.3 shows the net flows of “swing-ineligible” OEFs were estimated to have reduced by 3.87 percentage points (ppts) in March-2020, whereas that of “swing” OEFs only fell by 2.15 ppts, other things being equal. These imply that “swing” OEFs recorded smaller outflows than “swing-ineligible” OEFs by 1.72 ppts or 44% (i.e. 1.72 ppts divided by 3.87 ppts), suggesting that swing pricing may be effective in limiting OEFs’ redemption pressures during this episode.

The effectiveness of swing pricing shown above also applies to OEFs with different types of investors. Specifically, we divide our sample into “retail” and “institutional” OEFs and match them separately, and then re-estimate the panel data regression model on the two sub-samples¹¹. The middle and right parts of Chart B1.3, which

⁸ Morningstar Direct’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.

⁹ OEFs’ “actual” and “unswung” prices are disclosed by OEFs on a voluntary basis, and are obtained from Morningstar Direct.

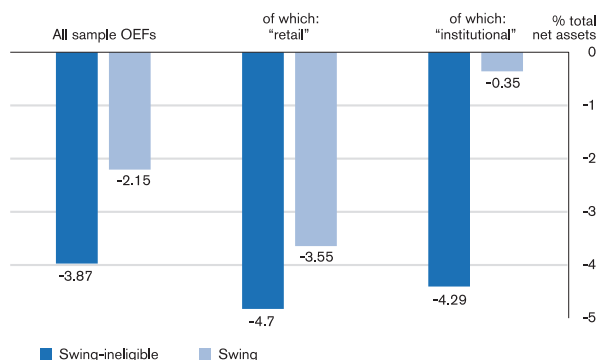
¹⁰ The remaining “swing” OEFs are not matched because there are no “swing-ineligible” OEFs with same investment area or major asset type.

¹¹ We classify an OEF as “institutional” OEF if its minimum subscription size exceeds US\$100,000 or fund fee is below 10 basis points or, if not, as “retail” OEF.

report the results for “retail” and “institutional” OEFs respectively, show that outflows were smaller for “swing” OEFs in both cases.

Chart B1.3

Estimated effect of swing pricing on OEF outflows in the March-2020 episode



Notes:

- (1) This chart depicts the estimated change in OEF net flows in March-2020 by different OEF groups. A negative value denotes OEF outflows.
- (2) The difference between the dark blue bar (i.e., “swing-ineligible” OEFs) and light blue bar (i.e., “swing” OEFs), which represents the effect of swing pricing, is statistically significant at 10% for “all sample”, “retail” and “institutional” OEFs.

Source: Morningstar and HKMA staff estimates.

What may limit the effectiveness of swing pricing?

We find three factors that may reduce the effectiveness of swing pricing in times of market stress. First, by design, swing pricing will increase the volatility of OEFs’ returns, which in turn could lead to a higher volatility of OEF’s flows. In times of market stress, the cost of redemptions would surge and the volatility of OEF returns could increase substantially¹², thus destabilising its flows and increasing its liquidity risk.¹³

Second, we find that the level of leverage in “swing” OEFs is higher than “swing-ineligible” OEFs¹⁴. With lower expected redemption pressure, “swing” OEFs may be tempted to take a

higher leverage to enhance their returns. In times of market stress, however, the high leverage could amplify “swing” OEFs’ losses and result in a larger redemption pressure.

Third, OEFs that are allowed to use swing pricing may not disclose their usage of swing pricing. However, we find that such a non-disclosure practice may have significantly weakened the effectiveness of swing pricing during the March-2020 episode¹⁵.

Conclusion and implications

This box finds that swing pricing was able to reduce OEFs’ liquidity risk in the March-2020 episode. In particular, OEFs that used swing pricing are found to have experienced smaller outflows than OEFs that could not use swing pricing during this stress episode.

However, the study also reveals three factors that may limit the effectiveness of swing pricing in times of market stress. These include (i) larger volatility of OEF flows due to swing pricing-led volatility of OEF returns; (ii) higher leverage employed by “swing” OEFs; and (iii) the lack of disclosure of swing pricing usage by some OEFs.

Taken together, our findings have two policy implications. First, while the evidence suggests that swing pricing could be an effective tool for OEFs’ liquidity management, it may come with “side effects”, including larger flow volatility and higher leverage. Proper design and combination with other risk management tools may be warranted for swing pricing to work in a more effective way. For example, in the context of higher leverage, the co-usage of swing pricing and limits on OEFs’ leverage may be considered. Second, policies to promote a higher level of relevant disclosures may also enhance the effectiveness of swing pricing.

¹² Swing pricing increased the return variance of the sample “swing” OEFs by 50% in March-2020.

¹³ Our estimation shows that a one-unit increase in the variance of OEF returns could increase the variance of OEF flows by 13%.

¹⁴ Our estimation shows that, holding other things equal, the average leverage ratio (defined as the ratio of total long asset position to total net assets) of “swing” OEFs is 10 ppts higher than “swing-ineligible” OEFs.

¹⁵ Our estimation shows that the mitigating effect could be reduced by as much as 51% when OEFs do not disclose their usage of swing pricing.

Box 2

Are investors sensitive to climate-related transition and physical risks? Evidence from global stock markets

Introduction¹⁶

With climate change posing significant uncertainties to firms' future cash flows, the extent to which climate risks are reflected in the prices of financial assets has become a concern. Low climate-risk sensitivity represents a potential vulnerability to financial stability, as abrupt changes in investor expectations, or sentiment over such risks, could trigger disorderly market repricing. Assessing the asset pricing implications of climate change, however, is complicated by the difficulty of quantifying climate risks. This study constructs newspaper-based indices of the public perception of climate-related physical and transition risks¹⁷, and explores whether global equity prices react to changes in perceived climate risks.

A newspaper-based proxy of climate risks

Our measures of physical and transition risks are constructed using the rich textual content embodied in more than 100,000 climate-related news articles published since 2000 in two widely-circulated international newspapers – The New York Times and The Guardian. We first compile two lexicons of terms related to physical risks and transition risks, respectively, that are then used to quantify the intensity of news coverage on the topics of interest. The resulting indices proxy for public awareness of climate risks, with the underlying assumption that intensified news reporting occurs when events

containing relevant information take place and increases the perceived relevance of such risks in the eyes of the public.

Charts B2.1 and B2.2 present our physical risks index and transition risks index, respectively, with the local highs and lows matching the occurrences of major global climate events such as natural disasters and international climate summits. Considering the global nature of climate change and the importance of multilateral efforts in driving national climate policies, our focus here is on the developments around the world rather than domestic ones only reported in local newspapers.

Chart B2.1
Global physical risks index

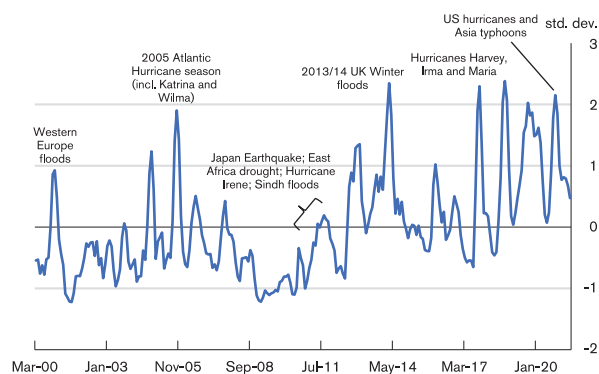
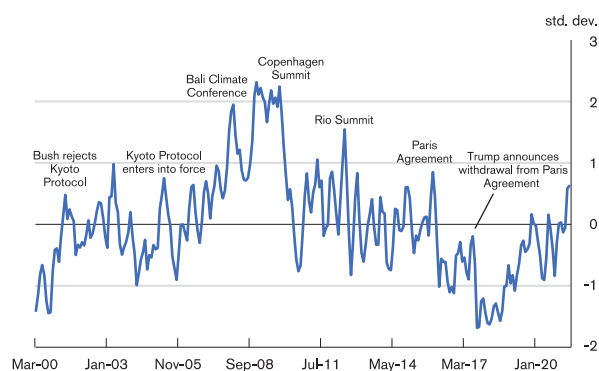


Chart B2.2
Global transition risks index



Note: Indices shown are normalised with their standard deviations ('std. dev'), and in 3-month moving averages.

Sources: The New York Times, The Guardian and HKMA staff calculations.

¹⁶ For details, see Zhang (2021) "Are investors sensitive to climate-related transition and physical risks? Evidence from global stock markets", *HKMA Research Memorandum* 2021/08.

¹⁷ "Physical risks" refer to the potential damage to asset values, productive capacity and overall economic activity caused by more frequent and severe weather events induced by climate change, while "transition risks" result from climate policy changes, unanticipated or otherwise, during the transition towards a greener economy that may cause some sectors to face impairment of asset values and/or higher business costs.

Assessing investor sensitivity to climate risks

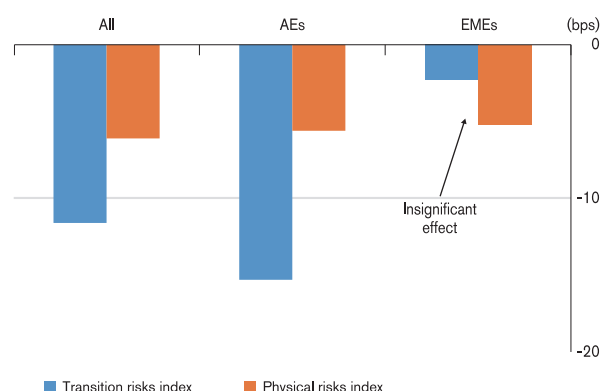
Using the indices outlined above, we estimate investor sensitivity to climate risks and firms' environmental performance with a stock returns model. Specifically, we regress monthly stock returns for a global sample of firms between January 2000 and May 2021 on changes in our two climate indices, their interactions with various measures of firm "greenness", and a set of controls commonly used in the asset pricing literature. Whether a firm is green or brown is defined by six dummy variables, shown in Table B2.1, that are constructed using annual environmental data from the Refinitiv Eikon and S&P Trucost databases.

Table B2.1
"Green" and "brown" dummy variables

Dummy variable	Dummy = 1 if :
Target emissions	Company has set targets / objectives on emissions reduction
Policy emissions	Company has a policy to improve emissions reduction
Emissions disclosure	Company has disclosed some form of emissions data
High ESG score	Company's ESG score is in the top 25th percentile
Carbon efficient	Company's total emissions-to-revenue ratio is in the bottom 25th percentile
Carbon inefficient	Company's total emissions-to-revenue ratio is in the top 25th percentile

We first estimate the model excluding the green / brown dummy variables, with the results shown in Chart B2.3. Blue (orange) bars represent the average stock price reaction of firms headquartered in each type of economy to increases in the transition (physical) risks index, with significant results shown in solid colours and insignificant results shown in shaded, more transparent ones. Consistent with higher climate risks representing an adverse state of the economy, increases in both climate indices are associated with negative stock returns, on average. The effect, however, is more visible in firms headquartered in AEs. For EME firms, there appears to be no significant reaction to changes in our climate indices.

Chart B2.3
Stock price reaction to rises in climate risk indices by firm headquarters



Note: Statistically significant results (p-values less than or equal to 5%) are shown in solid colours, while insignificant results are shown in shaded/more transparent colours.
Source: HKMA staff estimates.

A similar picture arises if we compare the equity pricing implications of being green versus brown for AE versus EME firms by interacting the dummy variables outlined in Table B2.1 with changes in the climate indices. Charts B2.4 and B2.5 present this interaction effect for AEs and EMEs respectively, with blue (orange) bars representing the average stock price reaction to increases in the transition (physical) risks index for firms in the green or brown category specified by the dummy variable along the x-axis.

As shown by the positive, solid-coloured bars above the green dummy classifications, greener firms are rewarded by the market when perceived climate risks increase, with the effect again more prevalent in AEs. Simply the act of setting an emissions target or policy or disclosing emissions information (regardless of actual environmental performance) distinguishes some AE companies from others. More sustainable AE firms characterised by higher ESG scores and carbon efficiency also outperform when climate transition risks increase, while carbon inefficient firms are penalised. This diverging stock market performance of green and brown corporates amid rising climate concerns is consistent with investors readjusting their expectations of firms' cash flows resulting from potential revisions to

climate policy and shifting their preferences towards greener firms¹⁸.

Chart B2.4
Stock price reaction of AE firms to rises in climate risk indices: green versus brown firms

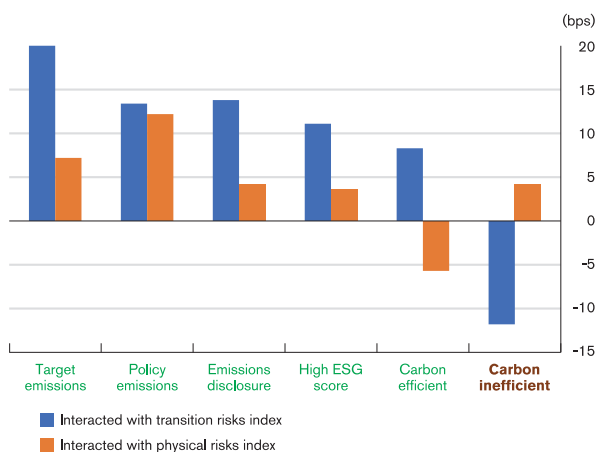
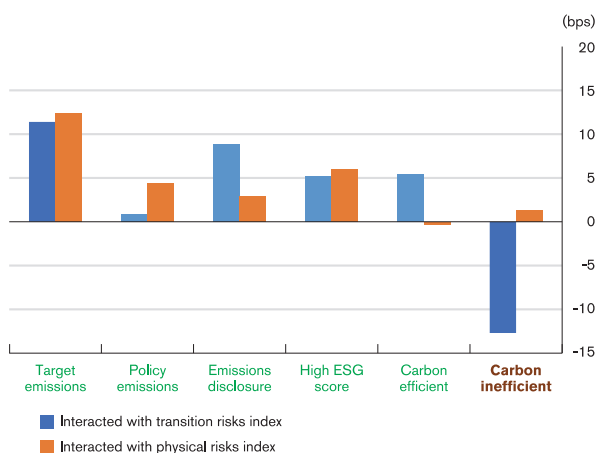


Chart B2.5
Stock price reaction of EME firms to rises in climate risk indices: green versus brown firms



Note: Statistically significant results (p-values less than or equal to 5%) results are shown in solid colours, while insignificant results are shown in shaded/more transparent colours.

Source: HKMA staff estimates.

For EME corporates, however, outperformance (underperformance) of green (brown) firms is modest when compared to their AE peers, with most measures of environmental performance registering an insignificant effect. Taken together with our earlier findings, our results point to a

relatively low level of climate-risk sensitivity among investors in EME markets. This stands in stark contrast to the fact that EMEs are arguably more vulnerable to climate-related transition and physical risks, with lower ESG integration and greater fossil-fuel dependency, greater fiscal constraints, and a lack of well-developed insurance markets (and hence greater uninsured losses against climatic disasters). Therefore, EME equity prices may not be reflecting the extent of climate risks that firms in these economies face, representing a potential vulnerability for financial stability, as sudden shifts in investor expectations over these risks could trigger sharp financial losses.

Concluding remarks

Using news-based measures of climate-related transition and physical risks, this study finds that increases in the public's perceived level of climate risks are associated with negative equity returns, with green (brown) firms outperforming (underperforming), and the effect is more visible in AE firms. The stock prices of EME corporates appear to be only modestly sensitive (if not insensitive) to global climate risks and their interactions with environmental performance, despite the very real threats climate change poses to firms in these economies. Our findings also highlight the need for increased effort to boost awareness of climate risks among investors of EME firms. Scaling up ESG integration will also be crucial for EMEs to broaden their investor base, as tackling climate change and green solutions increasingly dominate the agendas of global investors.

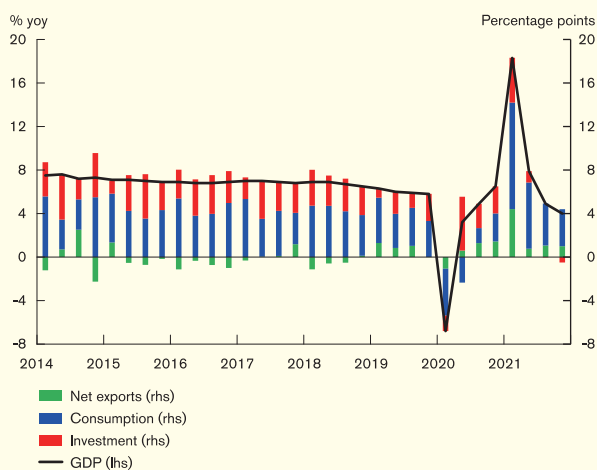
¹⁸ See, for example, Pastor, L., Stambaugh, R. F., & Taylor, L. A. (2020) "Sustainable Investing in Equilibrium", *Journal of Financial Economics*, <https://doi.org/10.1016/j.jfineco.2020.12.011>.

2.2 Mainland China

Real sector

After registering a strong recovery in the first half of 2021, the growth of the Mainland economy moderated in the second half of 2021 amid new waves of COVID-19 outbreaks, the power crunch, and tightening measures in the property market. In 2021, real GDP recorded a growth rate of 8.1%, higher than the official target of 6% (Chart 2.7).

Chart 2.7
Mainland China: Contribution to GDP growth by demand component



Sources: CEIC, National Bureau of Statistics and HKMA staff estimates.

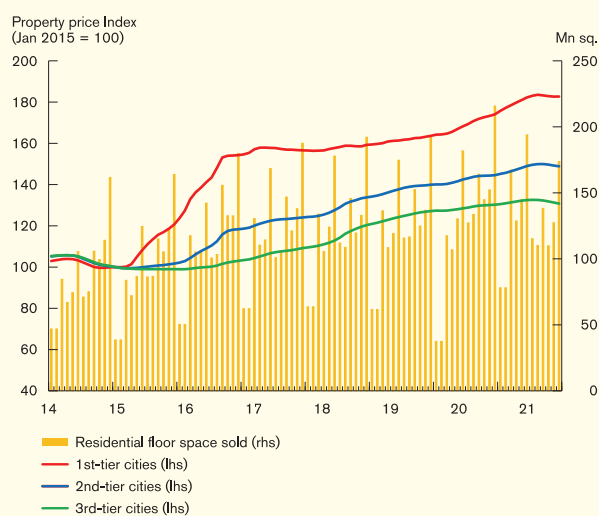
The Mainland economy may continue to face downward pressures in the near term. Domestically, while the Mainland authorities have marginally eased their property market policies recently, the ongoing property market downturn may persist in the near term and weigh on domestic demand, given the tight linkages of the real estate sector to other segments of the economy. In addition, the Omicron outbreaks may undermine the recovery of those businesses requiring in-person interactions. On the other hand, exports and manufacturing investment may continue to be supported by renewed external demand for COVID-related products (e.g. medical supplies

and work-from-home equipment), as well as technological upgrade and greenisation. With Mainland authorities setting growth stabilisation as the top priority and a growth target of around 5.5% for 2022, infrastructure investment is also expected to accelerate amid supportive fiscal and monetary policies (see the last subsection of this chapter for more details). According to the latest consensus forecasts, the Mainland economy is projected to expand by 5% in 2022.

Asset and credit markets

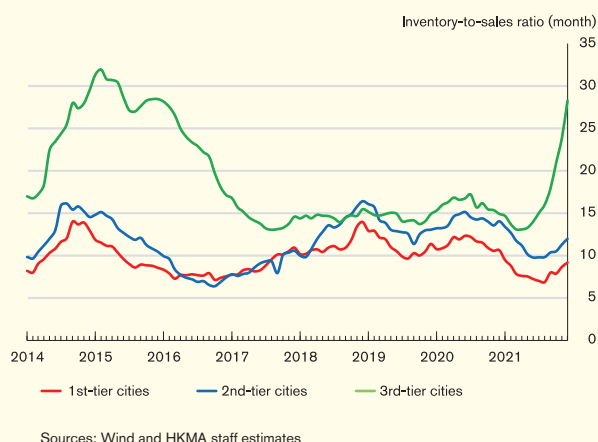
In the second half of 2021, Mainland property market activities contracted notably amid the tightening measures in place. While housing prices have eased across all tiers of cities, the cumulative decline in housing prices remained mild so far (Chart 2.8). Meanwhile, with weak market sentiment, residential floor space sold declined at a sharp pace on a year-on-year basis. Accordingly, the inventory-to-sales ratios picked up especially in third-tier cities, where the ratio rose visibly to 28 months at the end of 2021, close to the previous peak of 31 months in 2015 (Chart 2.9).

Chart 2.8
Mainland China: Residential prices by tier of cities and floor space sold



Sources: CEIC and HKMA staff estimates

Chart 2.9
Mainland China: Inventory-to-sales ratio by tier of cities



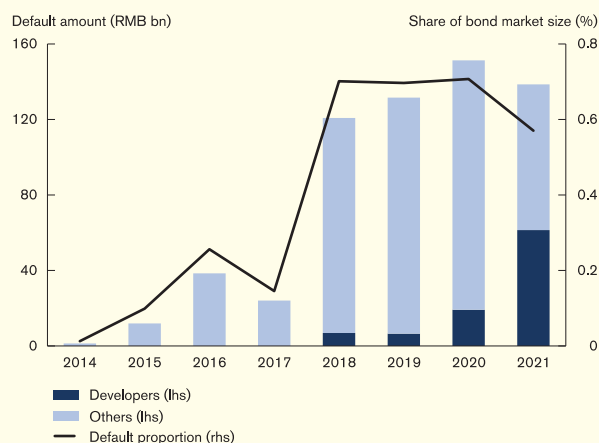
To stabilise the property market, the authorities have marginally eased their tightening policies towards the end of 2021 by vowing to meet the reasonable funding demand of property developers and mortgage needs of qualified home buyers¹⁹. While seeking to form a virtuous cycle in the property market, the 2021 Central Economic Work Conference also reiterated that “housing is for living in, not for speculation”, and thus an across-the-board loosening of policies is unlikely.

The total amount of onshore bond defaults decreased to RMB52 billion in the second half of 2021 from RMB87 billion in the first half, along with reduced onshore bond defaults of SOEs. Box 3 assesses the pricing of local SOE bonds and shows that recent credit events may have led to some differentiation of perceived government supports to local SOEs. Meanwhile, defaults of property developers remained high at RMB29 billion in the second half of 2021, compared with RMB33 billion in the first half. For 2021 as a whole, the total onshore bond defaults edged down amid a swift economic recovery, and the overall onshore bond default

rate remained below 1% (Chart 2.10)²⁰.

Nevertheless, defaults of property developers picked up to RMB61 billion, accounting for 44% of the total onshore bond defaults in 2021.

Chart 2.10
Mainland China: Bond default size and rate in the onshore market

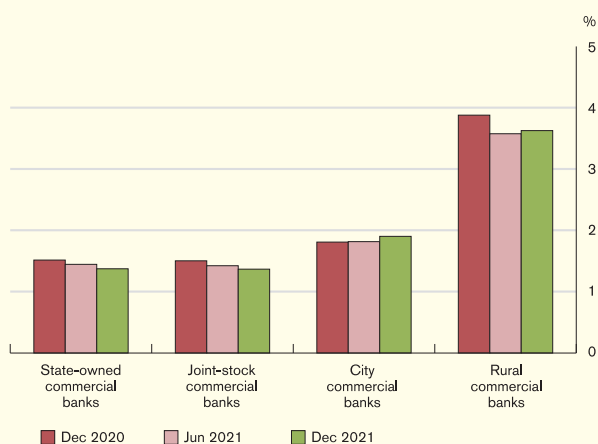


The overall risk in the banking sector remained manageable. Mainland banks especially systemically important banks have limited exposures to developer loans, and their exposures have also declined during the review period because of the deceleration in developer loan growth amid tightened lending standards. In addition, the NPL ratios of state-owned banks remained low and further declined to 1.37% in the fourth quarter of 2021 from 1.52% at end-2020 (Chart 2.11). Moreover, the provision coverage ratio of large Mainland banks improved to 239% at end-2021 from 215% in 2020, well above the regulatory requirement. That said, some smaller banks continued to face asset quality pressures. In particular, the NPL ratio of rural commercial banks stayed at a relatively high level of 3.63% in December 2021, despite declining from 3.88% at end-2020. This in part reflected an uneven recovery among different economic segments.

¹⁹ To shore up home buyers' confidence, the People's Bank of China (PBoC) and the China Banking and Insurance Regulatory Commission (CBIRC) announced that they would support bank lending to healthy developers to acquire incomplete projects by large risky developers, as well as protecting the interests and rights of home buyers.

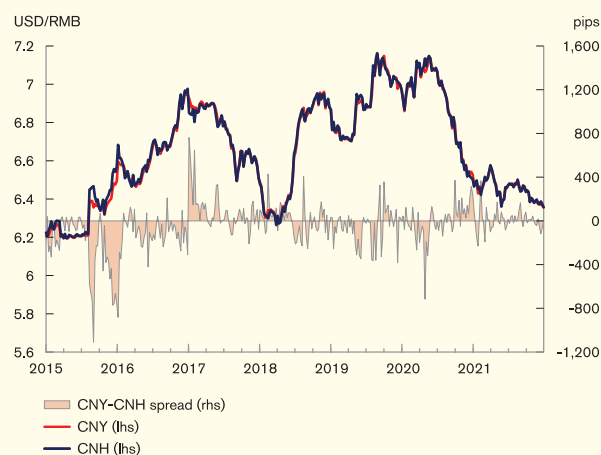
²⁰ Data covers enterprise and corporate bonds, medium-term notes, short-term commercial papers and private placement notes listed in both the interbank market and exchanges.

Chart 2.11
Mainland China: NPL ratio by bank type



Source: CEIC.

Chart 2.12
Mainland China: Onshore and offshore renminbi exchange rates against the US dollar



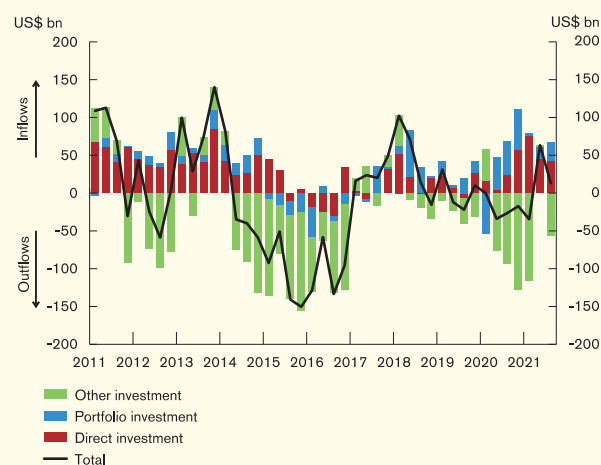
Sources: Bloomberg and HKMA staff estimates.

Exchange rate and cross-border capital flows

With strong export performance, the onshore renminbi (CNY) appreciated during most of the time in the second half of 2021. The offshore renminbi (CNH) exchange rate tracked closely its onshore counterpart, with the CNY-CN spread narrowing during the review period (Chart 2.12). To strengthen foreign exchange liquidity management of Mainland banks, the PBoC announced on 9 December 2021 a hike in the foreign exchange reserve requirement ratio (RRR) from 7% to 9%. In part reflecting market expectations of a narrowing interest rate differential between Mainland China and the US, the Bloomberg consensus forecast points to a softening of the renminbi exchange rate to 6.40 in the second quarter of 2022.

During the review period, capital outflow pressures remained largely subdued, with foreign exchange reserves remaining steady at above US\$3 trillion. The latest statistics on the balance of payments pointed to slight net capital inflows in the third quarter of 2021, as robust foreign direct investment inflows and a strong appetite of foreign investors for holding Mainland bonds offset the outflows stemming from increased holdings of foreign deposits by residents as well as more lending to non-residents. (Chart 2.13).

Chart 2.13
Mainland China: Net cross-border capital flows by type of flows



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

Looking ahead, cross-border capital flow volatility may increase amid uncertainties in the pandemic development as well as the emerging global monetary policy divergence especially between Mainland China and the US. Over the longer term, the further opening up of the Mainland financial markets may continue to attract more foreign investment.

Despite the expansionary fiscal policy stance, the overall risk of local government debt remained manageable, with Mainland local government debt-to-GDP ratio remaining low at 27% in 2021, similar to that in 2020, but some local governments with relatively weaker economic fundamentals may warrant closer monitoring.

Monetary and fiscal policy

In view of the downward economic pressure, the authorities strengthened the use of counter-cyclical measures during the review period, while iterating the importance to maintain the continuity, stability and suitability of the macro policy.

On the monetary policy front, the PBoC announced a cut of RRR by 50 basis points effective from 15 December, 2021, freeing up long-term liquidity by around RMB1.2 trillion to the banking system. The interbank market funding costs were further lowered by a cut of 10 basis points for both the 1-year medium-term lending facility (MLF) and 7-day reverse repo rates in mid-January 2022. To reduce the borrowing costs of business owners, the PBoC also lowered the 1-year loan prime rate (LPR) by 5 and 10 basis points respectively in late December 2021 and mid-January 2022. The 5-year LPR, a reference for mortgage rate, was also lowered in mid-January 2022 by 5 basis points. Amid the series of easing measures, the average 7-day repo rate and the 10-year government bond yield declined to 2.2% and 2.7% in January 2022 respectively from 2.6% and 2.8% in December 2021, lowering the funding costs for the real sector.

On fiscal policy, the policy stance was set to be more proactive, with faster public spending, acceleration in infrastructure investment, as well as tax and fee cuts for small and medium-sized enterprises (SMEs). Accordingly, the authorities front-loaded the special bond issuance quota of RMB1.46 trillion for the first quarter of 2022.

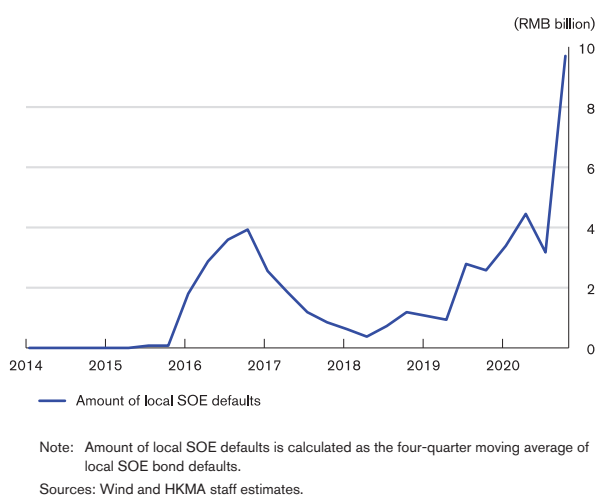
Box 3

The pricing of local SOE bonds in Mainland China

Introduction

Bond defaults by Mainland China's SOE have increased recently (Chart B3.1), while the bond default rate still remained very low at below one percent. The increased SOE defaults in part reflected the worsened financial positions of some Mainland SOEs amid the ongoing deleveraging campaigns and the economic headwinds stemming from the COVID-19 outbreak. The question is whether such credit events have helped to better-price the risk of SOE bonds in Mainland China. To shed some light on the question, this box explores how much local SOE bond pricing has deviated from the fundamentals (e.g. riskiness of issuers, characteristics of the bonds issued), and how the impact of SOE defaults, as well as local government fiscal space on such deviation, have changed over time.

Chart B3.1
Mainland bond market: the amount of local SOE bond defaults



Methodology and data

First, we estimate a *province premium* in the bond issuance yield of a local SOE. The *province premium* is defined as part of the SOE's financing cost that cannot otherwise be explained by the SOE's credit risk, which therefore captures the

extent to which the local SOE is supported by local government, as perceived by investors. Empirically the *province premium* is captured by a province dummy $Z_{p,t}$ in regression (1), where we regress the credit spread of bond k issued by SOE i , located in province p , at time t on a vector of bond-specific controls $X_{i,p,t}[k]$, firm-specific controls $F_{i,p,t}$, time-varying province dummies $Z_{p,t}$, and a residual component $\varepsilon_{i,p,t}[k]$:

$$\text{Spread}_{i,p,t}[k] = \beta_0 + \beta_1 \underbrace{X_{i,p,t}[k]}_{\text{bond risk}} + \beta_2 \underbrace{F_{i,p,t}}_{\text{issuer risk}} + \underbrace{\beta_3 Z_{p,t}}_{\text{province premium}} + S_i + \lambda_t + \varepsilon_{i,p,t} \quad (1)$$

The credit spread is constructed as the spread of bond k 's issuance yield over the yield of Mainland China's Treasury bill with the same duration on the same day t . Industry fixed effects S_i and quarterly fixed effect λ_t are included to take into account the sector-specific risk-pricing and the financial market conditions prevailing at the time of the issuance.

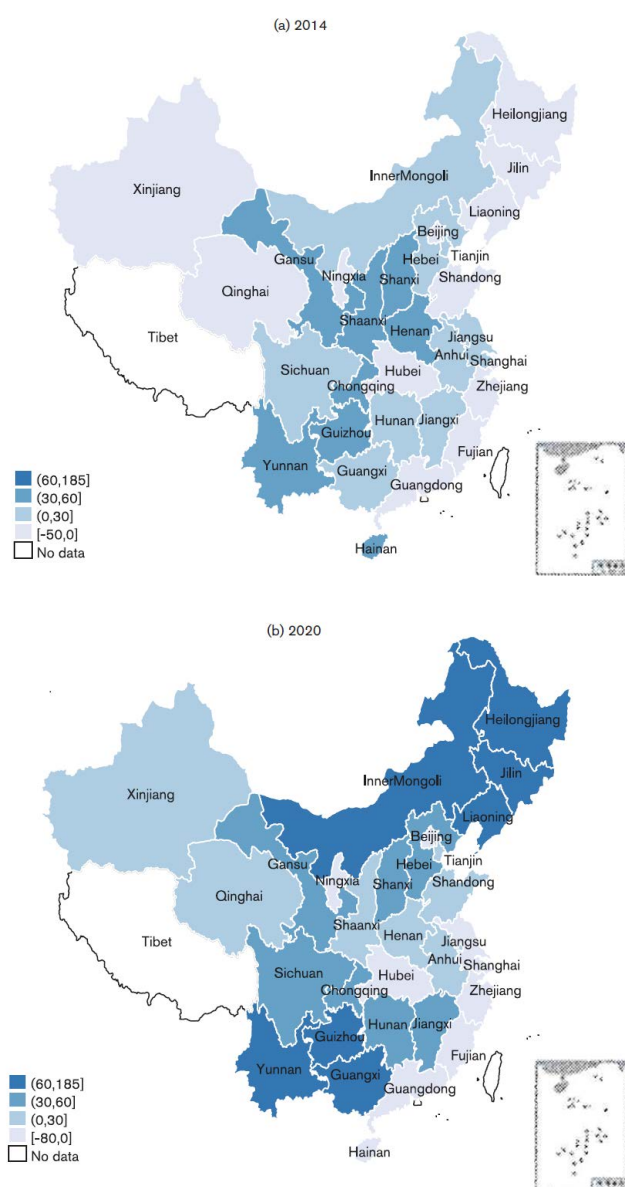
$\hat{\beta}_3$ is estimated at the quarterly frequency to capture the changing *province premium* while ensuring enough observations for each province.²¹

At the next step, we identify the potential driver of the estimated *province premium*. We consider several macroeconomic factors that are often studied in the sovereign credit risk literature (e.g. Aizenman et al. (2013)), including the

²¹ Here the *province premium* facing a local SOE bond is derived relative to a similar central SOE bond, which serves as a benchmark with the highest government support possible in Mainland China and the lowest default likelihood. Therefore, the higher the *province premium* (i.e., extra funding cost) facing a local SOE, the lower the investor-perceived support from the provincial government relative to the support which could be received by a central SOE from the central government.

government fiscal space, fixed asset investment (% of GDP), trade openness (sum of import and export volume, % of GDP), and the stage of economic development (GDP per capita). We also include a default dummy that takes the value of one if there is any local SOE bond default in the same province in the previous quarter, and zero otherwise. Our sample period is from the first quarter of 2013 to the fourth quarter of 2020 and the data are obtained from Wind and CEIC.

Chart B3.2
Estimated province premia 2014 vs. 2020 in Mainland China



Empirical results and policy implications

Chart B3.2 illustrates the estimated *province premia* in 2014 (prior to any SOE bond defaults) and 2020 (after increased local SOE defaults). In 2014, local SOEs in nearly half the provinces (the two lighter-coloured groups, Chart B3.2 (a)) were perceived as having no or little risk. However, the situation changed over the course of the next six years after the two waves of SOE defaults. In 2020 (Chart B3.2 (b)), the estimated *province premia* were higher across the board, except for a few South-eastern coastal regions. More notably, the *province premia* in North-eastern provinces rose from almost the lowest in 2014 to the highest in 2020. A similar shift appeared in the Southwestern regions as well, albeit to a lesser extent.

At the national level, the estimated average *province premium* also increased: it was roughly below 10 bps before picking up notably in 2018, and then hovered at 20-70 bps in recent years (Chart B3.3). Much of the increase was actually owing to the rising credit differentials, evidenced by a similar rise in the dispersion of *province premium* across different provinces, – measured either by standard deviation or by quartile deviation (Chart B3.4).

Chart B3.3
Estimated average province premium over time in Mainland China

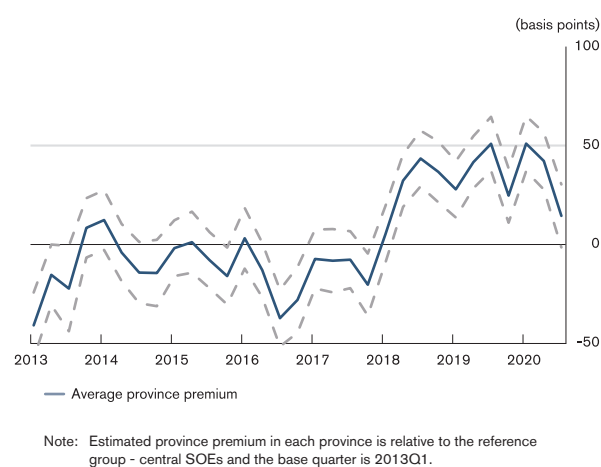


Chart B3.4
Dispersion of the estimated *province premium* over time in Mainland China

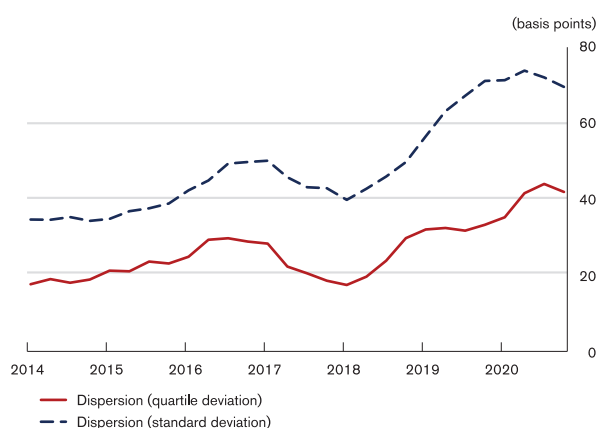


Chart B3.4 suggests that the estimated range of market-perceived risk increased more than two fold. This trend also appeared to coincide with the default cycle of local SOEs, which picked up during the SOE default period in 2016-2017 and rose further in 2019-2020. In fact, our empirical analyses suggest that, on average, any default incidences in the previous quarter would lead to an increase of 17-18 basis points in the funding cost for a local SOE issuing bonds in the next quarter (Table B3.1). This suggests that local SOE credit events may lead investors to differentiate provinces by the expected government support at the regional level.²²

Our empirical analyses also point to the importance of several other factors affecting the *province premium*. For instance, fixed asset investment (FAI)/GDP ratio is found to be significantly positive, implying that investors may demand a higher *province premium* when local economic growth relies more on fixed asset investment. Per capita GDP is negatively related to the *province premium*, showing that economic development tends to reduce provincial risk. Trade openness, on the other hand, does not seem to matter. Apart from the significant impacts of economic fundamentals on the

province premium, the fiscal space of local governments is found to be a statistically significant and economically important determinant as well. Specifically, a one percentage point rise in the debt/fiscal income ratio is estimated to increase the *province premium* by 0.11-0.12 basis points, while a one percentage point rise in the debt/GDP ratio is estimated to increase the *province premium* by 0.64-0.85 basis points.

Table B3.1
Fiscal space, local SOE bond default and *province premium* in Mainland China

Dependent variable	Contingent debt: LGB + LGFV		Explicit debt: LGB	
Est. premia	(1)	(2)	(3)	(4)
<i>Macro-fundamental</i>				
FAI/GDP	0.49*** (0.13)	0.55*** (0.13)	0.52*** (0.13)	0.57*** (0.13)
Trade openness	1.22 (1.67)	2.50 (1.74)	1.78 (1.63)	2.68 (1.61)
Per capita GDP	-12.43*** (3.49)	-13.67*** (3.38)	-10.45*** (3.51)	-12.31*** (3.39)
<i>Fiscal space</i>				
Debt/fiscal income	0.11*** (0.03)		0.12*** (0.03)	
Debt/GDP		0.64* (0.31)		0.85** (0.32)
<i>Credit event</i>				
Default	16.91** (6.22)	17.71** (6.49)	16.65** (6.20)	17.37** (6.42)
Province FE	Y	Y	Y	Y
Observations	930	930	930	930
R-squared	0.55	0.54	0.55	0.55

Note: Two sets of results are presented in Table B3.1, differing in the measure of fiscal space. (1) - (2) use the local government's contingent debt including bonds issued by local government financing vehicle (LGFV), and (3) - (4) only consider the local government bond (LGB) as its debt.

Conclusion

Our study examines the price discovery of the Mainland bond market. We find evidence that investors gradually asked for a higher compensation for local SOE bond financing. This coincides with the increased numbers of defaults of local SOEs, as well as the divergent fiscal space of local governments. Our findings suggest that credit allocation efficiency and the pricing of Mainland SOE bonds, can be improved with financial reforms such as the on-going SOE reforms that ensure market neutrality between

²² Also see for example Chapter 1 of the International Monetary Fund 2021, "Global Financial Stability Report: October 2021."

private firms and SOEs, and further enhancing public communication of the authorities' policy framework to manage the market expectations of implicit guarantees.

References

Aizenman, J., M. Hutchison, and Y. Jinjara (2013). What is the risk of European sovereign debt defaults? Fiscal space, CD's spreads and market pricing of risk. *Journal of International Money and Finance* 34, 37–59.

3. Domestic economy

With sustained growth in merchandise exports and private consumption, the Hong Kong economy continued to recover in the second half of 2021, resuming positive annual growth for the first time since 2019. Moving into 2022, the new wave of local infections and the resultant tightening of social distancing measures exerted pressures on domestic economic activities. While economic recovery is expected to continue for the year as a whole, its strength and speed are subject to uncertainties and risks, especially those surrounding the pandemic and the US monetary policy normalisation path. These cross-currents may also affect the labour market outlook following visible improvement in 2021. Local inflation will likely edge up in the near term alongside rising import prices, but soft domestic rentals and labour costs should keep overall price pressures in check.

3.1 Real activities

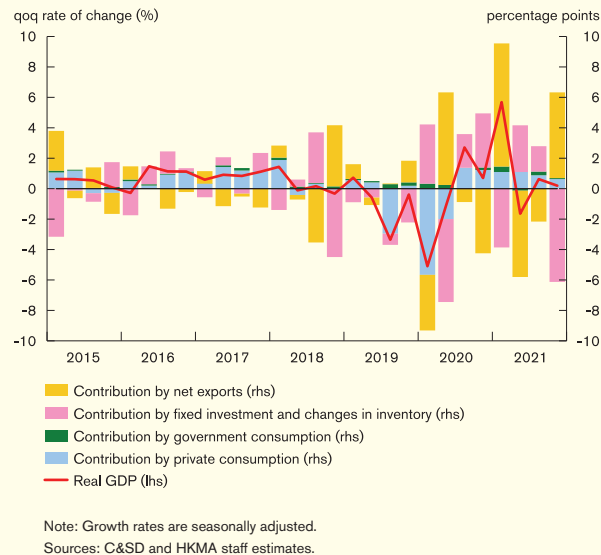
Hong Kong's economic recovery continued in the second half of 2021. Year on year, real GDP grew further by 5.5% in the third quarter and 4.8% in the fourth quarter (Table 3.A), albeit at a moderated pace compared to the first half of the year. For 2021 as a whole, real GDP expanded by 6.4%, marking the first annual growth since 2019.

Table 3.A
Real GDP growth

		Year-on-year growth rate (%)	Seasonally adjusted quarter-on-quarter growth rate (%)
2020	Q1	-9.3	-5.1
	Q2	-9.4	-1.1
	Q3	-4.1	2.7
	Q4	-3.4	0.7
2021	Q1	8.0	5.7
	Q2	7.6	-1.6
	Q3	5.5	0.6
	Q4	4.8	0.2

Source: C&SD.

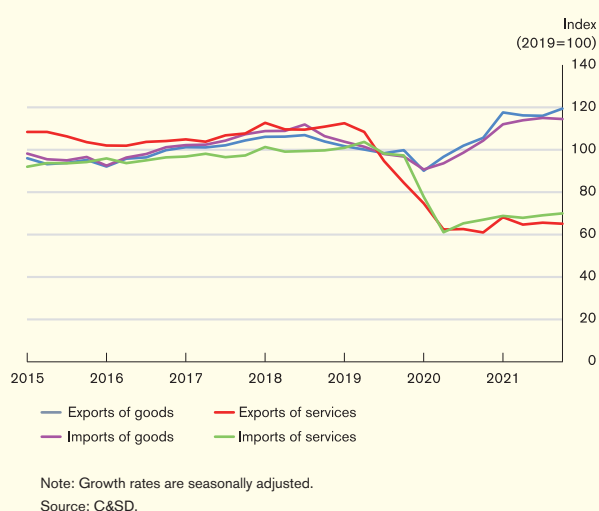
Chart 3.1
**Real GDP growth and contribution by major
expenditure components**



On a quarter-on-quarter basis, economic activities grew mildly by 0.6% and 0.2% in the third and fourth quarters respectively in 2021 (Chart 3.1). Domestically, private consumption powered ahead on the back of improved labour market conditions and the boost from the Government's Consumption Voucher Scheme. However, aggregate investment spending retreated in the final quarter following a strong

rebound in the preceding two quarters. Externally, Hong Kong's merchandise trade performance remained robust amid the continued global economic recovery, while trade in services stayed low partly because inbound tourism remained at a standstill (Chart 3.2).²³ On net, external trade dragged down GDP in the third quarter, but contributed positively to GDP growth in the fourth quarter.

Chart 3.2
Exports and imports in real terms



At the start of 2022, a new wave of local COVID-19 infections and the resultant tightening of social distancing measures exerted pressures on domestic economic activities. In response, the Government introduced the fifth and sixth rounds of the Anti-epidemic Fund and additional countercyclical measures under the 2022/23 Budget to help support the economy.²⁴ To provide cash flow support, the 100% Personal Loan Guarantee Scheme and various guarantee products under the SME Financing Guarantee Scheme (SFGS) have been enhanced through higher maximum loan amounts and longer

application and repayment periods. The HKMA, together with the banking sector, also extended the Pre-approved Principal Payment Holiday Scheme to the end of October 2022.²⁵ The Scheme will also offer a one-year partial principal repayment option to the customers and the arrangement is also applicable to loans under SFGS.

For 2022 as a whole, Hong Kong's economic recovery is expected to continue, albeit at a slower pace compared to 2021, partly reflecting moderating global growth amid the lingering pandemic and a less favourable base effect. Specifically, Hong Kong's exports of goods will continue to benefit from the global economic expansion.²⁶ The various capital works and infrastructure projects to be taken forward by the Government will also lend support to the economy. The Government forecasts real GDP growth for 2022 in the range between 2.0% and 3.5%, and the growth estimates by international organisations and private sector analysts average 1.6%. However, the strength and speed of the economic recovery are subject to a number of uncertainties and risks as discussed in previous chapters. In particular, the recent pandemic developments, a faster pace of US monetary policy normalisation and the heightened geopolitical concerns (e.g. the Russia-Ukraine conflict) have clouded the near-term global economic outlook including Hong Kong. On the other hand, a sooner-than-expected resumption of quarantine-free travel with the Mainland could be an upside that boosts local economic growth.

²³ Tourist arrivals in 2021 remained dismal, plummeting by 97.4% year on year.

²⁴ These measures include, among others, a one-off provision of HK\$10,000 electronic consumption vouchers to each eligible resident and tax deduction for domestic rental expenses. The Government estimates that these countercyclical measures, together with the spending in infrastructure projects and other items, will boost economic growth by around 3 percentage points.

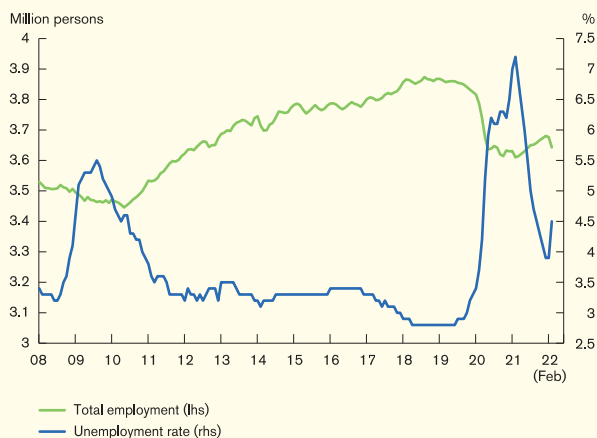
²⁵ The HKMA also announced on 11 January 2022 a further 90-day repayment deferment for trade facilities under the Pre-approved Principal Payment Holiday Scheme.

²⁶ In addition, as the Regional Comprehensive Economic Partnership among 10 members from The Association of Southeast Asian Nations (ASEAN) plus Mainland China, Australia, Japan, South Korea, and New Zealand entered into force on 1 January 2022, this largest free trade agreement in the world will facilitate regional trade flows and benefit Hong Kong's external trade.

3.2 Labour market conditions

Alongside the economic recovery, the labour market continued to improve in the second half of 2021, with the seasonally adjusted unemployment rate declining to 3.9% at year-end (Chart 3.3). Total employment in December 2021 also rebounded by 2.0% from a recent low in February 2021, albeit still below its pre-pandemic level. In early 2022, official data show that pressures on the labour market re-surfaced amid the new wave of local infections. Additionally, fewer new vacancies have become available, as suggested by the declining number of online job advertisements. In the near term, the new wave of local infections and the tightening of anti-epidemic restrictions will exert further pressures on the local labour market (especially the contact-intensive sectors). Further out, labour market conditions will depend on the state of the local epidemic and the pace of the domestic economic recovery.

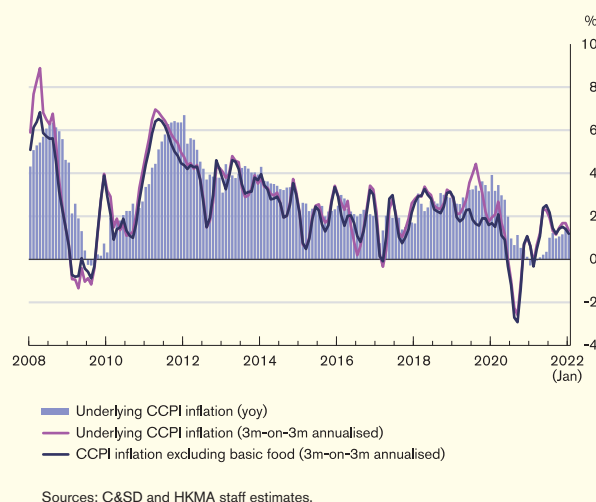
Chart 3.3
Labour market conditions



3.3 Inflation

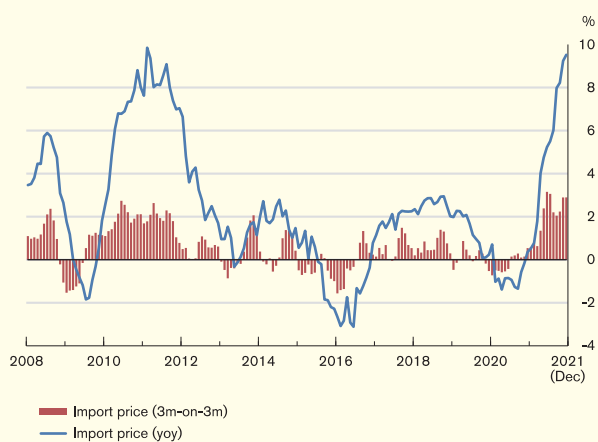
Local inflationary pressures have generally increased in recent months, but remained moderate. Year on year, the underlying consumer price inflation edged up to 1.1% and 1.2% in the third and fourth quarters of 2021 respectively, and stayed at 1.2% in January 2022 (Chart 3.4).²⁷ Inflation momentum, as measured by the annualised three-month-on-three-month underlying inflation rate, also broadly picked up in recent months. Specifically, prices of meals out and some energy-related items saw faster increases amid revived domestic demand and rising external prices (Chart 3.5). Meanwhile, the rental component of the Composite Consumer Price Index (CCPI) continued to decline in general, thereby restraining the overall inflation momentum (Chart 3.6). Real unit labour costs remained soft, despite slight increases in recent quarters, in part due to the improved real payroll per person (Chart 3.7).

Chart 3.4
Different measures of consumer price inflation



²⁷ Inclusive of the effects of the Government's relevant one-off relief measures, the year-on-year headline inflation rate was 2.3% and 2.0% in the third and fourth quarters of 2021, higher than an average of 1.6% in the first and second quarters of 2021.

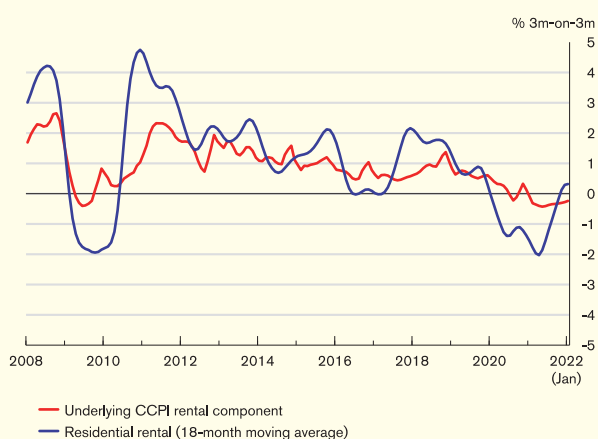
Chart 3.5
Hong Kong's import prices



Source: C&SD.

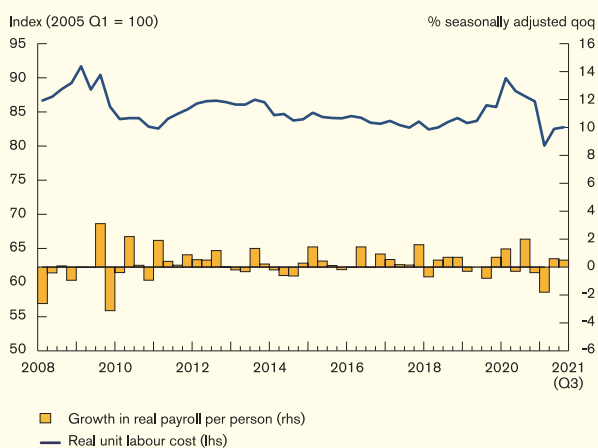
Looking ahead, alongside rising import prices and the pandemic-induced logistic disruptions, local inflation is expected to edge up in the near term, but should stay broadly in check due to soft rentals and mild local labour cost pressures. Market consensus forecasts the headline inflation rate for 2022 to reach 2.4%, and the Government projects the headline inflation rate to be 2.1% and the underlying inflation rate to be 2.0% in 2022.

Chart 3.6
CCPI rental component and market rental



Sources: C&SD and Rating and Valuation Department.

Chart 3.7
Unit labour cost



Sources: C&SD and HKMA staff estimates.

4. Monetary and financial conditions

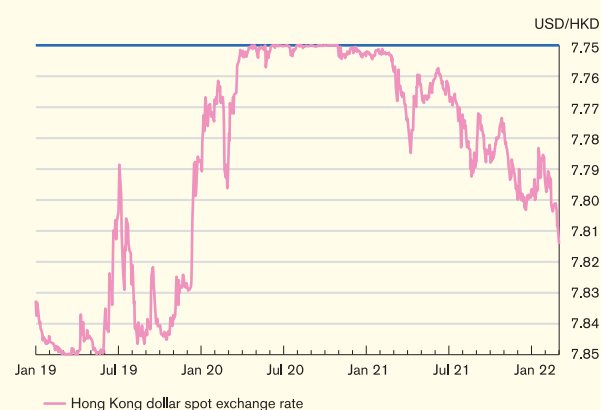
The Hong Kong dollar exchange rate softened during the review period amid risk-off sentiment in the local equity market and concerns over US monetary policy normalisation. With abundant Hong Kong dollar liquidity, the HIBORs continued to stay at low levels. Overall, the Hong Kong dollar exchange and money markets continued to trade in a smooth and orderly manner. In the near term, while uncertainties surrounding the US monetary policy, the pandemic and the rising geopolitical tensions may heighten the volatility in fund flows, Hong Kong is well-positioned to withstand the volatility given its ample foreign reserves and robust banking system.

4.1 Exchange rate and capital flows

For the most part, the Hong Kong dollar remained in the strong side of the Convertibility Zone and continued to trade in a smooth and orderly manner. Since September 2021, the Hong Kong dollar has eased gradually against the US dollar amid risk-off sentiment in the local equity market (Chart 4.1). While the Hong Kong dollar rebounded slightly in October 2021 as market sentiment improved, it lost momentum thereafter, due to lacklustre net buying interests from the southbound Stock Connects (Chart 4.2), as well as the expectation of a stronger US dollar along with the Fed's hawkish shift in its monetary policy outlook. Over the review period, the IPO pipeline remained supportive of the Hong Kong dollar (Chart 4.3).²⁸

With total deposits increasing moderately during the review period, there was also no notable sign of outflows from the Hong Kong banking system²⁹. Meanwhile, the latest Balance of Payment statistics suggested non-residents' direct investment inflows into Hong Kong continued in the second half of 2021, and did not show any abnormal cross-border flow pattern.

Chart 4.1
Hong Kong dollar exchange rate



Source: HKMA.

²⁸ Data from Hong Kong Exchanges and Clearing Limited (HKEX) show that there were 159 active applications for listing in Hong Kong at 28 February 2022. Among the total, the listing applications of 24 companies were approved, while the applications of 135 companies were still being processed.

²⁹ For a detailed analysis of Hong Kong's deposit growth, see section 4.2.

Chart 4.2
Net buying flows through southbound Stock Connects

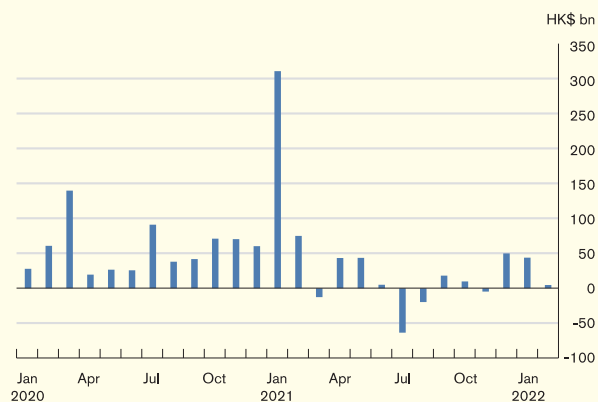
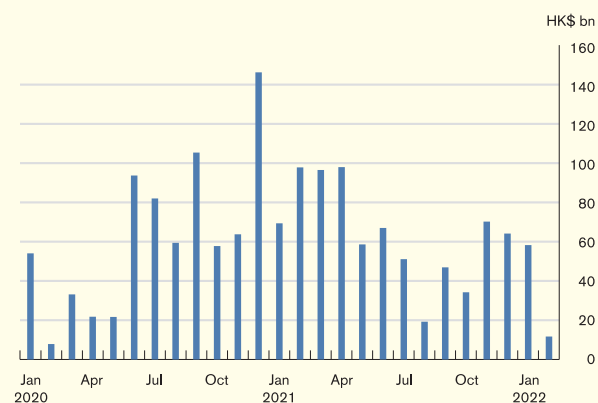
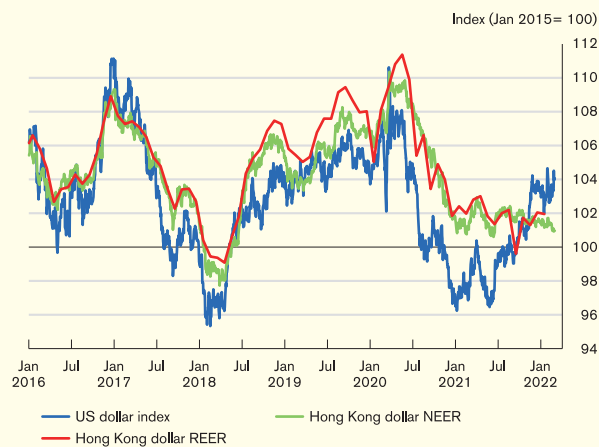


Chart 4.3
Equity funds raised in HKEX



Reflecting the appreciation of the renminbi against the Hong Kong dollar, the Hong Kong dollar nominal effective exchange rate index (NEER) stayed flat despite a strengthening of the US dollar during the review period (Chart 4.4). Given the small inflation differential between Hong Kong and its trading partners, the Hong Kong dollar real effective exchange rate index (REER) generally followed the movement of the NEER.

Chart 4.4
Nominal and real effective exchange rate index



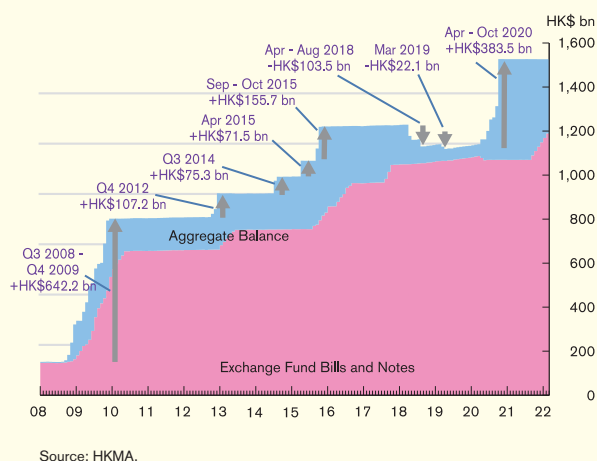
Looking ahead, uncertainties surrounding the US monetary policy, ongoing pandemic developments and the rising geopolitical tensions may heighten fund-flow volatility. Along with rising US dollar interest rates, in accordance with the normal functioning of the Linked Exchange Rate System (LERS), any possible Hong Kong dollar fund outflows (pace and size will depend on the prevailing market conditions) might weaken the Hong Kong dollar exchange rate and trigger the weak-side Convertibility Undertaking. Given the ample foreign reserves position and the robust banking system, Hong Kong is well-positioned to withstand the fund-flow volatility without compromising its financial stability.

4.2 Monetary environment and interest rates

Hong Kong's monetary environment remained accommodative during the review period. The Hong Kong dollar Monetary Base increased by 1.4% during the eight-month period since the end of June 2021, mainly driven by an increase in Certificates of Indebtedness. Reflecting the increased issuance of Exchange Fund Bills (EFBs) to meet the ongoing demand by banks amidst the abundance of liquidity in the banking system, the Exchange Fund Bills and Notes

(EFBNs) rose by HK\$119.7 billion to HK\$1,188.7 billion and the Aggregate Balance (AB) (before Discount Window activities) correspondingly decreased by HK\$119.9 billion to HK\$337.6 billion during the review period (Chart 4.5).³⁰ At the same time, Government-issued notes and coins remained relatively stable.

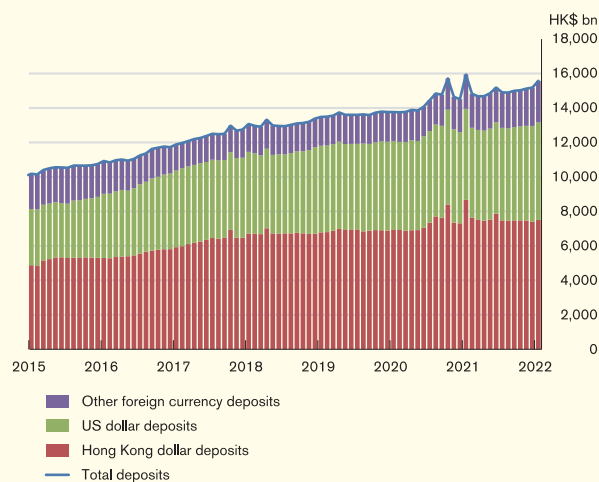
Chart 4.5
Aggregate Balance and Exchange Fund Bills and Notes



Source: HKMA.

In the six-month period since the end of July 2021, total deposits with authorized institutions (AIs) increased moderately by 4.5% and the Hong Kong dollar deposits also increased modestly by 0.3%. It should be noted that monetary statistics are subject to volatility due to a wide range of transient factors, such as seasonal and IPO-related funding demand as well as business and investment-related activities. It is therefore more appropriate to observe the longer-term trends. For 2021 as a whole, total deposits and Hong Kong dollar deposits grew by 4.6% and 1.4% respectively.

Chart 4.6
Deposits with authorized institutions by currency

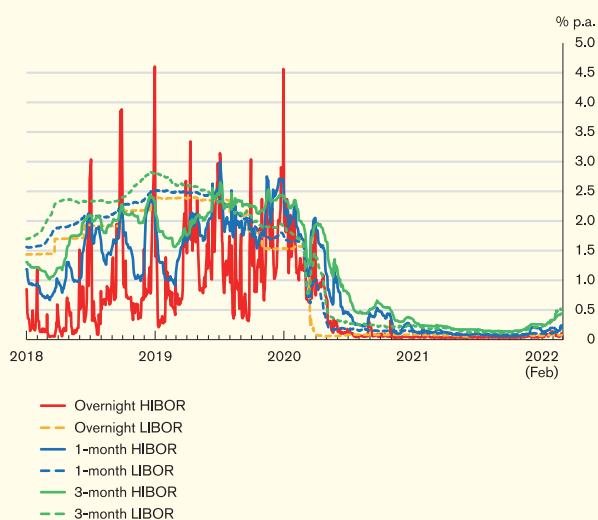


Source: HKMA.

Overall, Hong Kong's interbank market continued to trade in a smooth and orderly manner. With abundant liquidity in the banking system, HIBORs continued to stay at low levels despite concerns over US monetary tightening (Chart 4.7). Partly reflecting anticipated funding needs towards year-end, HIBORs witnessed a slight pickup in December 2021. The average lending rate for new mortgages increased slightly from 1.48% in July 2021 to 1.56% in January 2022. On the other hand, the Best Lending Rates of major retail banks stayed unchanged between 5.00% and 5.50% during the review period. Looking ahead, the abundant liquidity in the banking system should provide a sizeable cushion in the event of large-scale capital market activities or financial market volatility.

³⁰ To meet the ongoing demand for Exchange Fund paper by banks amidst the abundance of liquidity in the banking system, the HKMA increased the issuance size of 91-day Exchange Fund Bills during the period from September 2021 to February 2022. The issuance size of the Bills increased by a total of HK\$120 billion, and the Aggregate Balance decreased by the same amount. The increase in the supply of Exchange Fund Bills is consistent with the Currency Board principles, as the additional issuance simply represents a change in the composition of the Monetary Base.

Chart 4.7
Hong Kong dollar and US dollar interbank interest rates

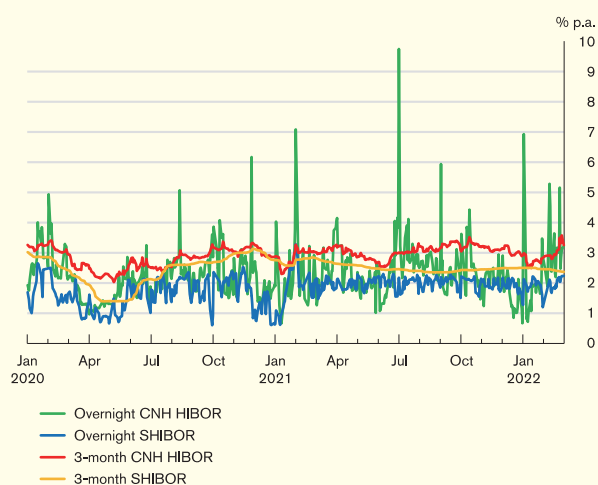


Sources: CEIC and HKMA.

Offshore renminbi banking business

The CNH interbank market continued to function normally during the review period.³¹ The overnight CNH HIBOR witnessed modest fluctuations in late December 2021 due to seasonal liquidity demand near the year-end, whereas the three-month CNH HIBORs remained relatively steady and hovered around 3% throughout the review period (Chart 4.8).

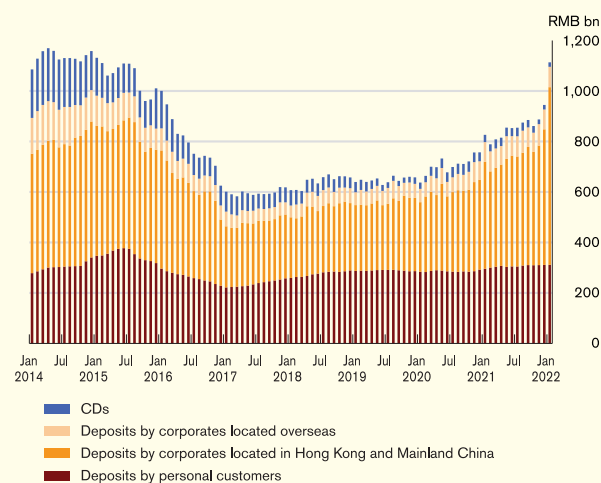
Chart 4.8
The overnight and the three-month offshore renminbi HIBOR fixings



Source: CEIC.

Hong Kong's CNH liquidity pool continued to expand steadily during the second half of 2021. The total outstanding amount of renminbi customer deposits and certificates of deposit (CDs) recorded a 30.3% increase in the six-month period since the end of July 2021, amounting to RMB1,113.5 billion at the end of January 2022 (Chart 4.9 and Table 4.A). Among the total, the renminbi customer deposits expanded by 33.5%, largely driven by inflows from corporations, more than offsetting the 48.0% decline in the outstanding amount of CDs.

Chart 4.9
Renminbi deposits and certificates of deposits in Hong Kong



Source: HKMA.

Table 4.A
Offshore renminbi banking statistics

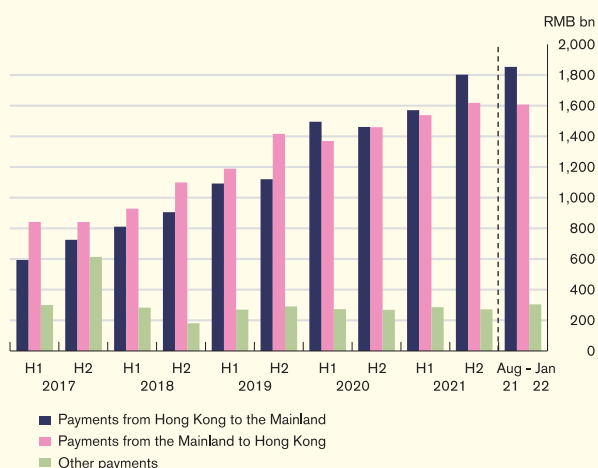
	Dec 2020	Jan 2022
Renminbi deposits & CDs (RMB bn)	757.2	1,113.5
Of which:		
Renminbi deposits (RMB bn)	721.6	1,095.9
Share of renminbi deposits in total deposits (%)	5.9	8.6
Renminbi CDs (RMB bn)	35.5	17.6
Renminbi outstanding loans (RMB bn)	152.1	167.6
Number of participating banks in Hong Kong's renminbi clearing platform	206	213
Amount due to overseas banks (RMB bn)	99.4	127.7
Amount due from overseas banks (RMB bn)	97.3	82.9
	2020	2021
Renminbi trade settlement in Hong Kong (RMB bn)	6,324.1	7,083.6
Of which:		
Inward remittances to Hong Kong (RMB bn)	2,827.7	3,154.6
Outward remittances to Mainland China (RMB bn)	2,955.0	3,371.3
Turnover in Hong Kong's RMB real time gross settlement (RTGS) system (Daily average during the period; RMB bn)	1,191.5	1,522.6

Source: HKMA.

³¹ See Chapter 2.2 for the development of offshore and onshore renminbi exchange rates.

While the outstanding amount of renminbi loans decreased by 10.2% to RMB167.6 billion in the six-month period since July 2021, Hong Kong's renminbi trade settlement continued to pick up. Transactions handled by banks in Hong Kong amounted to RMB3,763.0 billion for the period between end-July 2021 and end-January 2022 (Chart 4.10), up by 18.3% compared with RMB3,181.0 billion during the same period last year. The deep pool of renminbi liquidity in Hong Kong continued to be adequate to support a large amount of renminbi payments and financing transactions. For 2021 as a whole, the average daily turnover of the renminbi Real Time Gross Settlement system rose to RMB1,522.6 billion from RMB1,191.5 billion recorded in 2020.

Chart 4.10
Flows of renminbi trade settlement payments



Source: HKMA.

In the period ahead, along with the establishment of the two-way Stock, Bond and Cross-boundary Wealth Management Connects, Hong Kong's offshore renminbi business is expected to benefit from the continuing liberalisation of Mainland's capital account, rising demand for renminbi assets from international investors, as well as deepening regional economic and financial cooperation under the Belt and Road and the Guangdong-Hong Kong-Macao Greater Bay Area initiatives.

Asset markets

Major equity markets continued to rally in the final quarter of 2021 but have consolidated since January 2022 amid rising concerns over the tightening stance of major central banks and the escalating Russian-Ukraine conflict. In Hong Kong, the stock market remained subdued in the final quarter of 2021, mainly affected by sharp declines in technology stocks. The global risks as well as uncertainties surrounding the development of pandemic in Hong Kong sent the Hang Seng Index to around 2-year low at the end of February. The CNH debt market in Hong Kong continued to grow steadily in the second half of 2021. Meanwhile, the residential property market softened somewhat since mid-2021, partly reflecting a weakened asset market sentiment and the new wave of local infections.

4.3 Equity market

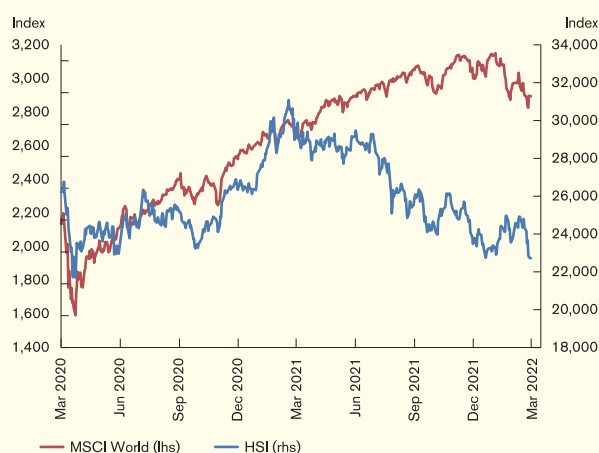
Major equity markets as a whole continued to rally in the final quarter of 2021, leading the MSCI World Index to hit an all-time high of 3,262 points on 4 January 2022 (Chart 4.11). The rally was supported by the global economic recovery and strong corporate earnings on the back of government stimulus from monetary and fiscal policies, although the pandemic remained a major risk concern for investors throughout the year. Major equity markets, however, have consolidated since early January 2022 on rising concern over the tightening stance of major central banks in AEs amid inflation risks, sharp rises in commodity prices, and the escalating Russian-Ukraine conflict.

In contrast, the Hong Kong stock market continued to underperform relative to other major global equity markets towards the end of 2021. After hovering between 24,000 and 26,500 points from September to mid-November, the HSI ended 2021 at 23,398 points, a drop of 14.1% from 2020. In early 2022, buying interests from value investors returned to the Hong Kong equity market, driving the HSI back to around

25,000 points in January. However, uncertainties surrounding the development of pandemic in Hong Kong and the escalating Russian-Ukraine conflict sent the HSI to around 2-year low of 22,713 at the end of February.

For the whole review period between end-August 2021 and February 2022, the HSI dropped by 12.2%, and the MSCI World Index declined by 5.2% (Chart 4.11).

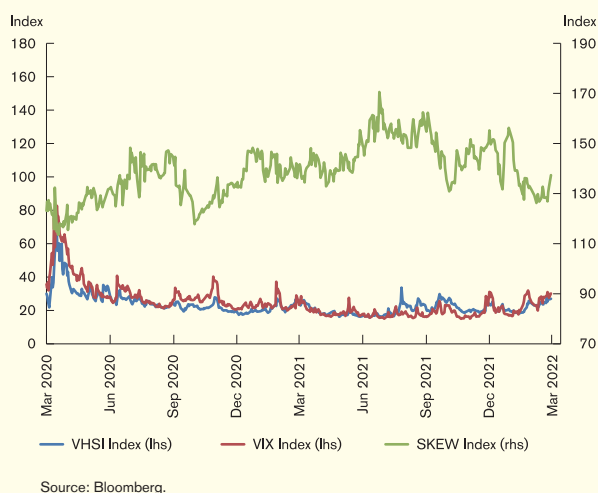
Chart 4.11
The Hang Seng Index and The MSCI World Index



Source: Bloomberg.

Equity market volatility spiked at the end of November 2021 due to the emergence of the highly infectious Omicron COVID-19 variant and has retreated somewhat since then. Although the SKEW Index fell from its record high in late June 2021, it has remained at an elevated level, reflecting investors' concerns about the risk of market corrections amid the long rally since the pandemic outbreak and hence the willingness to pay more for downside protection (Chart 4.12)³².

Chart 4.12
Option-implied volatilities of the Hang Seng Index and the S&P 500 Index, and the SKEW Index



Amid ample global liquidity, the Hong Kong stock market continued to record net inflows from international investors since the previous report (Chart 4.13). On the contrary, the southbound Stock Connects observed a significant net outflow in the third quarter of 2021 mainly over concerns of the impact of Mainland regulatory changes on technology stocks.

Nevertheless, buying interest through the southbound Stock Connects began picking up in December 2021 and registered a cumulative inflow of HK\$98.3 billion till the end of February. During the review period, the cumulative net buying amount increased by 5.7% to HK\$2,233.0 billion (Chart 4.14).

Chart 4.13
Equity market fund flows into Hong Kong

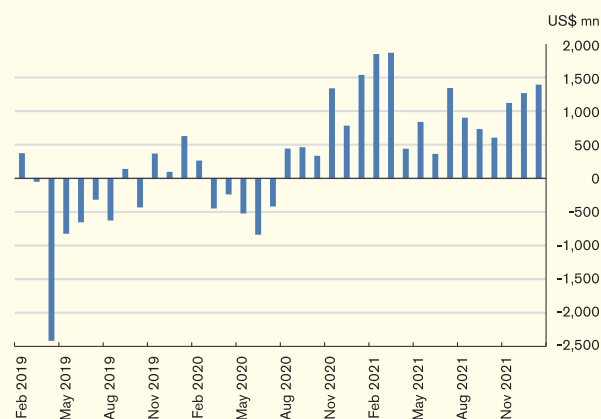
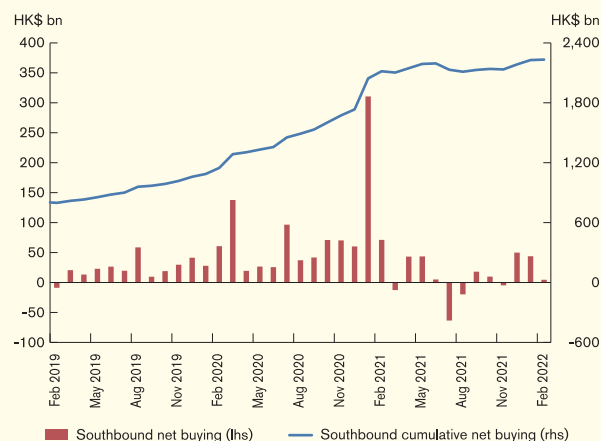


Chart 4.14
Net flows through Stock Connect

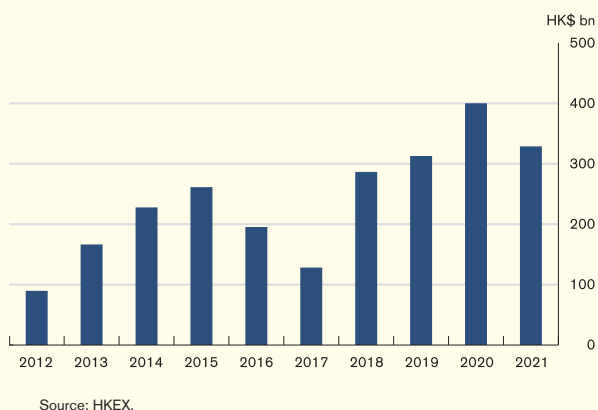


Hong Kong's primary market slowed in the second half of 2021 after its strongest-ever first half in terms of funds raised. For 2021 as a whole, there were 98 IPOs raising a total of HK\$328.9 billion (Chart 4.15), a decrease of 17.8% in total funds raised compared with the year before. In 2021, the HKEX ranked fourth

³² The SKEW Index is calculated by the Chicago Board Options Exchange from the prices of the S&P 500 out-of-the-money options. A SKEW value of 100 means that the probability of outlier negative returns on a 30-day horizon is negligible. As the SKEW 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>.

among global IPO rankings in terms of funds raised, after NASDAQ, the New York Stock Exchange and the Shanghai Stock Exchange.

Chart 4.15
Initial public offering market in Hong Kong

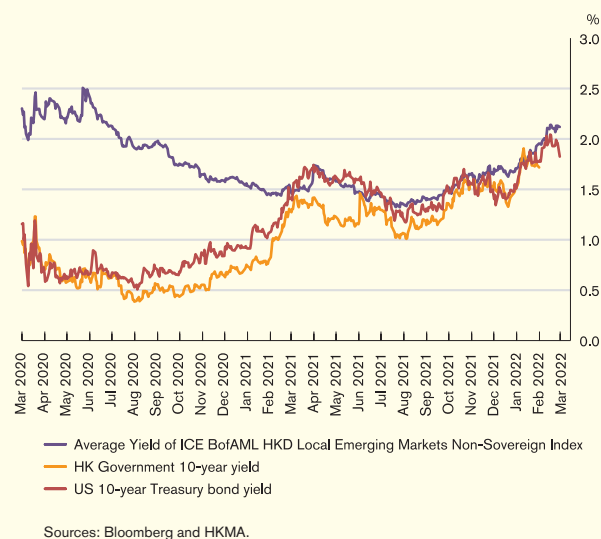


The outlook for the local equity market remains uncertain. While monetary policy easing on the Mainland and more secondary listings in the primary market will improve the Hong Kong equity market sentiment, the market still faces a number of headwinds, including uncertainties over the epidemic situation in Hong Kong, the risk of a faster-than-expected pace of US monetary policy normalisation and the escalating Russian-Ukraine conflict.

4.4 Debt market

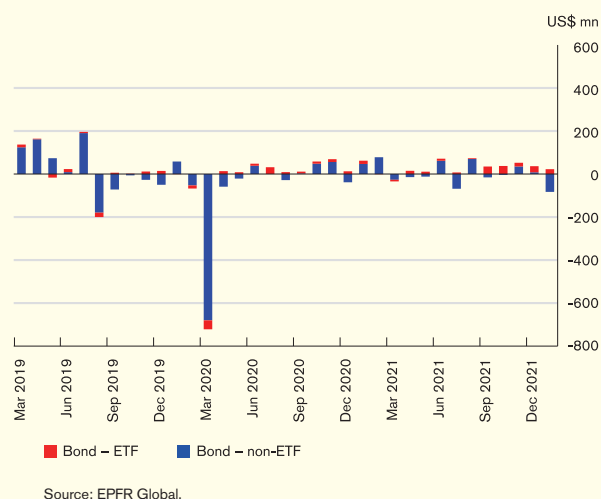
The outstanding amount of the Hong Kong dollar debt market continued to expand despite a slowdown in new issuance in the second half of 2021 along with a slight rise in bond yields. With accelerated inflation in the US on the back of continuing disruptions to global supply chains and a tightening in the job market, the 10-year US Treasury yield surged to a more than two-year high of 2.0% on 10 February 2022. However, it dropped to slightly above 1.8% in late February as the demand for safe-haven assets surged amid the escalating Russian-Ukraine conflict. Broadly in tandem with the movements in US Treasury yields, the Hong Kong dollar 10-year sovereign bond yield and non-sovereign bond yield also increased in the review period (Chart 4.16).

Chart 4.16
Hong Kong dollar sovereign and non-sovereign bond yields and 10-year US Treasury yield



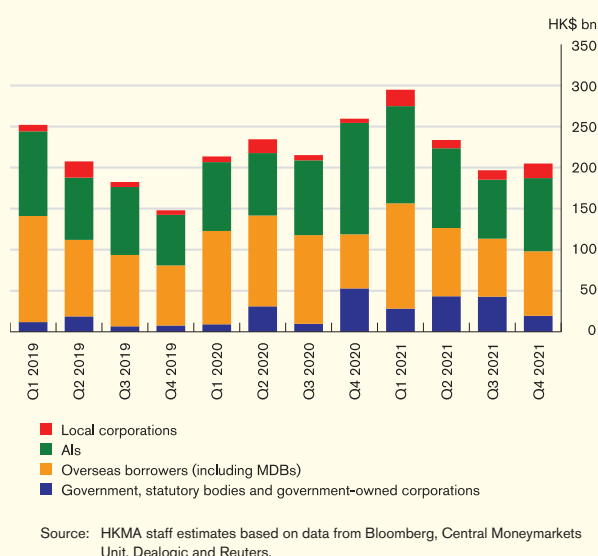
Net bond fund inflows to Hong Kong continued in the second half of 2021 (Chart 4.17). ETF bond funds had garnered a total inflow of US\$140.3 million between September 2021 and January 2022. Such an inflow may be partly attributable to the introduction of two new fee waivers for Hong Kong-listed fixed income ETFs and money market ETFs in May 2021. Meanwhile, the non-ETF bond funds had registered a total outflow of US\$59.9 million. Overall, Hong Kong recorded more than US\$80 million bond fund inflows during the review period.

Chart 4.17
Flows of exchange traded fund and non-exchange traded fund bond funds into Hong Kong



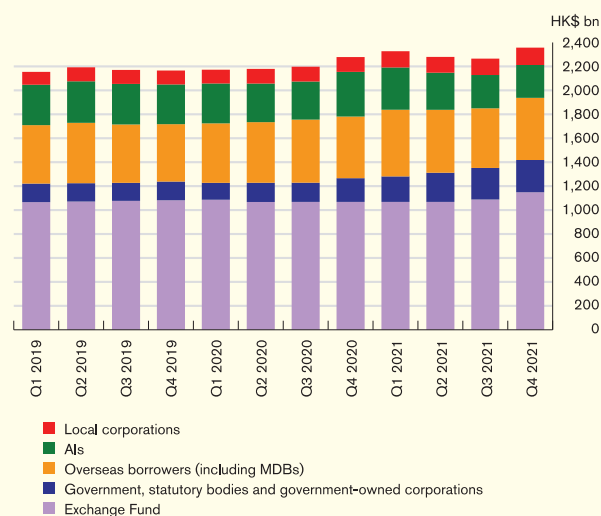
The total issuance of Hong Kong dollar debt in the second half of 2021 decreased by 2.1% to HK\$2,163.4 billion, compared with the same period last year. The drop in the non-EFBN issuance contributed to the decline as EFBN issuance recorded a modest increase. In particular, there was a reduction of 29.0% in the issuance by AIs, and a 14.2% drop in issuance by overseas borrowers (Chart 4.18).

Chart 4.18
New issuance of non-Exchange Fund Bills and Notes Hong Kong dollar debt



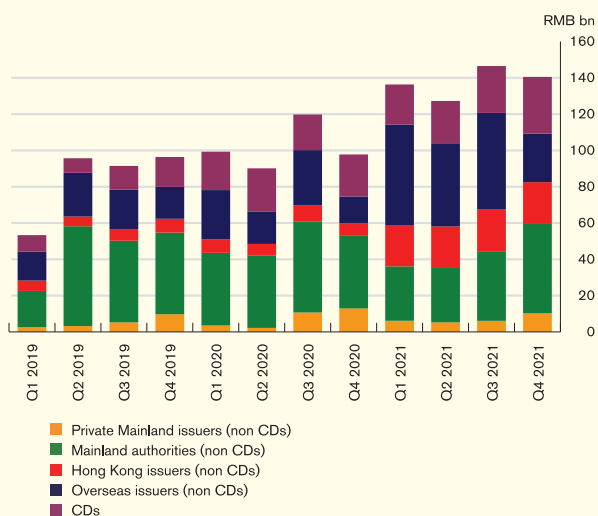
Despite the drop in the total issuance in the second half of 2021, the outstanding amount of Hong Kong dollar debt at the end of 2021 expanded by 3.5% year-on-year to HK\$2,356.8 billion (Chart 4.19). The amount was equivalent to 29.3% of Hong Kong dollar M3, and to 24.4% of the Hong Kong dollar-denominated assets of the banking sector. Within the government sector, the outstanding amount of non-EFBN debt rose sharply by 36.2% year on year to HK\$269.8 billion, and that of EFBN debt increased by 7.5% to HK\$1,148.6 billion.

Chart 4.19
Outstanding Hong Kong dollar debt by issuer



The offshore renminbi debt market in Hong Kong continued to grow in the second half of 2021. Total new issuance increased by 31.9% to RMB287.0 billion in the second half of 2021 compared with the same period last year. This sharp rise was mainly driven by an increase of 77.5% in non-CD issuance by overseas entities, together with an increase of 33.3% in issuance of CDs. Meanwhile, the issuance by Mainland authorities decreased by 3.1% to RMB87.2 billion while the non-CD issuance by private Mainland issuers dropped by 30.7% to RMB16.4 billion (Chart 4.20).

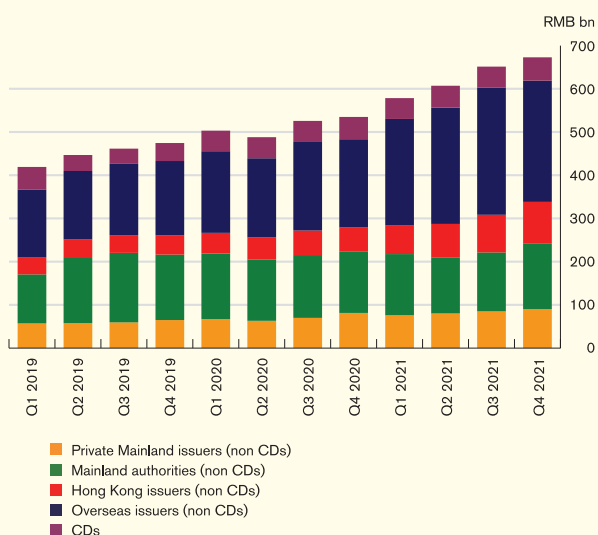
Chart 4.20
New issuance of offshore renminbi debt securities in Hong Kong



Sources: HKMA staff estimates based on data from Bloomberg, Central Moneymarkets Unit, Dealogic and Reuters.

Due to the surge in new issuance, total outstanding CNH debt securities recorded a 25.8% year-on-year increase to RMB673.0 billion at the end of 2021 (Chart 4.21).

Chart 4.21
Outstanding offshore renminbi debt in Hong Kong



Source: HKMA staff estimates based on data from Bloomberg, Central Moneymarkets Unit, Dealogic and Reuters.

Near-term prospects for the debt market in Hong Kong will be affected by a number of factors, including uncertainties surrounding the sustainability of the global economic recovery,

the pandemic's progress under the rapid spread of the Omicron variant, rising energy prices and the monetary policies of major central banks in response to the resurgent inflation rate. These factors could weigh on market sentiment in the Hong Kong debt market. While the valuation of renminbi fixed-income assets will benefit from the prospective monetary policy divergence between the Mainland and other major advanced economies, the concerns over the rising renminbi bond defaults may still linger, which could dampen investors' demand on CNH debt securities.

In the medium term, local debt market development is supported by a number of policy initiatives. On 15 September 2021, the PBoC and the HKMA made a joint announcement on the long-awaited southbound Bond Connect, which debuted on 24 September 2021³³. The southbound Bond Connect provides a convenient channel for Mainland institutional investors to invest in Hong Kong and the global bond market. This marks another important milestone in the two-way opening up of the Mainland financial markets.

On 12 October 2021, the Shenzhen Municipal People's Government debuted the first offshore renminbi municipal government bond in Hong Kong with a total size of RMB5 billion³⁴. Other than the two-year bond, the three-year and five-year bonds are green bonds. This also demonstrates the joint effort by Hong Kong and Mainland municipal governments to use Hong Kong's bond market platform for green financing.

These new policy initiatives have laid out the foundation for the vibrant development of the bond market in Hong Kong as they broaden its local fixed income investor base and further enrich its product offerings.

³³ On the first day of southbound trading, more than 40 Mainland institutional investors and 11 Hong Kong market makers completed over 150 transactions, amounting to a total of around RMB4 billion.

³⁴ The bond was oversubscribed by 2.5 times, attracting orders from 89 global governments, insurers and pension funds.

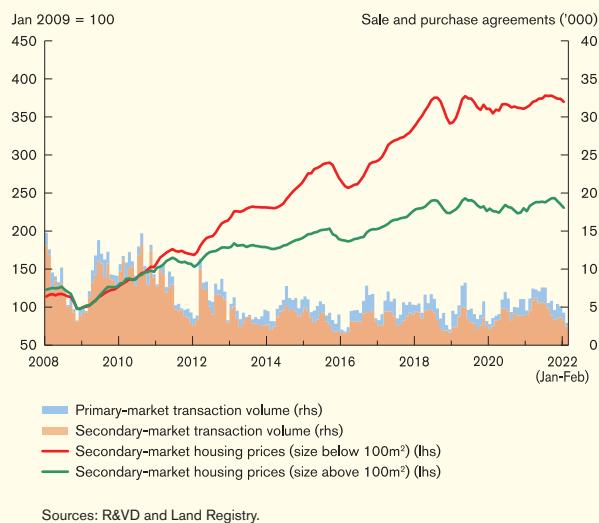
4.5 Property markets

Residential property market

The residential property market has softened somewhat since mid-2021. Market sentiment was dampened by the heightened local stock market volatilities, growing concerns over US policy rate hikes, the spread of the Omicron variant and the tightened social distancing measures locally. The average monthly transactions moderated from a recent high of about 6,700 units in the first half of 2021 to 5,700 units in the second half (Chart 4.22). Housing transactions reduced further to 3,594 units in January–February 2022 alongside a slowdown in flat-viewing activities amid the resurgence of local infections and the holiday effect of the Chinese New Year.

Secondary-market housing prices have also moderated after reaching a recent peak in September 2021. In particular, prices of large flats (with a saleable area of at least 100m²) decreased slightly faster than those of small and medium-sized flats (with a saleable area of less than 100m²) (Chart 4.22). Overall, flat prices declined by 1.2% in the last quarter of 2021, but still recorded an increase of 3.6% for 2021 as a whole. Moving into 2022, the Centa-City Leading Index of housing prices softened by about 3% in early March compared to the end of 2021.

Chart 4.22
Residential property prices and transaction volumes

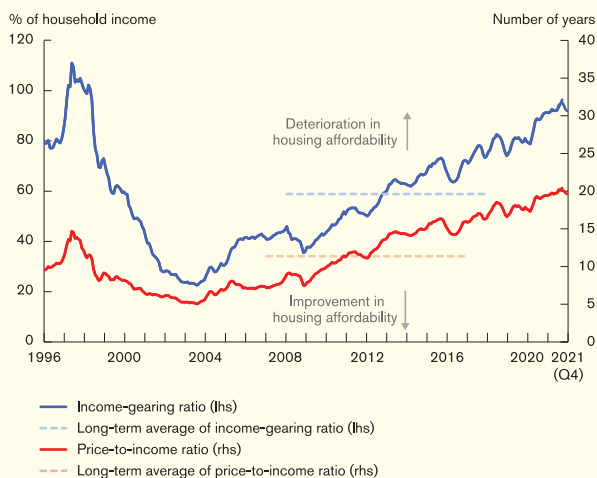


Housing affordability remained highly stretched. The housing price-to-income ratio reached 19.8 in the fourth quarter of 2021, compared with the peak value of about 15 in 1997. The income-gearing ratio also reached 92.9%, well above the long-term average (Chart 4.23).³⁵ After some revivals in the second and third quarters of 2021 supported by the domestic economic recovery, housing rentals softened again by 1.7% in the four months through January 2022 and were still 9.4% below the peak in August 2019 (Chart 4.24). The positive buy-rent gap³⁶ narrowed slightly in the fourth quarter of 2021. Residential rental yields remained low at 2.1–2.4% in January 2022.

³⁵ The price-to-income ratio measures the average price of a typical 50m² flat relative to the median income of households living in private housing. Alternately, the income-gearing ratio compares mortgage payment for a typical 50m² 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.

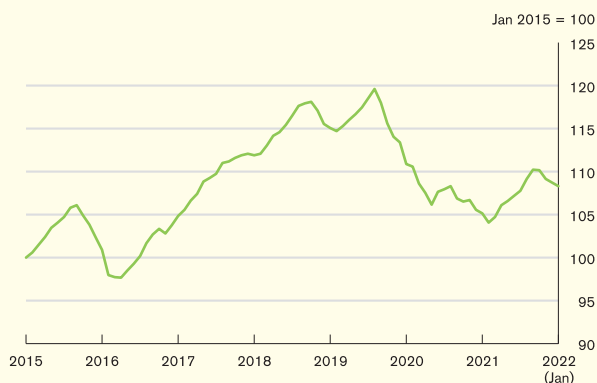
³⁶ The buy-rent gap estimates the cost of owner-occupied housing under a 20-year mortgage scheme with a 70% LTV ratio relative to rentals.

Chart 4.23
Indicators of housing affordability



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

Chart 4.24
Housing rentals

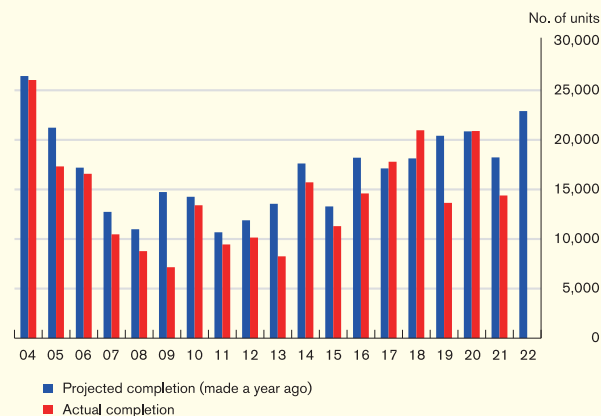


Source: R&VD.

Despite a challenging economic environment, 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 potential interest rate or property market shocks. The average LTV ratio for new mortgages was 54% in January 2022, below the prevailing ratio of 64% before the measures were first introduced, while the debt-servicing ratio also stayed low at around 36%. Box 4 investigates the prevalence of residential mortgage loans offered by non-bank institutions using transactional big data and discusses the related policy implications.

The residential property market outlook is subject to a number of uncertainties and risks as discussed in previous chapters. Domestically, the new wave of local infections and the re-tightening of social distancing measures could drag on the economic recovery and dampen the housing demand. Externally, the uncertainty over the US policy interest rate outlook will continue to affect 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 (Chart 4.25).³⁷

Chart 4.25
Projected and actual private flat completion



Sources: Transport and Housing Bureau and R&VD.

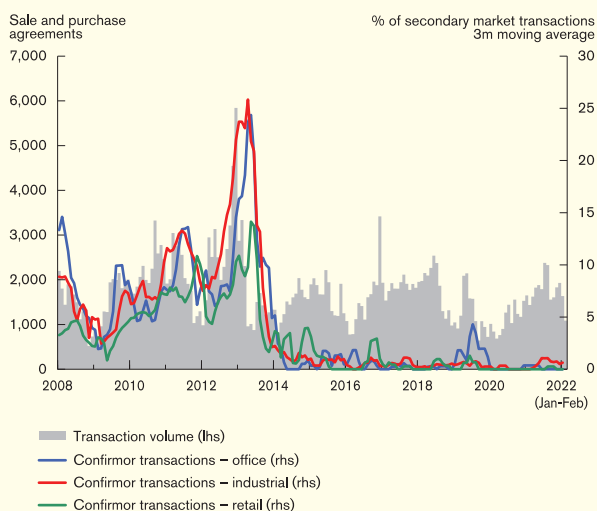
Non-residential property market

The non-residential property market showed signs of stabilisation in the second half of 2021 following some improvement in the first half. Average monthly transactions stayed high at around 1,700 units during the period, and speculative activities remained inactive (Chart 4.26). The prices of office space remained suppressed, while the prices of retail premises and factory spaces stabilised somewhat, albeit still below their respective peaks in 2018 or 2019 (Chart 4.27). In the leasing market, office rentals remained flat while rentals of retail shop spaces

³⁷ According to R&VD's projections, on average more than 22,000 private residential flats per year will be completed in 2022–2023, higher than the annual average of the previous five years.

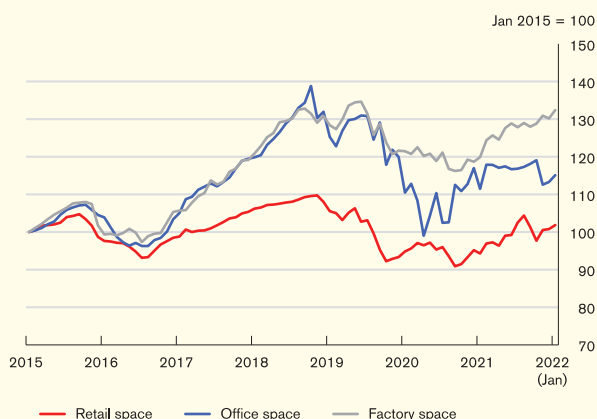
and industrial properties increased alongside robust merchandise trade and a better retail sales performance (Chart 4.28). Rental yields across the segments stayed low at 2.5–2.9% in December 2021. In early 2022, both official data and market intelligence suggest some softening of activities in the non-residential property market.

Chart 4.26
Transactions in non-residential properties



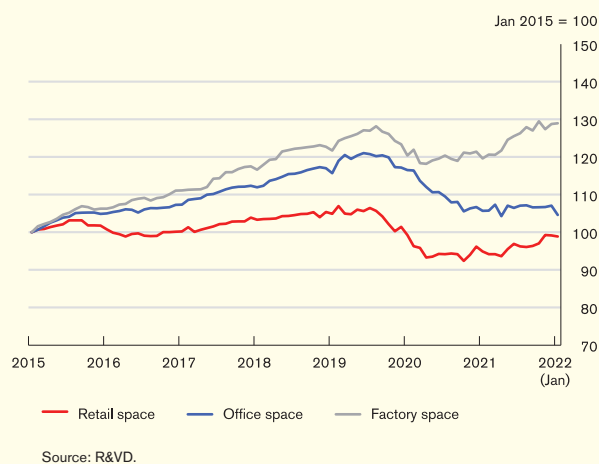
Sources: Land Registry and Centaline Property Agency Limited.

Chart 4.27
Non-residential property price indices



Source: R&VD.

Chart 4.28
Non-residential property rental indices



The outlook for the non-residential property market will hinge on the developments with the latest infection wave, as well as the evolving economic environment. For example, amid the new wave of local infections, tighter social distancing measures and the resultant weaker business sentiment could suppress demand for commercial properties, especially office space in view of greater supply in the coming years.³⁸ On the other hand, a resumption of quarantine-free travel with the Mainland may bode well for the non-residential property market.

³⁸ According to R&VD's projections, more than 173,000 m² of private office spaces will be completed in 2022, which would be the highest since 2020.

Box 4

Using transactional big data to monitor Hong Kong's residential mortgage loans offered by non-bank institutions

Introduction

In addition to banks, money lenders, property developers and their related finance companies also offer mortgage loans to homebuyers in Hong Kong. These non-bank institutions fall outside the HKMA's supervisory ambit, which may lead to macroprudential policy leakages. With only some aggregate or scattered data on these non-bank mortgages currently available³⁹, this box strengthens our regular surveillance and data collection framework by using transactional big data to better monitor the activities of these non-bank institutions in the residential mortgage market.⁴⁰

Use of mortgage information in the transaction records

First, from the Land Registry, we collected and processed about 1.6 million residential property transaction records between 2000 and 2021.⁴¹ From these big data, we can identify whether a transacted property is associated with any first mortgage or subsequent mortgages, together with the name of the mortgagees (i.e. the lenders) and the time of mortgage registration or release. This new data collection framework gives us a big, granular dataset on over 2 million residential mortgage records⁴² associated with over 1.3 million private housing units. In particular,

we can now slice and dice the mortgage data into different types of lenders and market segments, and can trace the mortgage history of the property units. In the next section, we discuss some stylised facts derived from our initial analysis of this rich dataset.

The role of non-bank institutions in the residential mortgage market

In our sample period from 2000 to 2021, the aggregate market share of mortgages provided by non-bank institutions⁴³ (hereafter also referred to as “non-banks”) averaged about 10% of the number of all new mortgage loans registered (i.e. cases of new mortgage loans made) (Chart B4.1). In any case, the aggregate outstanding value of mortgage loans granted by the non-banks remained small, representing less than 3% of the total outstanding residential mortgage loans of the banking sector in Hong Kong.⁴⁴

³⁹ The HKMA conducts regular bank surveys to understand the credit relationship between banks and property developers or finance companies engaging in mortgage business. Some listed firms may also publish their figures on mortgage loan assets.

⁴⁰ In its Financial System Stability Assessment with Hong Kong published in June 2021, the IMF also recommended strengthening the systemic risk monitoring and data collection framework on non-bank mortgages.

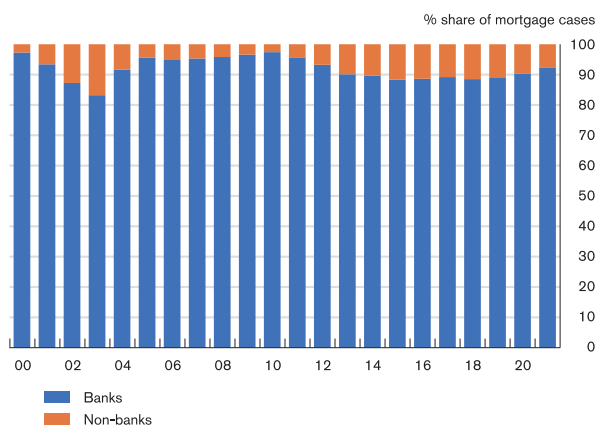
⁴¹ For more details on these Land Registry data, see “Box 3: Monitoring Hong Kong's non-residential property market with transactional big data”, *HKMA Half-Yearly Monetary and Financial Stability Report*, September 2021.

⁴² Mortgage records include loan agreements, but exclude equitable mortgages to avoid double counting.

⁴³ Government-related bodies (e.g. Hong Kong Housing Authority, Hong Kong Housing Society, etc.) also provide mortgages to homebuyers. These types of non-bank institutions are excluded in our analysis as they are not common nowadays, particularly after the termination of the Home Assistance Loan Scheme in the mid-2000s.

⁴⁴ For example, see the inSight articles “Property Mortgage Loans by Finance Companies and Countercyclical Measures” and “Mortgage Loans with High Loan-to-Value Ratios offered by Property Developers” published on 20 March 2015 and 20 June 2016 respectively and also the Speech “Risk Management for Lending to Property Developers (Chinese version only)” on 12 May 2017, all available on the HKMA's website.

Chart B4.1
Share of residential mortgage cases made by banks and non-bank institutions

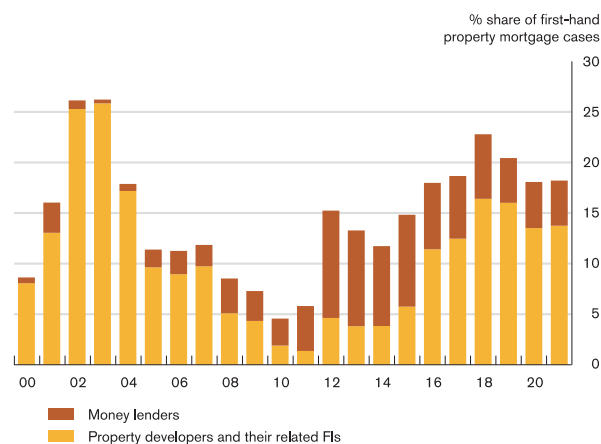


Note: Mortgage loans offered by non-profit organisations or jointly by banks and non-bank institutions are excluded.

Sources: Land Registry, Economic Property Research Centre (EPRC) and HKMA staff estimates.

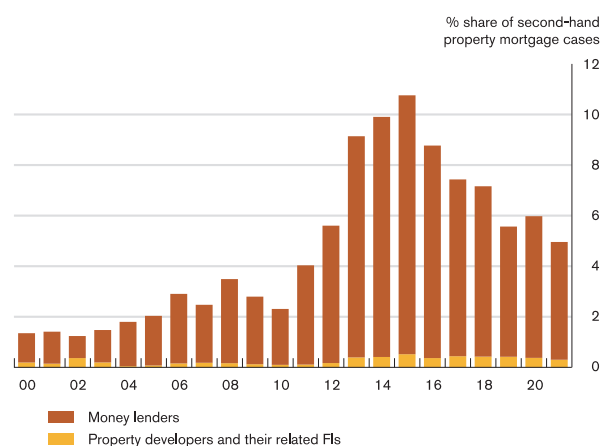
By breaking down the new non-bank mortgage cases into those offered by (i) property developers and their related financial institutions (FIs) and (ii) other “unrelated” money lenders (hereafter simply referred to as “money lenders”), we find that property developers and their related FIs⁴⁵ mainly served the primary market, in part, to boost the sales of their new development projects (Chart B4.2). In addition, they barely provided mortgage lending for residential properties in the secondary market (Chart B4.3). By contrast, other money lenders were generally active in granting mortgages in both the primary and secondary markets (Charts B4.2 and B4.3).

Chart B4.2
Share of first-hand property mortgage cases made by non-bank institutions



Sources: Land Registry, EPRC and HKMA staff estimates.

Chart B4.3
Share of second-hand property mortgage cases made by non-bank institutions

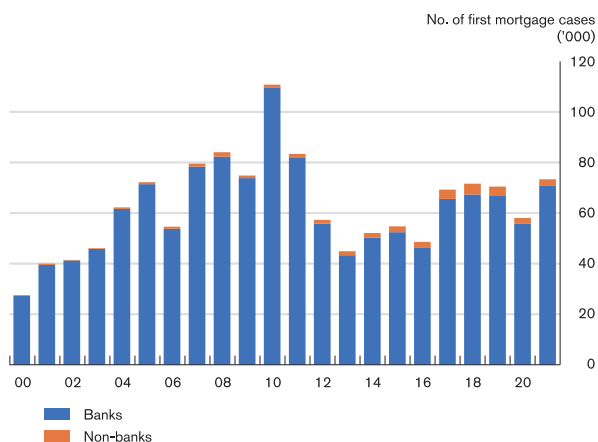


Sources: Land Registry, EPRC and HKMA staff estimates.

Analysed by types of mortgages, banks dominated the first mortgage market, while non-banks made up a larger share in the second mortgage market (Charts B4.4 and B4.5). The second mortgage market here refers to any subsequent mortgage of a property besides the first mortgage. Partly reflecting prudent risk management practices, banks were less active in providing second mortgages, making room for non-banks to develop in this market segment.

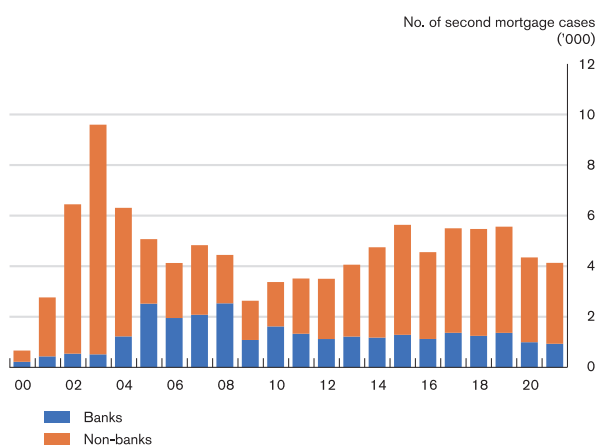
⁴⁵ In practice, property developers usually set up their own financial subsidiaries or collaborate with other finance companies to offer mortgage plans to homebuyers. Indeed, property developers that are mortgagees themselves are rare according to our data.

Chart B4.4
First mortgage cases made by banks and non-bank institutions



Sources: Land Registry, EPRC and HKMA staff estimates.

Chart B4.5
Second mortgage cases made by banks and non-bank institutions



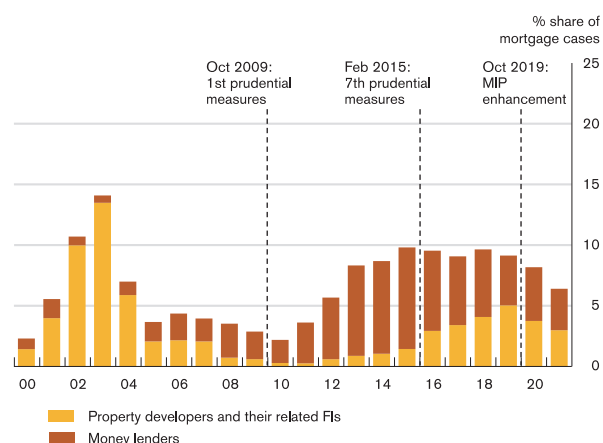
Sources: Land Registry, EPRC and HKMA staff estimates.

Policy implications

In addition to strengthening regular surveillance, our novel dataset on mortgages can also help us draw policy implications. First, the popularity of non-bank mortgages increased after the introduction of the first round of macroprudential measures in 2009, but their market share has been gradually reduced since 2016 (Chart B4.6). In particular, the share of money lenders fell as banks tightened their lending policy to these money lenders under the seventh round of macroprudential measures

imposed in 2015.⁴⁶ Meanwhile, the share of property developers and their related FIs edged up for a period but subsequently declined after the 2019 enhancement of the Mortgage Insurance Programme (MIP) that allowed banks to offer higher-LTV mortgage loans under expanded conditions.

Chart B4.6
Share of residential mortgage cases made by non-bank institutions

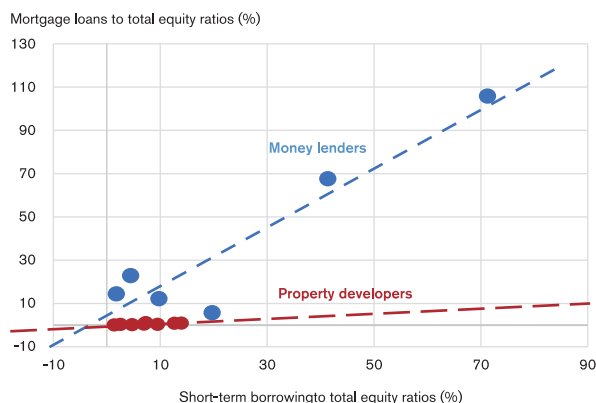


Sources: Land Registry, EPRC and HKMA staff estimates.

Second, we find that money lenders were more aggressive in extending mortgage loans relative to property developers and their related FIs, and this may expose the former to a larger liquidity mismatch risk. Indeed, money lenders usually have higher mortgage loans to total equities ratios compared to property developers (Chart B4.7). As well, they relied more on short-term borrowings (mostly bank loans) to finance their mortgage lending. Therefore, the seventh round of macroprudential measures not only reduced the leakage to non-banks, but also helped safeguard the resilience of the overall mortgage supply by passing the mortgage lending back to banks, given that banks tend to have more stable funding resources than non-banks.

⁴⁶ More specifically, banks that lend to money lenders have to require the money lenders to either comply with the HKMA's macroprudential policies on mortgage loans, or risk losing their credit relationship with banks.

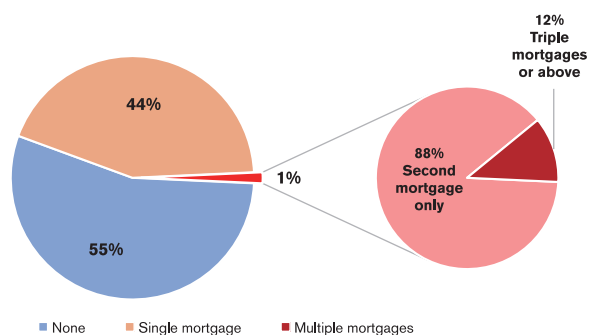
Chart B4.7
Mortgage business size and short-term borrowings for listed non-bank institutions between 2011 and 2020



Note: Short-term borrowings are those with loan tenor equal to or less than one year.
 Sources: Land Registry, EPRC, Bloomberg and HKMA staff estimates.

Third, our mortgage data suggest that the household leverage risks remain manageable as over half the private housing mortgages are paid down, and multiple mortgages are not common in the private residential property market (Chart B4.8). Specifically, more than half of the private housing units (55%) did not have any outstanding mortgage at the end of 2021⁴⁷, and only about 1% of them had multiple mortgages. Among those properties with multiple mortgages, the majority of them had second mortgages only, and triple mortgages or above were rare.

Chart B4.8
Share of private residential properties with outstanding mortgages at end-2021



Sources: Land Registry, EPRC and HKMA staff estimates.

Concluding remarks

This box adopts a new data collection framework to investigate the involvement of non-bank institutions in Hong Kong's residential mortgage market. Broadly in line with our previous understanding, the market shares of mortgages provided by non-bank lenders remained small, especially in the first mortgage market. In addition, property developers and their related finance companies focused more on the primary-market properties, while other money lenders were also active in engaging secondary-market properties. We also find that the seventh round of macroprudential measures and MIP enhancements have helped curtail the potential leakage of macroprudential measures, as the market share of non-bank mortgages has been reduced. Our big mortgage dataset also reveals that more than half of the private housing units do not have mortgages and multiple mortgages are not prevalent, both of which suggest household leverage risks are contained.

⁴⁷ This is roughly consistent with the 2021 Population Census data, which show that 66% of owner-occupier households are without mortgages.

5. Banking sector performance

Retail banks registered thinner profit in the second half of 2021. Classified loan ratio slightly increased during the review period, but remained low and sound by historical and international standards. The Hong Kong banking sector remained resilient, underpinned by robust capital and liquidity positions. During the review period, the HKMA extended various support measures to further help the economy ride out this difficult period. In the near term, the rapid spread of the Omicron variant could threaten the economic recovery. This, coupled with risks of a faster-than-expected pace of US monetary policy normalisation, will pose challenges to banks' credit risk management. Banks should therefore remain vigilant and carefully assess the potential impacts on the asset quality of their loan portfolios.

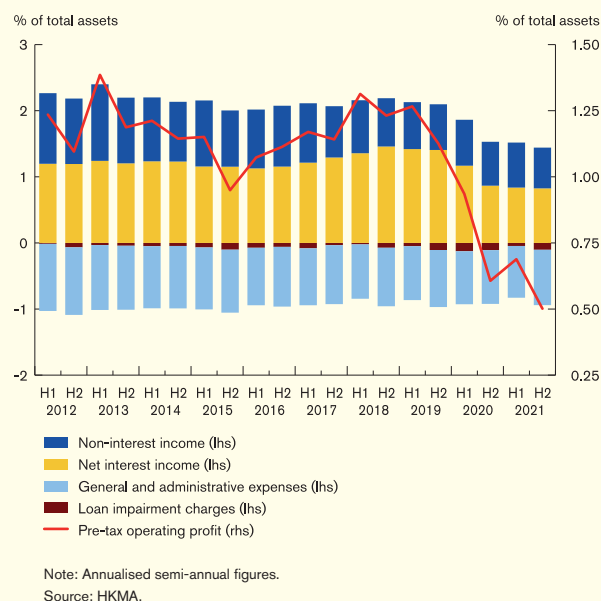
5.1 Profitability and capitalisation

Profitability

The aggregate pre-tax operating profit of retail banks⁴⁸ decreased by 16.1% in the second half of 2021, compared with the same period in 2020. The lacklustre earnings performance was driven by decreases in both net-interest and non-interest incomes, and an increase in operating expenses. As a result, the return on assets declined to 0.50% in the second half of 2021, compared with 0.61% in the same period in 2020 (Chart 5.1).

For 2021 as a whole, the aggregate pre-tax operating profit decreased by 18.6% compared with 2020, while the return on assets dropped from 0.77% to 0.59%.

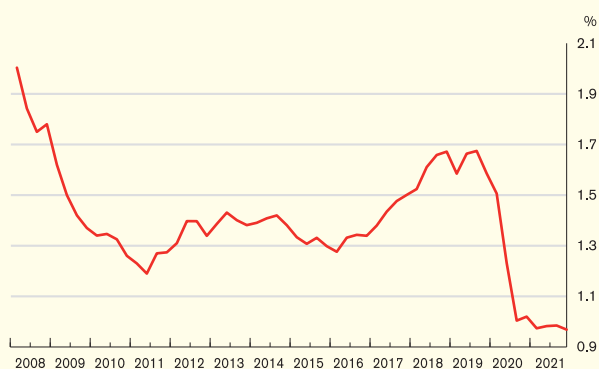
Chart 5.1
Profitability of retail banks



Amid the prolonged low interest rate environment, the net interest margin (NIM) of retail banks also stayed at a low level of 0.98% in the second half of 2021 (Chart 5.2).

⁴⁸ 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

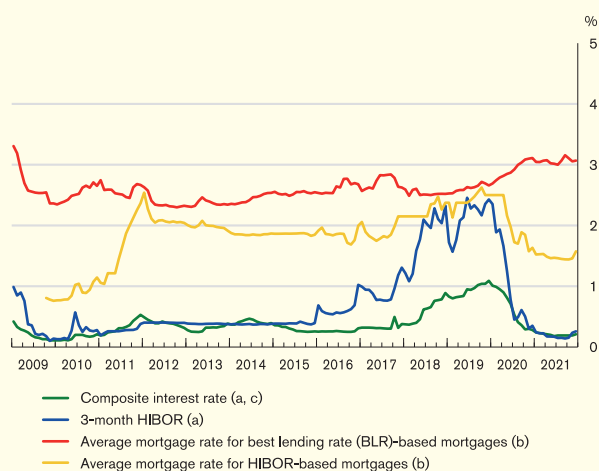


Note: Annualised quarterly figures.
Source: HKMA.

Reflecting year-end funding demand and a lower level of the Aggregate Balance (AB) after the increased issuances of Exchange Fund Bills (EFBs) by the HKMA,⁴⁹ Hong Kong interbank interest rates picked up mildly in the last quarter of 2021. Nevertheless, they remained at relatively low levels amid the still very ample liquidity in the banking system. Specifically, the three-month Hong Kong Interbank Offered Rate (HIBOR) registered a mild increase of 9 basis points from six months ago to 0.26% at the end of December 2021 (blue line in Chart 5.3).

Funding costs of retail banks remained stable during the review period. In particular, the average Hong Kong dollar funding costs for retail banks, as measured by the composite interest rate, increased mildly by 3 basis points to 0.21% at the end of 2021 from 0.18% six months ago (green line in Chart 5.3).

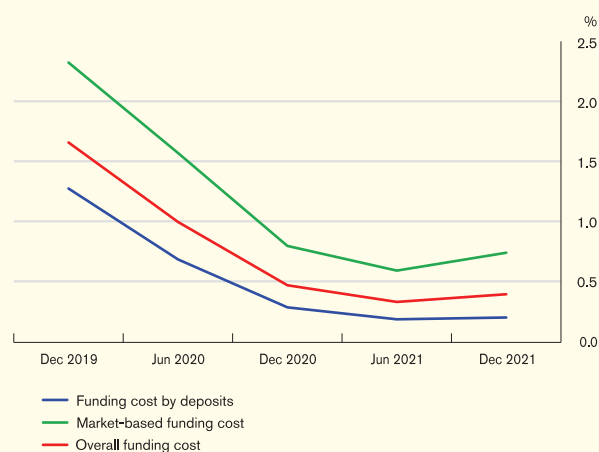
Chart 5.3
Interest rates



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 edged up by 6 basis points during the second half of 2021 (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 not exempted from the new local IRRBB framework report under the new framework, while exempted licensed banks continue to report under the existing interest rate risk exposure framework. The overall funding cost 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.

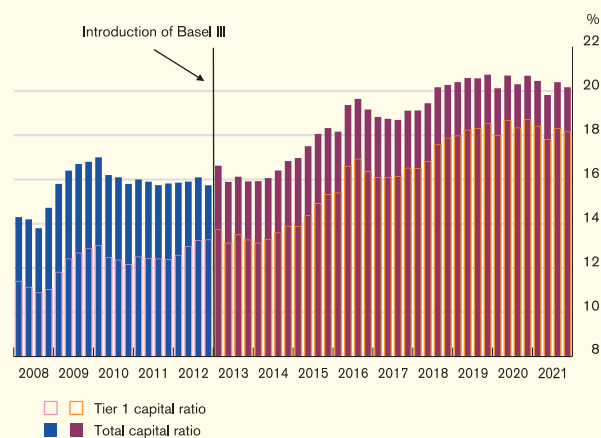
⁴⁹ The HKMA increased the issuances of EFBs by HK\$120 billion to meet the demand by banks in the second half of 2021.

While the prospect of the US monetary policy normalisation may point to a better outlook on banks' profitability, the near-term improvement may be partially offset by two factors. First, although the Fed will have multiple rate hikes in 2022, past experience⁵⁰ suggests that the pass through to domestic interest rates may be lagging, particularly when the domestic interbank liquidity condition remains abundant. Thus, it may take time to see the positive impacts on banks' NIMs. In addition, the surge of Omicron variant cases could pose uncertainties on economic recovery, weighing on banks' asset quality and thus 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 20.2% at the end of 2021 (Chart 5.5), considerably above the international minimum requirement of 8%. The Tier 1 capital ratio and Common Equity Tier 1 (CET1) capital ratio were 18.2% and 16.2% respectively in the same period. In addition, the non-risk-based Leverage Ratio⁵¹ (LR) of locally incorporated AIs recorded a healthy level of 7.9% at the end of 2021, 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

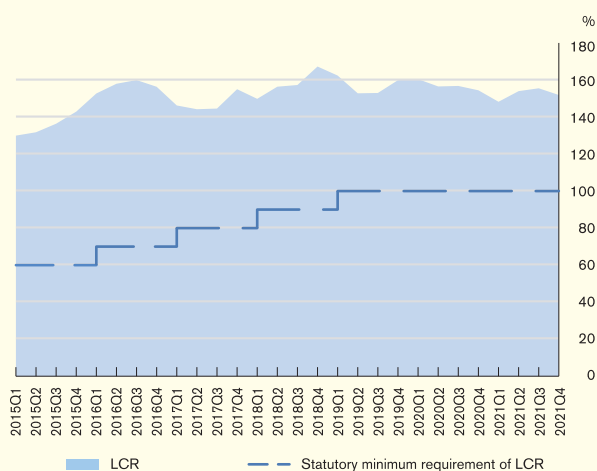
The liquidity positions of the banking sector, as measured by the Basel III Liquidity Coverage Ratio (LCR)⁵², remained sound during the review period. The average LCR of category 1 institutions maintained at 151.9% in the fourth quarter of 2021 (Chart 5.7), staying well above the statutory minimum requirement of 100%. The average Liquidity Maintenance Ratio (LMR) of category 2 institutions was 59.1% during the same period, also well above the statutory minimum requirement of 25%.

⁵⁰ In the previous US interest rate upcycle between 2016 and 2018, Hong Kong dollar interest rates started to increase notably only after multiple US policy rate hikes and a sizable reduction in the AB.

⁵¹ 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).

⁵² The Basel III LCR requirement is designed to ensure that banks have sufficient high-quality liquid assets to survive a significant stress scenario lasting 30 calendar days. In Hong Kong, AIs designated as category 1 institutions adopt the LCR; while category 2 institutions adopt the LMR. For details, see the HKMA's Supervisory Policy Manual (SPM) LM-1, "Regulatory Framework for Supervision of Liquidity Risk".

Chart 5.6
Liquidity Coverage Ratio



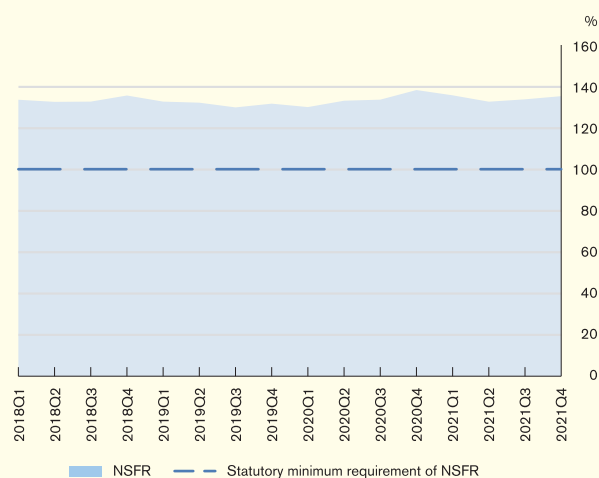
Notes:

1. Consolidated basis.
2. Quarterly average figures.

Source: HKMA.

The latest ratios of the Net Stable Funding Ratio (NSFR)⁵³ requirement also reflected a stable funding position of AIs. The average NSFR of category 1 institutions remained at a high level of 135.3% in the fourth quarter of 2021 (Chart 5.7), well above the statutory minimum requirement of 100%. The average Core Funding Ratio (CFR) of category 2A institutions also registered a high level of 150.4%, exceeding the statutory minimum requirement of 75%. These indicate that the Hong Kong banking sector is well positioned to withstand liquidity shocks.

Chart 5.7
Net Stable Funding Ratio

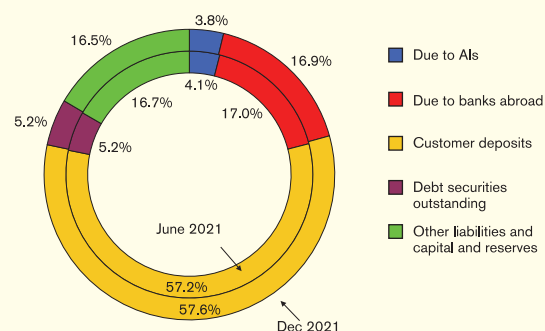


Note: Consolidated basis.

Source: HKMA.

Customer deposits continued to be the primary source of funding for AIs. At the end of 2021, the share of customer deposits to all AIs' total liabilities hovered around 57.6%, which is similar to 57.2% six months ago (Chart 5.8).

Chart 5.8
The liability structure of all AIs



Notes:

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

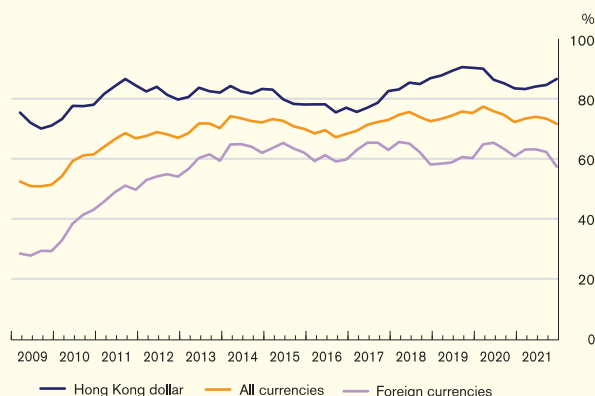
Source: HKMA.

In the second half of 2021, while total deposits of the banking sector flattened, total loans and advances declined moderately. As a result, the average all-currency loan-to-deposit (LTD) ratio for the banking sector declined moderately to 71.8% at the end of 2021 from 74.1% at the end of June 2021 (Chart 5.9).

⁵³ 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).

The decline in all-currency LTD was mainly driven by a decrease in foreign currency LTD ratio, which more than offset the increase in the Hong Kong dollar LTD. Reflecting a decline in foreign currency loans and a rise in corresponding deposits, the average foreign currency LTD ratio dropped to 57.5% at the end of 2021, from 63.3% six months ago. By contrast, as the decline in Hong Kong dollar deposits outweighed the drop in Hong Kong dollar loans, the Hong Kong dollar LTD ratio increased moderately to 86.7% from 84.2% six months ago.

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

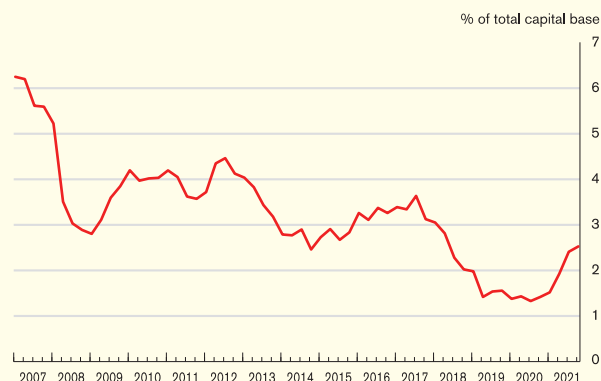


Note: End-of-quarter figures.
Source: HKMA.

Interest rate risk

The interest rate risk exposure of locally incorporated licensed banks increased slightly, but still remained at a relatively low level in the fourth quarter of 2021. 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 2.53% of their total capital base at the end of 2021 (Chart 5.10).⁵⁴

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 2021.
2. The impact of the interest rate shock refers to its impact on the economic value of the banking and trading book⁵⁵, 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

Mainly due to the high base effect arising from IPO-related loans straddled at the end of June, bank credit recorded a decrease in the second half of 2021. However, for 2021 as a whole, total credit of the banking sector still recorded an annual growth rate of 3.8%, up from 1.2% in 2020.

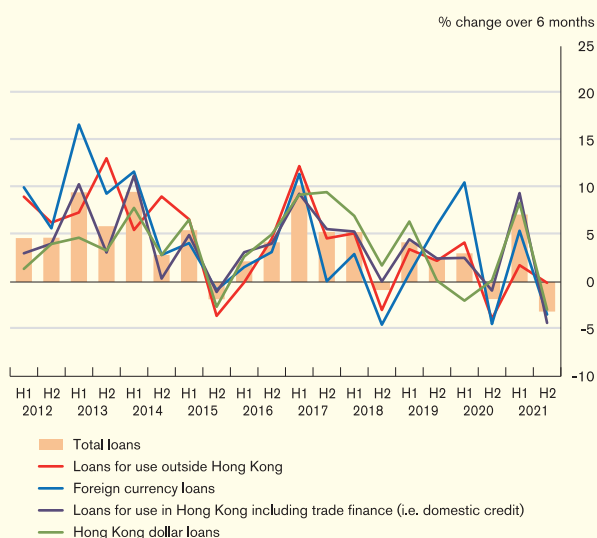
On a half-yearly basis, total loans and advances of all AIs decreased by 3.1% in the second half of 2021 (Chart 5.11). Excluding the IPO-related loans straddled at the end of June 2021, total loans and advances edged down by 0.6% during the same period. This slight decline (excluding IPO-related loans) was mainly driven by a mild decrease in domestic loans (comprising loans for

⁵⁴ 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.

⁵⁵ 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.

use in Hong Kong and trade financing). Domestic loans (excluding IPO-related loans at June 2021) contracted by 0.8%⁵⁶ during the second half, after recording a robust growth of 5.6% in the preceding six months. Loans for use outside Hong Kong remained broadly steady 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 stay stable in the near term. According to the results of the HKMA Opinion Survey on Credit Condition Outlook in December 2021, the share of surveyed AIs expecting loan demand to remain the same in the following three months increased from 67% to 70% compared to the results conducted six months ago (Table 5.A).

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

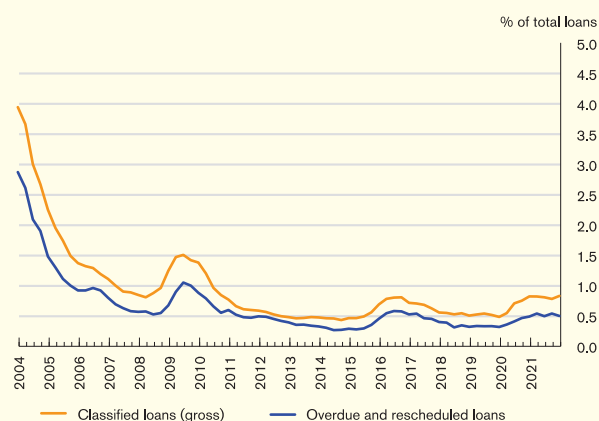
% of total respondents	Mar-21	Jun-21	Sep-21	Dec-21
Considerably higher	7	7	3	0
Somewhat higher	30	23	30	23
Same	57	67	60	70
Somewhat lower	7	3	7	7
Considerably lower	0	0	0	0
Total	100	100	100	100

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

Source: HKMA.

The gross classified loan ratio (CLR) of all AIs increased slightly to 0.88% at the end of 2021 from 0.86% in June, while the ratio of overdue and rescheduled loans of all AIs edged down to 0.56% from 0.58%. For retail banks, the gross CLR increased slightly to 0.83%, while the ratio of overdue and rescheduled loans stayed at a low level of 0.50% (Chart 5.12). Despite the slight increases, asset quality remained sound by both historical and international standards.

Chart 5.12
Asset quality of retail banks



Notes:

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

Source: HKMA.

⁵⁶ Domestic loans would have decreased by 4.3% in the second half of 2021 if IPO-related loans were included.

Household exposure⁵⁷

Household debt grew steadily by 4.4% in both the first half and second half of 2021 (Table 5.B). A breakdown of the data shows that the growth of personal loans slowed to 1.6% in the second half from 5.3% in the first half of 2021, while the growth of residential mortgage loans accelerated to 5.7% from 4.0%.

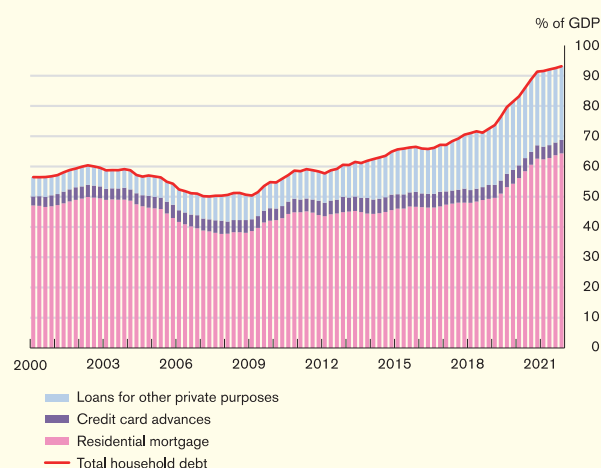
Table 5.B
Half-yearly growth of loans to households of all AIs

(%)	2019		2020		2021	
	H1	H2	H1	H2	H1	H2
Residential mortgages	4.7	5.5	3.5	4.7	4.0	5.7
Personal loans	11.2	5.9	-2.4	2.2	5.3	1.6
of which:						
Credit card advances	-3.8	4.1	-9.0	0.0	-0.4	8.1
Loans for other private purposes	14.9	6.2	-1.1	2.6	6.4	0.5
Total loans to households	6.8	5.6	1.5	3.9	4.4	4.4

Source: HKMA.

The household debt-to-GDP ratio edged up to 93.1% in the second half of 2021 from 92.1% in the first half (Chart 5.13), due to the growth in household debt (driving the ratio up by 4.1 percentage points), which was partly offset by the growth in the nominal GDP (offsetting 3.1 percentage points).

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: (1) 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 borrowing. Therefore, the household debt-to-GDP ratio does not reflect the actual debt-servicing burden of households in the economy; and (2) 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 36.0% in January 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

⁵⁷ 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 2021, household lending made up 34.5% of domestic lending.

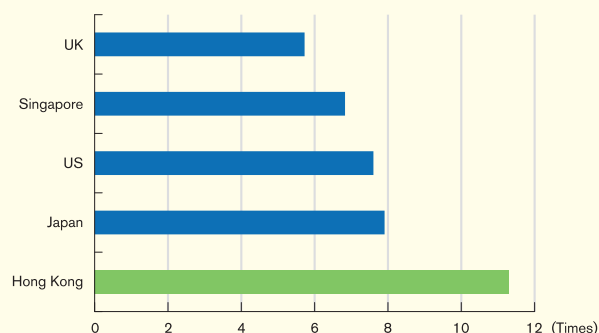
11.3 times and 2.96 times respectively in 2020 (Charts 5.14 and 5.15), which are much higher than those of most other developed economies. This suggests that Hong Kong's households, on aggregate, are financially sound and have a strong buffer to cushion potential financial and economic shocks.

The HKMA has been closely monitoring household indebtedness and regularly collecting data from banks. The majority of 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. These two types of loans accounted for about 90% of the household debt. Coupled with the fact that household net worth remaining at a high level, the HKMA considers the household balance sheet is healthy and the associated credit risk is manageable.

For residential mortgages, the average LTV ratio and average debt-servicing ratio of newly approved mortgage loans have stayed at healthy levels following the introduction by the HKMA of several rounds of countercyclical macroprudential measures 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 conduct prudent operations on credit card advances 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.

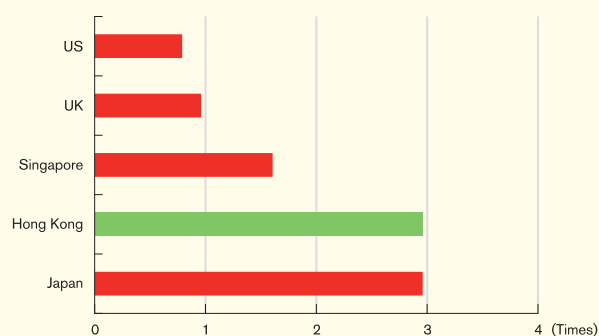
Chart 5.14
Household net worth-to-liabilities ratio for selected economies



Note: Japan figures refer to those at end-2019, while other figures refer to those at end-2020.

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

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

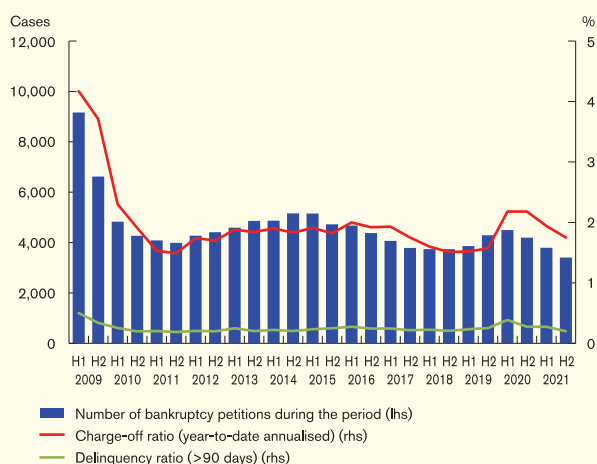


Note: Safe assets comprise deposits, as well as currencies if data is available. In the case of Hong Kong, safe assets refer to deposits only. Japan figures are from end-2019, while all other reported figures are from end-2020.

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. The year-to-date annualised credit card charge-off ratio decreased to 1.75% in the fourth quarter of 2021 from 1.94% in the second quarter of 2021, while the delinquency ratio dropped to 0.20% in the same period (Chart 5.16). The number of bankruptcy petitions decreased further in the second half of 2021 compared with the preceding six months.

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

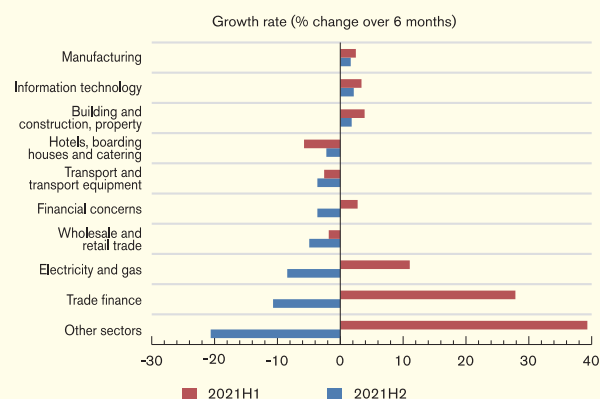


Sources: Official Receiver's Office and HKMA.

Corporate exposure⁵⁸

Domestic corporate loans (excluding IPO-related loans straddled at end-June) declined by 3.4%⁵⁹ on a half-yearly basis at the end of 2021, after recording a strong growth of 6.4% during the first half. In particular, trade finance and loans for use in the electricity and gas sector decreased notably in the second half, after registering a strong expansion in the first half. Loans to economic sectors mostly affected by the pandemic, such as transportation, wholesale and retail, and hotel and accommodation services, continued to decline in the review period (Chart 5.17).

Chart 5.17
Growth in domestic corporate loans by selected sector



Source: HKMA.

The demand-side survey on the credit conditions of SMEs showed that SME's perception remained stable in the fourth quarter of 2021, with 13% of the respondents perceiving credit approval as "more difficult" relative to six months ago, broadly similar to the 12% registered in the third quarter of 2021 (Chart 5.18), and down from an average 29% in the first half of 2021. Of the respondents with existing credit lines, 5% indicated a tighter stance by banks in the fourth quarter of 2021, virtually unchanged from the previous quarter (Chart 5.19).

Continuing its support to SMEs, in February 2022, the HKMA announced the extension of the Pre-approved Principal Payment Holiday Scheme (the Scheme) to the end of October 2022. At the same time, the Scheme offered an option to corporates which 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 February 2022, over 86,000 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\$930 billion. In addition, the Hong Kong Mortgage Corporation Limited has extended the application period for the 80% Guarantee Product, the 90% Guarantee Product and the

⁵⁸ Excluding interbank exposure. At the end of 2021, the share of corporate loans in domestic lending was 65.4%.

⁵⁹ If IPO loans straddled at the end of June 2021 were included, domestic corporate loans would have decreased by 8.3% in the second half of 2021.

Special 100% Loan Guarantee of the SME Financing Guarantee Scheme to end-June 2023. The maximum loan amount per enterprise under the Special 100% Loan Guarantee was raised from the total amount of employee wages and rents for 18 months to that for 27 months, subject to a ceiling of HK\$9 million (originally HK\$6 million), and the maximum repayment period was extended from eight years to ten years. The principal moratorium arrangement under the SME Financing Guarantee Scheme has been extended by six months to a total of 30 months, and the application period for the principal moratorium has also been extended to the end of December 2022. Meanwhile, an option for borrowers to resume making 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 February 2022, over 48,000 applications involving more than HK\$85 billion in loans had been approved under the Special 100% Loan Guarantee. With the overarching objective of maintaining banking 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

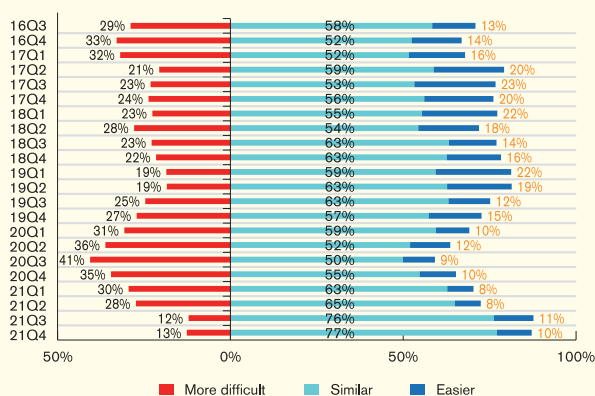
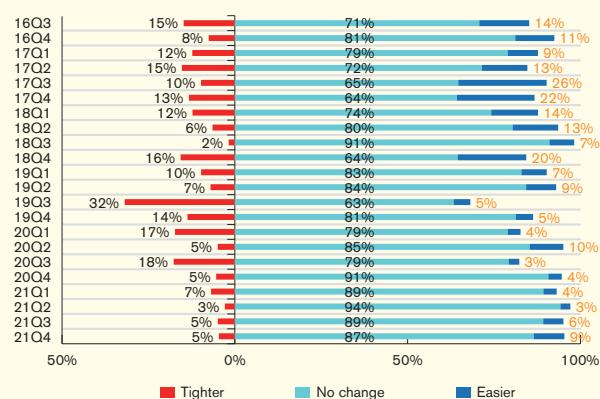
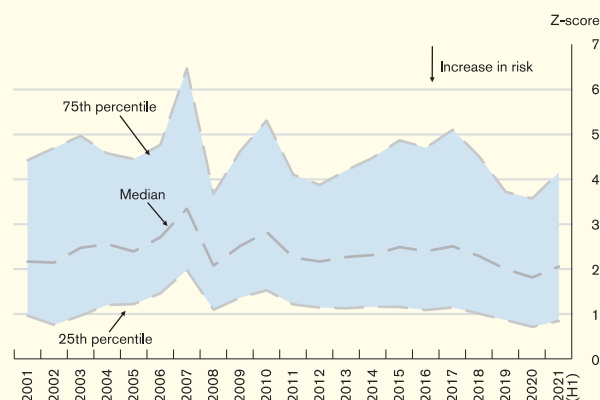


Chart 5.19
SMEs' reported change in banks' stance on existing credit lines



There were signs of improvement in the financial health of corporates amid the notable economic recovery in 2021. Based on accounting data for all non-financial corporates listed in Hong Kong, the Altman's Z score (a default risk measure for non-financial corporates) saw an across-the-board increase during the first half of 2021, reflecting a lower default risk of these corporates (Chart 5.20).

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

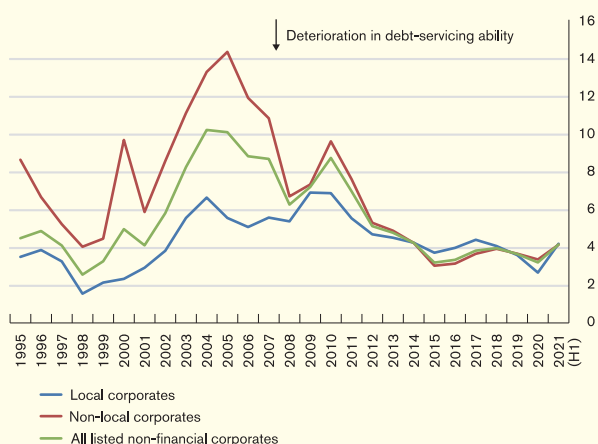


Notes:

1. All non-financial corporates listed on the Hong Kong Stock Exchange are selected.
 2. Figures are calculated based on information up to end-February 2022.
- Source: HKMA staff calculations based on estimates compiled by Bloomberg.

Consistent with the observation in the Altman's Z-score, listed non-financial corporates' debt servicing ability also recorded an improvement during the same period. The weighted average interest coverage ratios (ICRs) for both local and non-local corporates rebounded in the first half of 2021 (the blue and red lines in Chart 5.21), mainly due to a recovery in corporate earnings.

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



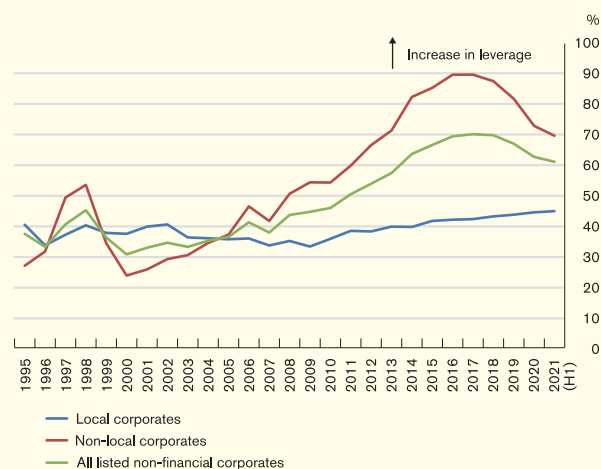
Notes:

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-February 2022.

Source: HKMA staff estimates based on data from Bloomberg.

The weighted average debt-to-equity ratio, a common measure of corporate leverage, decreased slightly in the first half of 2021 for listed non-financial corporates in Hong Kong (the green line in Chart 5.22), as non-local corporates continued to deleverage (the red line in Chart 5.22). While the average leverage for local corporates increased mildly (the blue line in Chart 5.22), the current level remained relatively low.

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-February 2022.

Source: HKMA staff estimates based on data from Bloomberg.

The financial fundamentals of corporates improved in 2021, but how long this may persist will hinge on the development of several downside risk factors, including uncertainties over the spread of new variants and the pace of the US monetary policy tightening. These risk factors, if intensified, can again drag on business sentiment and weigh on firms' financial fundamentals. Therefore, banks should continue to stay vigilant and assess the potential impact of these risk factors on the credit risk of their corporate exposures.

Mainland-related lending and non-bank exposures

The banking sector's total Mainland-related lending decreased by 3.2% to HK\$4,725 billion (15.8% of total assets) at the end of December 2021, from HK\$4,880 billion (16.3% of total assets) at the end of June 2021 (Table 5.C). Other non-bank exposures increased by 0.5% to HK\$1,984 billion (Table 5.D).

Table 5.C
Mainland-related lending

HK\$ bn	Mar 2021	Jun 2021	Sep 2021	Dec 2021
Mainland-related loans	4,747	4,880	4,918	4,725
Mainland-related loans excluding trade finance	4,435	4,500	4,511	4,410
Trade finance	312	380	407	315
By type of Als:				
Overseas incorporated Als	1,776	1,769	1,824	1,678
Locally incorporated Als*	2,157	2,261	2,232	2,172
Mainland banking subsidiaries of locally incorporated Als	814	850	861	875
By type of borrowers:				
Mainland state-owned entities	1,959	1,983	2,007	1,844
Mainland private entities	1,440	1,493	1,484	1,472
Non-Mainland entities	1,348	1,403	1,426	1,409

Notes:

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

Source: HKMA.

Table 5.D
Other non-bank exposures

HK\$ bn	Mar 2021	Jun 2021	Sep 2021	Dec 2021
Negotiable debt instruments and other on-balance sheet exposures	1,368	1,465	1,481	1,494
Off-balance sheet exposures	492	510	526	490
Total	1,860	1,974	2,006	1,984

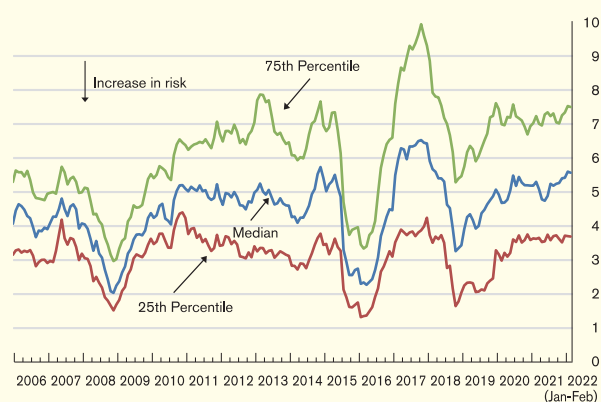
Note: Figures may not add up to the total due to rounding.

Source: HKMA.

The gross CLR of Mainland-related lending of all Als⁶⁰ was 0.85% at the end of 2021, a level largely similar to 0.84% at end-June 2021.

The distance-to-default (DTD) index⁶¹ (a forward-looking market-based indicator) also suggested a stabilisation in the default risk of the Mainland corporate sector during the review period. More specifically, the median and 75th percentiles of the DTD index slightly improved compared with six months earlier (Chart 5.23).

Chart 5.23
Distance-to-default index for the Mainland corporate sector



Note: The DTD index is calculated based on the non-financial constituent companies (i.e. excluding investment companies and those engaged in banking, insurance and finance) of the Shanghai Stock Exchange 180 A-share index.

Source: HKMA staff estimates based on data from Bloomberg.

However, in view of the economic headwinds facing the Mainland economy arising from the recent outbreak of Omicron variant cases in some provinces, and the property market downturn, banks should stay attentive to the credit risk management of their Mainland-related exposures.

Macro stress testing of credit risk⁶²

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 5.24 presents a simulated future credit loss rate of retail banks in the fourth quarter of 2023 under four specific macroeconomic shocks⁶³ using information up to the fourth quarter of 2021.

⁶⁰ Figures cover Als' Hong Kong offices and Mainland branches and subsidiaries.

⁶¹ The DTD is a market-based default risk indicator based on the framework by R. Merton (1974), "On the pricing of corporate debt: the risk structure of interest rates", *Journal of Finance*, Vol. 29, pages 449–470, in which equity prices, equity volatility, and companies' financial liabilities are the determinants of default risk. In essence, it measures the difference between the asset value of a firm and a default threshold in terms of the firm's asset volatility.

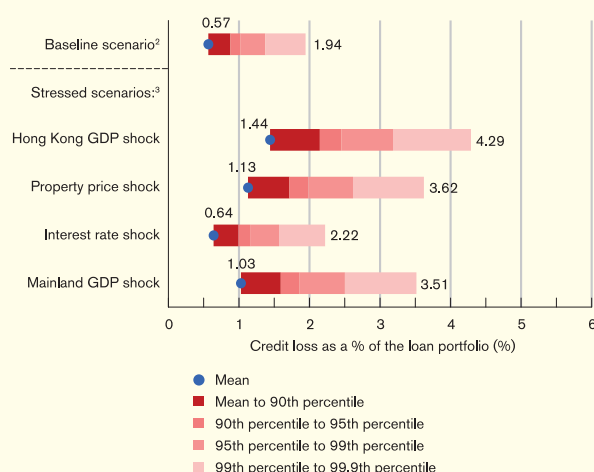
⁶² Macro stress testing refers to a range of techniques used to assess the vulnerability of a financial system to "exceptional but plausible" macroeconomic shocks. The credit loss estimates presented in this report are obtained based on a revised framework from J. Wong et al. (2006), "A framework for 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.

⁶³ These shocks are calibrated to be similar to those that occurred during the Asian financial crisis, except the Mainland GDP shock.

In stressed scenarios, the expected average credit losses two years after different macroeconomic shocks are estimated to be moderate, ranging from 0.64% (Interest rate shock) to 1.44% (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 2.22% (Interest rate shock) to 4.29% (Hong Kong GDP shock), which are significant, but smaller than the estimated loan loss of around 4.5% following the Asian financial crisis.

Chart 5.24
The mean and value-at-risk statistics of simulated credit loss distributions¹



Notes:

- The assessments assume the economic conditions in Q4 2021 as the current environment. The Monte Carlo simulation method is adopted to generate the credit loss distribution for each scenario.
- Baseline scenario: no shock throughout the two-year period.
- Stressed scenarios:
 - Hong Kong GDP shock:** reductions in Hong Kong's real GDP by 2.7%, 2.4%, 1.7% and 1.6% respectively in each of the four consecutive quarters starting from Q1 2022 to Q4 2022.
 - 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 Q1 2022 to Q4 2022.
 - Interest rate shock:** A rise in real interest rates (HIBORs) by 300 basis points in the first quarter (i.e. Q1 2022), followed by no changes in the second and third quarters, and another rise of 300 basis points in the fourth quarter (i.e. Q4 2022).
 - Mainland GDP shock:** An average year-on-year real GDP growth rate of 2% for the four consecutive quarters starting from Q1 2022.

Source: HKMA staff estimates.

5.4 Systemic risk

Underpinned by the continued economic recovery and an easing of local epidemic situation in the second half of 2021, the systemic risk of Hong Kong banking sector has thus far been contained.

Nevertheless, the global and domestic economic outlooks have been clouded by several downside risks, most eminently the uncertainties surrounding the development of the pandemic and the pace of US monetary policy normalisation. The escalating Russian-Ukraine geopolitical tensions may also increase the downside risks to the global economy. These risk factors, if intensified, would pose challenges to banks in Hong Kong on various fronts.

In particular, if the widespread transmission of the Omicron variant leads to a more stringent and prolonged tightening of social distancing measures, it could drag down economic activities and delay the recovery for many corporates. Particularly, given that many corporates have still not fully recovered from their pre-pandemic positions and that some also have a thinner financial buffer than before, their resilience to a deterioration of the epidemic situation could be called into question. Banks should therefore continue to uphold their credit risk management and reassess the potential impacts of the pandemic on the financial fundamentals of their corporate borrowers.

The pace of US interest rate hikes is another key risk factor to be watched carefully. In view of rising inflationary pressure in the US,⁶⁴ their interest rate hikes could become faster than initially expected. Any abrupt surge in US interest rates could potentially trigger a sharp tightening in global financial conditions and may lead to heightened volatility in capital flows and interest rates in the region.

⁶⁴ Related discussions are provided in Chapter 2.1.

While rising interest rates may help banks to improve their NIMs, the resulting higher funding costs for corporates could weaken corporate profitability amid the renewed outbreak of the pandemic. This could put the debt servicing ability of corporates (particularly those highly leveraged) under the test. This would pose challenges to banks' credit risk management for their corporate exposures.

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

From a longer term perspective, climate-related risks will likely have significant implications for financial stability. In particular, the transition towards a low-carbon economy will inevitably affect many economies and sectors on various fronts. Therefore, it is vital to strengthen the climate risk assessment and monitoring framework globally. In this regard, the HKMA has recently conducted and published the results of the first pilot climate risk stress test exercise (CRST) on the Hong Kong banking sector.⁶⁵

Correspondingly, Box 5 develops a top-down analytical framework to assess the financial impacts of climate-related risks on non-financial corporates listed in Hong Kong, based mainly on two climate reference scenarios by the Network of Central Banks and Supervisors for Greening the Financial System (NGFS). The analysis strengthens our systemic risk analysis on climate-related issues and shows the HKMA's commitment to supporting the NGFS Glasgow Declaration.⁶⁶

An important finding from our analysis is that the longer-term impacts of climate transition risks on firms' default risks would be significantly smaller in the "orderly transition" scenario than in the "disorderly transition" scenario. In addition, the impact of physical risks under these two transition scenarios is found to be lower than the "no action" case. The results together support that there are clear benefits to taking climate action, and acting early.

The countercyclical capital buffer for Hong Kong

The countercyclical capital buffer (CCyB) is part of the internationally agreed Basel III standards and is designed to enhance the resilience of the banking sector against system-wide risks associated with excessive aggregate credit growth. This buffer can be deployed in times of a downturn, allowing banks to continue providing credit to support the real economy. The latest applicable jurisdictional CCyB for Hong Kong, announced on 28 January 2022, was 1.0%.⁶⁷

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).⁶⁸ The setting of the CCyB for Hong Kong is however not a mechanical exercise and the Monetary Authority will always consider a broad range of reference indicators ("Comprehensive Reference Indicators") in addition to the indicative buffer guide.⁶⁹

⁶⁵ The pilot climate risk stress test exercise (CRST) was launched in January 2021 with 27 participating banks. For details, see "Pilot Banking Climate Risk Stress Test", HKMA, 30 December 2021.

⁶⁶ The HKMA issued a statement in November to support the NGFS Glasgow Declaration. For details, see "Supporting the Central Banks and Supervisors Network for Greening the Financial System Glasgow Declaration", HKMA, 3 November 2021.

⁶⁷ For details, see the Announcement of the CCyB to AIs on 28 January 2022 (<https://www.hkma.gov.hk/eng/key-functions/banking/banking-legislation-policies-and-standards-implementation/countercyclical-capital-buffer-ccyb/>).

⁶⁸ 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.

⁶⁹ These include measures of bank, corporate and household leverage; debt servicing capacity; profitability and funding conditions within the banking sector and macroeconomic imbalances.

For the latest situation, the indicative buffer guide, calculated based on the third-quarter data of 2021, signals a CCyB of 1.50%. The projection, based on all available data at the decision date, suggests the indicative buffer guide is likely to signal a lower CCyB when all relevant data for the last quarter of 2021 becomes available.

Nevertheless, information drawn from the series of Comprehensive Reference Indicators, along with all relevant information available at the time of the decision in January 2022, suggests that although the latest economic indicators point to a continued recovery in Hong Kong in the fourth quarter of 2021, uncertainties about the global and domestic pandemic situations remained elevated. Therefore, the Monetary Authority considered that it is appropriate to keep the CCyB unchanged at 1.0% and continue to monitor the situation closely.

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

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

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

	5-Aug-21	28-Oct-21	28-Jan-22
Announced CCyB rate	1.0%	1.0%	1.0%
Date effective	05/08/2021	28/10/2021	28/01/2022
Indicative buffer guide	2.5%	2.3%	1.6%
Basel Common Reference Guide	2.5%	2.5%	2.5%
Property Buffer Guide	2.5%	1.8%	0.8%
Composite CCyB Guide	2.5%	2.3%	1.6%
Indicative CCyB Ceiling	None	None	None
<i>Primary gap indicators</i>			
Credit/GDP gap	13.8%	18.6%	10.7%
Property price/rent gap	10.3%	7.8%	4.7%
<i>Primary stress indicators</i>			
3-month HIBOR spread (percentage points)	0.15%	0.12%	0.08%
Quarterly change in classified loan ratio (percentage points)	0.00%	-0.01%	-0.03%

Notes:

- 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.
- Following a review of the appropriate risk-free rate benchmark (previously identified as the three-month Overnight Index Swap (OIS) rate, the HKMA amended the definition of the interbank market spread to the difference between the three-month HIBOR and the three-month Exchange Fund Bill yield on April 2017.

Source: HKMA.

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

	Dec 2020	Sep 2021	Dec 2021
Interest rates			
1-month HIBOR fixing ² (quarterly average)	0.27	0.07	0.11
3-month HIBOR fixing (quarterly average)	0.42	0.15	0.20
BLR ³ and 1-month HIBOR fixing spread (quarterly average)	4.73	4.93	4.89
BLR and 3-month HIBOR fixing spread (quarterly average)	4.58	4.85	4.80
Composite interest rate ⁴	0.28	0.19	0.21
All AIs			
Balance sheet developments⁵			
Total deposits	-1.8	-1.2	+1.2
Hong Kong dollar	-4.4	-4.9	-0.9
Foreign currency	+1.1	+2.8	+3.3
Total loans	-4.8	-2.0	-1.2
Domestic lending ⁶	-5.6	-3.6	-0.7
Loans for use outside Hong Kong ⁷	-2.9	+2.2	-2.3
Negotiable instruments			
Negotiable certificates of deposit (NCDs) issued	+3.9	-1.5	+1.1
Negotiable debt instruments held (excluding NCDs)	+3.9	+1.0	+3.7
Asset quality			
As a percentage of total loans ⁸			
Pass loans	97.29	97.69	97.59
Special mention loans	1.81	1.49	1.53
Classified loans ⁹ (gross)	0.90	0.81	0.88
Classified loans (net) ¹⁰	0.50	0.43	0.48
Overdue > 3 months and rescheduled loans	0.57	0.60	0.56
Classified loan ratio (gross) of Mainland related lending ¹¹	0.96	0.77	0.85
Liquidity ratios (consolidated)			
Liquidity Coverage Ratio — applicable to category 1 institutions (quarterly average)	154.4	155.5	151.9
Liquidity Maintenance Ratio — applicable to category 2 institutions (quarterly average)	57.7	58.2	59.1
Net Stable Funding Ratio — applicable to category 1 institutions	138.2	133.8	135.3
Core Funding Ratio — applicable to category 2A institutions	139.5	147.6	150.4
Retail banks			
Profitability			
Loan impairment charges as a percentage of average total assets (year-to-date annualised)	0.12	0.04	0.07
Net interest margin (year-to-date annualised)	1.18	0.98	0.98
Cost-to-income ratio (year-to-date)	47.0	51.7	54.7
Surveyed institutions			
Asset quality			
Delinquency ratio of residential mortgage loans	0.04	0.03	0.04
Credit card lending			
Delinquency ratio	0.27	0.22	0.20
Charge-off ratio — quarterly annualised	2.17	1.84	1.53
— year-to-date annualised	2.18	1.90	1.75
All locally incorporated AIs			
Capital adequacy (consolidated)			
Common Equity Tier 1 capital ratio	16.7	16.3	16.2
Tier 1 capital ratio	18.7	18.3	18.2
Total capital ratio	20.7	20.4	20.2
Leverage ratio	8.2	8.0	7.9

Notes:

- Figures are related to Hong Kong offices only except where otherwise stated.
- The Hong Kong Interbank Offered Rates are released by the Hong Kong Association of Banks.
- With reference to the rate quoted by The Hongkong and Shanghai Banking Corporation Limited.
- The composite interest rate is a weighted average interest rate of all Hong Kong dollar interest-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.
- Quarterly change.
- Loans for use in Hong Kong plus trade finance.
- Including "others" (i.e. unallocated).
- Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' overseas branches and major overseas subsidiaries.
- Classified loans are those loans graded as "substandard", "doubtful" or "loss".
- Net of specific provisions/individual impairment allowances.
- Figures are related to all AIs' Hong Kong offices, as well as locally incorporated AIs' Mainland branches and subsidiaries.

Box 5

Assessing the financial impacts of climate-related risks on listed non-financial firms in Hong Kong using NGFS scenarios

Introduction

Climate change is one of the most pressing challenges facing the world today. For example, the transition towards a low-carbon economy will inevitably affect many economies and sectors on various fronts. This highlights the growing importance of strengthening climate risk assessment and monitoring framework globally.

To facilitate the development of the framework for central banks and regulators, the NGFS⁷⁰ has developed and published a granular database of reference climate scenarios for a wide range of countries and sectors. This database provides key inputs for central banks, regulators, and other stakeholders to evaluate the effects of climate change on a consistent and comparable basis.

Building on the contributions of the NGFS and related analysis by major central banks,⁷¹ this box aims to develop an analytical framework to assess the financial impacts of climate-related risks on non-financial corporates listed in Hong Kong.⁷² The framework enables a top-down analysis on how climate transition and physical risks may adversely affect firms' default risks over a 30-year horizon through different transmission channels. It also attempts to show how the NGFS climate scenario data together with firm-specific data

may help assess the potential impact of climate-related risks on the corporate sector.⁷³

Overview of the NGFS scenarios

This section introduces the NGFS scenarios considered in this box. We focus on two of the climate scenarios, the “orderly” and “disorderly” transition scenarios. Specifically, they both assume the target of limiting global warming to below 2 °C will be achieved by the end of 2050, but they vary in terms of policy timing and policy stringency. The outcomes of both scenarios can be assessed against a baseline case (referred to as “business-as-usual” (BAU) scenario), in which policymakers are assumed to follow only those climate policies that were already implemented, implying no additional transition risks by the end of 2050.^{74, 75} Comparing the transition scenarios to the baseline case may give a clearer picture of the impact of risks under the transition scenarios.

Chart B5.1 displays the projected average world carbon price (in bars) and the corresponding projected path of the annual world greenhouse gas (GHG) emission levels (in lines) under the three scenarios respectively.

⁷⁰ The NGFS, consisting of hundreds of members and observers, aims at strengthening the global response required to meet the goals of the Paris agreement.

⁷¹ The European Central Bank (ECB) and several other central banks have also conducted climate stress-testing initiatives to assess the climate resilience of the financial system in recent years. (See Alogoskoufis et al. “ECB economy-wide climate stress test”, *ECB Occasional Paper Series*, No. 281, September 2021.)

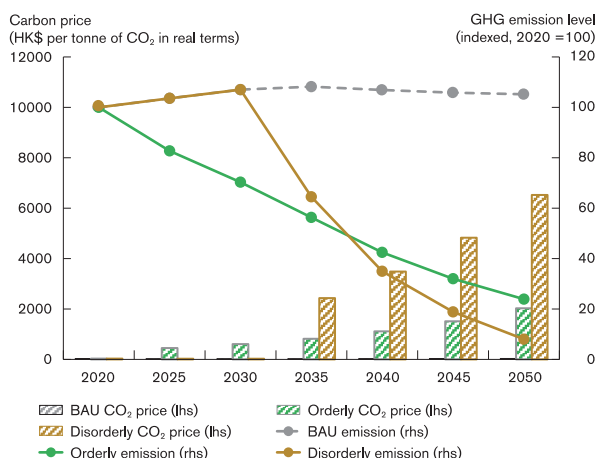
⁷² For details, we refer readers to Ho et al. (2022): “Assessing the financial impacts of climate-related risks on HK-listed non-financial firms: A forward-looking analysis based on NGFS scenarios”, *HKMA Research Memorandum* 01/2022.

⁷³ It should be emphasised that this analysis is an initial attempt to study the issue, and further refinements could be made in future.

⁷⁴ It should be noted that there is a number of alternative projections by other institutions. Due to different projection methodologies, their estimates may differ from those under the NGFS reference scenarios.

⁷⁵ In the Phase II of the NGFS data and in the full research paper, “orderly”, “disorderly” and “BAU” scenarios are respectively named as “Below 2°C”, “Delayed transition” and “Current Policies” scenarios.

Chart B5.1
Projected average world carbon price and world GHG emission levels across time



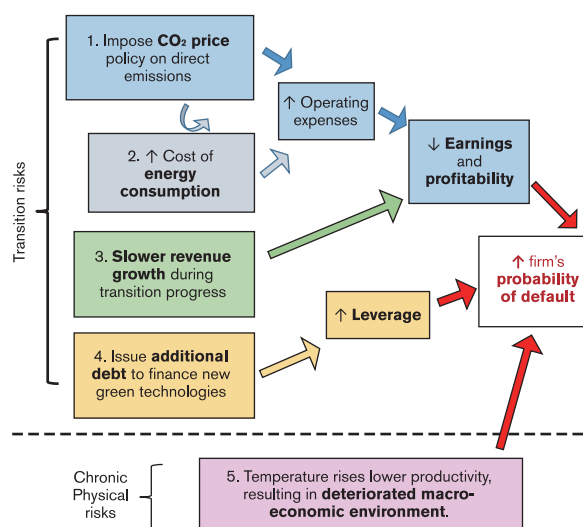
Under the orderly scenario, climate policies (such as carbon tax) are assumed to be imposed immediately and then gradually increased over time in an orderly manner. Thus, the projected carbon price will rise gradually from 2020 onwards (the green bar in Chart B5.1). In response to the imposition of carbon prices, the annual GHG emissions are projected to decline in an orderly manner over time, as shown by the green line in the same chart.

By contrast, under the disorderly scenario, due to delayed actions by policymakers, more stringent policies will be imposed from 2030 to meet the same target as the orderly scenario by the end of 2050. The brown bars in Chart B5.1 show the carbon price will remain largely near zero before 2030, followed by an abrupt rise with the imposition of more stringent climate policies. Accordingly, the annual GHG emissions will only start declining after 2030, but in a disruptive manner given the significant rise in the carbon price (the brown line in Chart B5.1). As such, the transition risk will likely be higher under the disorderly scenario than in the orderly case between 2030 and 2050.

Discussion on the transmission channels

Chart B5.2 graphically overviews the analytical framework that captures several key transmission channels through which transition and physical risks could affect the financial fundamentals of firms, and thus their default risk.

Chart B5.2
Flow diagram on key channels through which climate-related risks affect firms' financial fundamentals



Indeed, climate transition risks could affect the profitability and leverage of firms in several ways. First, as carbon prices are assumed to be imposed on firms' direct GHG emissions (i.e. carbon tax) under the NGFS scenarios, they will not only face higher operating expenses directly from the carbon tax on their emissions, but also indirectly from higher energy consumption costs.⁷⁶ Both could put downward pressure on firms' profitability.⁷⁷ In response, firms are assumed to lower their emissions and shift towards using more green energy in their productions to mitigate the impacts on their profitability.

⁷⁶ Higher carbon taxes will increase the price of energy generated from fossil fuel combustion. If consumers cannot easily substitute by switching to cheaper and greener renewable energy sources, they will then face higher energy consumption costs.

⁷⁷ The resource reallocations arising from the climate transition may prompt adjustments in economic activities, which may slow economic momentum relative to the "BAU" case. This, in turn, may lead to a slower firm revenue growth.

Second, firms are assumed to invest in more sustainable production technologies to achieve the target of reducing GHG emissions. Such investment is assumed to be financed by new debt, leading to higher leverage.

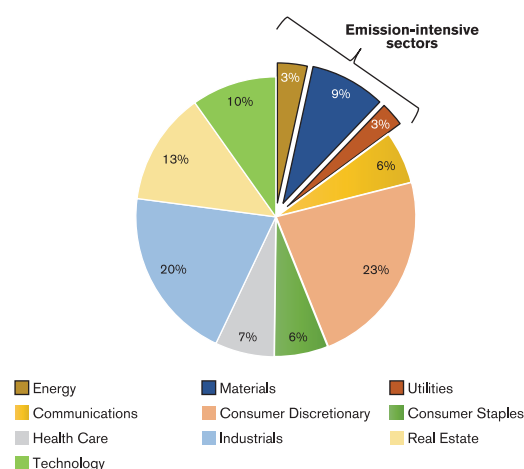
On physical risks, our analysis captures the macro impact of global temperature rises, which leads to lower productivity and output loss, thereby affecting firms' financial fundamentals. While the specific exposure of firms to physical risks is important, the impact cannot be assessed in the current analysis due to data limitations.⁷⁸ However, further refinements are possible if the data gaps are addressed.

With the transmission channels discussed, we can assess how different NGFS scenarios will likely impact firms' profitability, leverage and macro environments over a 30-year horizon. Using these estimates, we can further assess the impact on a firm's 1-year default probability (PD)⁷⁹ based on a satellite model that empirically explains the PD of a firm by its returns on assets, debt-to-assets, size and the macro environments measured by the output gap.

Data

The analysis covers non-financial firms listed in Hong Kong (around 2200 firms in total⁸⁰). Chart B5.3 presents the share of firms by sector using the Global Industry Classification Standard. While firms from consumer discretionary, industrial and real estate sectors accounted for over half the samples, firms from the energy, materials and utilities sectors, which are more subject to climate transition risks, made up around 15% of the total samples.

Chart B5.3
Distribution of sampled firms by sector



Source: HKMA staff calculation based on S&P Capital IQ data.

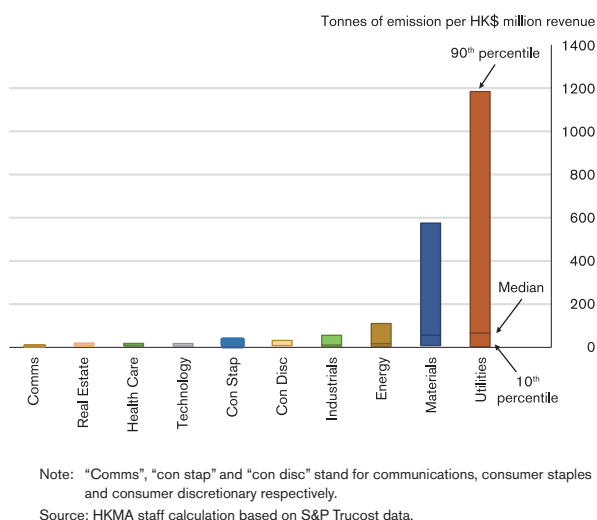
There is a large variation in firms' GHG emission intensities (measured by firms' emissions relative to their revenues) across different sectors. Each bar in Chart B5.4 presents the 10th, median and 90th percentiles of the sampled firms' emission intensities. As shown, utilities, materials and energy sectors are the highest GHG emitting sectors (denoted as emissions-intensive sectors hereafter), while other sectors generally have low emissions intensity. It is also noteworthy that there is a large variation in emission intensities among firms within the emission-intensive sectors, suggesting the extent of transition risks and the potential impacts could vary significantly even among firms from the emission-intensive sectors.

⁷⁸ Apart from chronic risk, physical risks can also arise from extreme weather events (e.g. storm, drought-risks) which pose direct financial losses on firms' assets that are exposed to these extreme events. However, quantifying such financial impact requires detailed location data of firms' assets and activities, which are not readily available.

⁷⁹ One-year ahead probability of default by Bloomberg is chosen to proxy for the default risk.

⁸⁰ Among them, around 790 of listed firms are domiciled in Hong Kong, while the rest are domiciled outside Hong Kong.

Chart B5.4
Emissions intensity by sector



Key findings

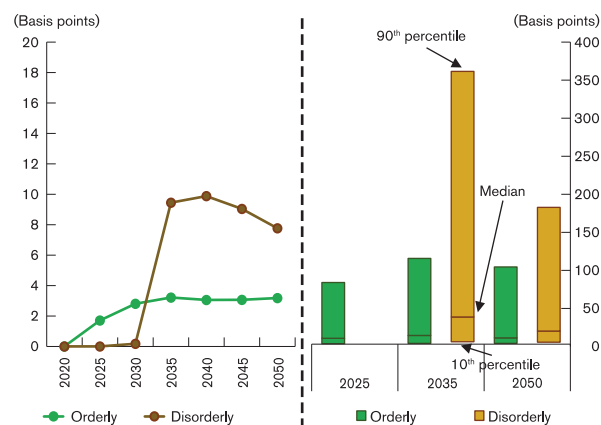
a. Impact of transition risks

Our assessment finds that the transition towards a low carbon economy will generally lead to lower profitability and higher leverage in firms, which in turn translates into a higher average PD of firms relative to the baseline scenario (i.e. BAU scenario which assumes no transition risks).

We first assess how the default risk of a *typical firm* will be affected under the two transition scenarios by focusing on the median impact on PD of all sampled firms over time (left panel of Chart B5.5). Although the impact on default risk is found to be mild under the two scenarios, it is found that under the disorderly transition scenario, the median impact on PD (the brown line) is significantly higher than that under the orderly transition scenario (the green line) in the longer-term (i.e. 8 basis points (bps) versus 3 bps at the end of 2050). This suggests the long-term benefit of an orderly transition.

It is important to note, however, that the mild median impact on PD under both scenarios may be primarily driven by the fact that the vast majority of firms listed in Hong Kong are not from emission-intensive sectors (See Chart B5.3), and thus they may be less subject to high transition risks.

Chart B5.5
Projected median change in probability of default for all HK-listed firms (left panel) and projected change in probability of default for firms from emissions-intensive sectors only (right panel)



When assessing firms from emissions-intensive sectors, the median impact on PD (see middle marks of the bars in the right panel of Chart B5.5) is found to be much higher than the full sample estimates presented in the left panel of Chart B5.5. In particular, in a disorderly transition scenario, the median impact on PD around 2035 may reach its peak at around 37 bps, while the corresponding estimate under the orderly scenario is around 12 bps.⁸¹ Importantly, comparing the median impact on PD for firms from emission-intensive sectors under the two scenarios would see even stronger evidence of supporting an orderly transition.

Another noteworthy finding is the large cross-sectional variations in the rise of PD among firms from emissions-intensive sectors. Taking the "disorderly" case in 2035 as an example (brown bar in the right panel of Chart B5.5), the change in PD could range widely from 4 bps at the 10th percentile to around 360 bps at the 90th percentile. One important implication is that it is vital to take into account the environmental data and business nature of firms, to have a more

⁸¹ The corresponding full-sample estimates are 10 bps and 3 bps respectively.

accurate assessment of climate-related risks on firms.

b. Impact of chronic physical risks

We also assess the impact of physical risks through the macro channel (as discussed in Chart B5.2) on firms' PD under the two transition scenarios and compare the results with the baseline "BAU" scenario. Our assessment shows that the impact of physical risk under the two transition scenarios would be much lower than the baseline case.

In particular, the temperature rise is assumed to exceed 3°C under the baseline "BAU" scenario, in which the associated physical risk could lead to a significant rise in firms' median PD by around 130 bps in 2050. By contrast, under both orderly and disorderly scenarios where climate policy actions will help keep the rise in global temperature to well below 2°C by 2050, the corresponding rises in firms' median PD is found to be lower than that under the baseline scenario by around 65 bps, pointing to a long-term benefit of adapting a green transition as opposed to a "no action" case.

Conclusion

This box presents a framework for assessing the impact of climate-related risks on firms' credit risks using the NGFS reference scenarios. Overall, our analysis suggests that the credit risks arising from climate-related risks should be relatively manageable for most of the firms in Hong Kong. That said, some firms, especially those from emissions-intensive sectors, could face material transition risks and therefore may be subject to a notable rise in credit risks under the disorderly transition scenario. Regarding the implications for the Hong Kong banking sector, while the transition risks may become a source of credit risks of banks' loan portfolios, the impact could be different across banks depending on the sectoral composition of their loan portfolios. Nonetheless, the Hong Kong banking sector as a whole is not heavily exposed to emission-

intensive sectors. Importantly, underpinned by the strong capital position, the Hong Kong banking sector should remain resilient to the climate transition risks.

Our findings also show that from a long-term perspective, the impacts of climate transition risks on firms' default risks would be significantly smaller in the "orderly transition" scenario than the "disorderly" one. In addition, the impact of physical risks under these two transition scenarios would be lower than the "no action" case. The results together support the position that there are clear benefits to taking climate action, and acting early.

This analysis also demonstrates the HKMA's support for the NGFS Glasgow Declaration⁸² and commitment to integrating climate-related risks into financial stability monitoring and using NGFS climate scenarios in our analyses.

Nevertheless, our analysis comes with caveats. First, data gap issues preclude us from fully assessing the climate-related risks, particularly in assessing firm specific exposure to physical risks.⁸³ Second, the estimates for a long time horizon (up to 2050) could be subject to large uncertainties. As such, caution should be exercised when interpreting the results.

⁸² The HKMA issued a statement in November to support the NGFS Glasgow Declaration. For details, see "Supporting the Central Banks and Supervisors Network for Greening the Financial System Glasgow Declaration", HKMA, 3 November 2021.

⁸³ Apart from data gap related to physical risk, other key data gaps may include the opportunities in transition, such as higher demand driven by consumer green preferences, improved energy efficiency and operational flexibility. These factors could potentially result in improvement in firms' profitability.

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
7dma	Seven-day moving average
AC	All-Country
AB	Aggregate Balance
AEs	Advanced economies
Als	Authorized institutions
ASEAN	Association of Southeast Asian Nations
ASEAN-5	Indonesia, Malaysia, the Philippines, Thailand and Vietnam
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
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

CPI	Consumer Price Index
CU	Convertibility Undertaking
DI	Direct investment
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
EMEs	Emerging Market Economies
EPRC	Economic Property Research Centre
EPS	Earnings per share
ESG	Environmental, Social and Governance
ETFs	Exchange traded funds
EU	European Union
EUR	Euro
Fed	Federal Reserve
FI	Financial Institution
FMA	First-mover advantage
FOMC	Federal Open Market Committee
FX	Foreign exchange
GBP	British Pound Sterling
GDP	Gross Domestic Product
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
IFC	International Finance Corporation
IIF	Institute of International Finance
IMF	International Monetary Fund
IPO	Initial Public Offering
IRRBB	Interest rate risk in the banking book
IT	Information technology
JPY	Japanese Yen
LCR	Liquidity Coverage Ratio
LIBOR	London Interbank Offered Rate
LEERS	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
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
NY	New York
OEF	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
PCE	Personal consumption expenditure
PD	Probability of default
PE	Price-to-Earnings
PMI	Purchasing Managers' Index
PPPHS	Pre-approved Principal Payment Holiday Scheme
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
ROA	Return on assets
ROE	Return on equity
RRR	Required reserve ratio
RTGS	Real Time Gross Settlement
SAFE	State Administration of Foreign Exchange
SDR	Special Drawing Rights
SFGS	SME Financing Guarantee Scheme
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
Std. dev.	Standard deviations
SWIFTs	Society for Worldwide Interbank Financial Telecommunication

S&P 500	Standard & Poor's 500 Index
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
WEO	World Economic Outlook
wk	Week
WMP	Wealth management product
WTO	World Trade Organisation
yoy	Year-on-year

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