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.

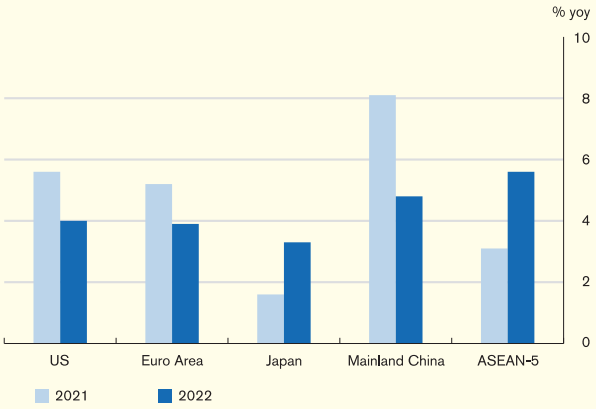
In Mainland China, economic growth slowed in the second half of 2021 amid new waves of COVID-19 outbreaks, the power crunch, and tightening measures applied to the property market. Looking ahead, the Mainland economy may continue to face downward pressures stemming from the property market downturn and 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).

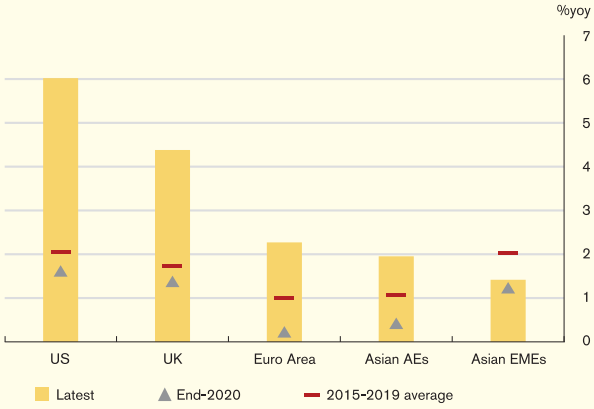
Chart 2.1
IMF's real GDP growth projections



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.

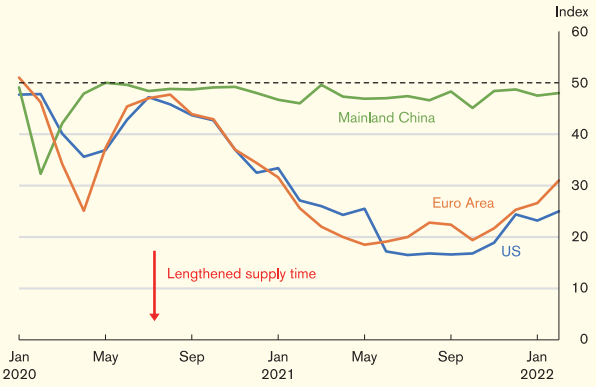
Chart 2.2
Core consumer price index (CPI) rate in selected economies



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.

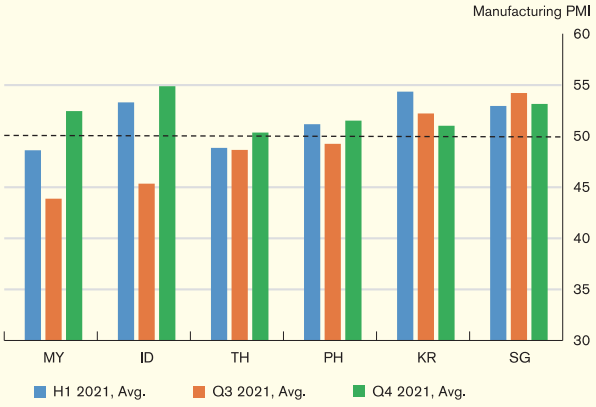
Provided that the pandemic remains under control, supply bottlenecks can be expected to dissipate gradually, offering some relief to goods inflation. However, several developments could render the current spell of global inflation more persistent than expected, including the risk of increases in commodity 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.

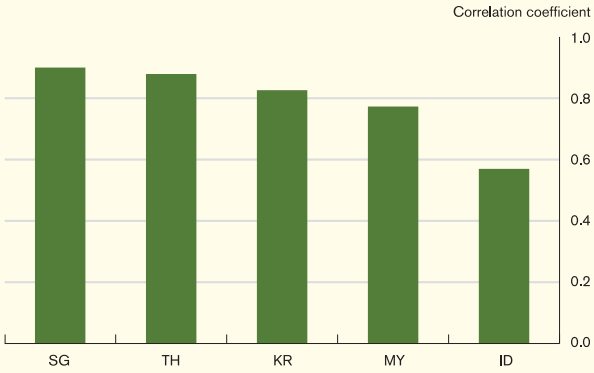
In emerging Asia, economic recovery continued in the second half of 2021, although the spread of the Delta variant dented the growth momentum in the third quarter, especially in some Southeast Asian economies (Chart 2.4). This further widened the unevenness in the recovery between the Southeast Asian 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.

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.

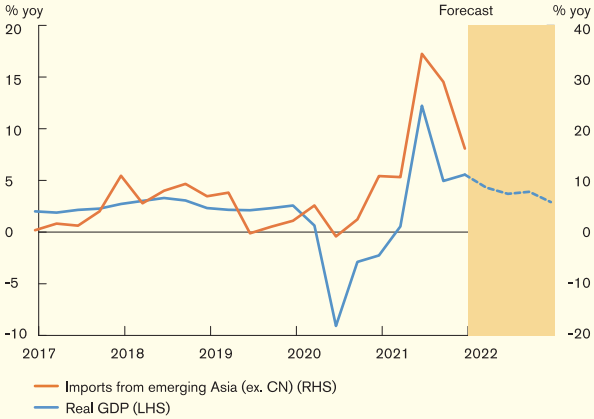
While the market consensus points to a broad-based recovery in emerging Asia in 2022, the region's near-term economic outlook is facing multiple headwinds:

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.

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.

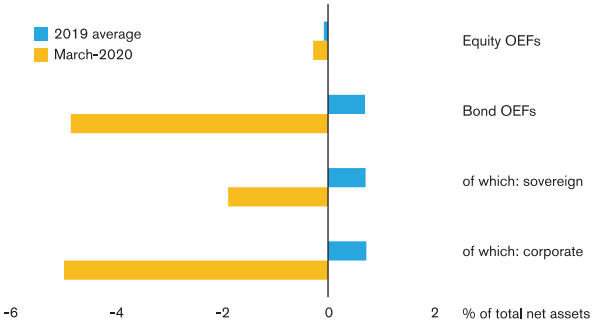
The pandemic also serves as a wake-up call to regional economies for the need to rebuild a more sustainable and resilient growth model in the long term, to better prepare for other high-impact risks such as climate change. To achieve this, it is necessary for investors to put more weight on environmental, 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

Introduction[6]

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



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

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 episode[7], 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%).

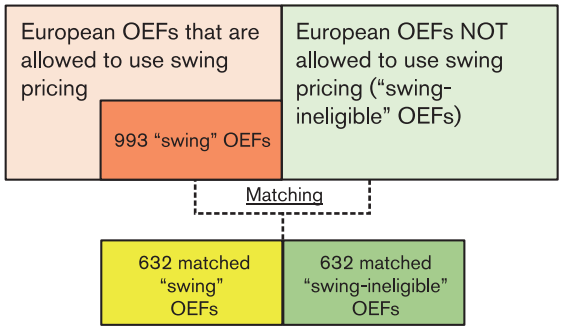
Methodology and Data

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 Direct[8], 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 period[9]. 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 analysis[10].

Chart B1.2
Sample of "swing" and "swing-ineligible" OEFs



632 pairs of matched OEFs with same investment area, major asset type, and smallest percentage differences in OEF size, age and return

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-samples[11]. 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.

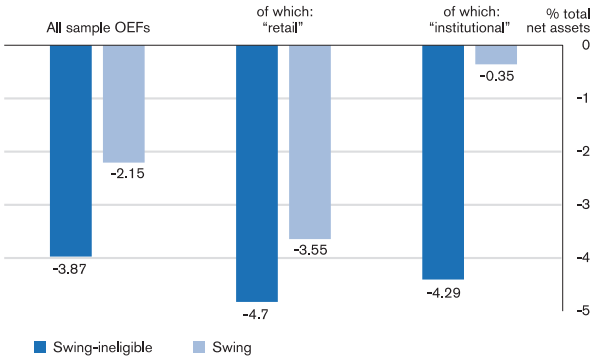
[9] OEFs' "actual" and "unswung" prices are disclosed by OEFs on a voluntary basis, and are obtained from Morningstar Direct.

[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 substantially[12], 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" OEFs[14]. 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 episode[15].

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

Introduction[16]

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 risks[17], 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 two 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

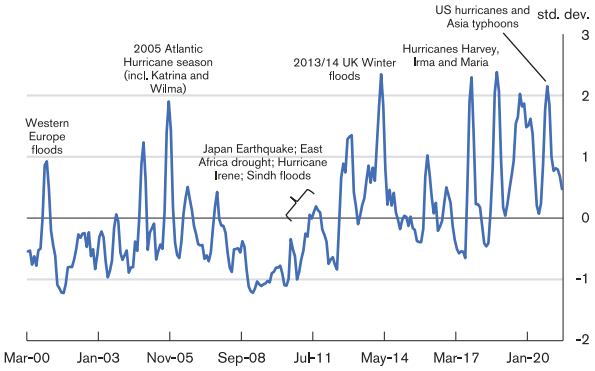
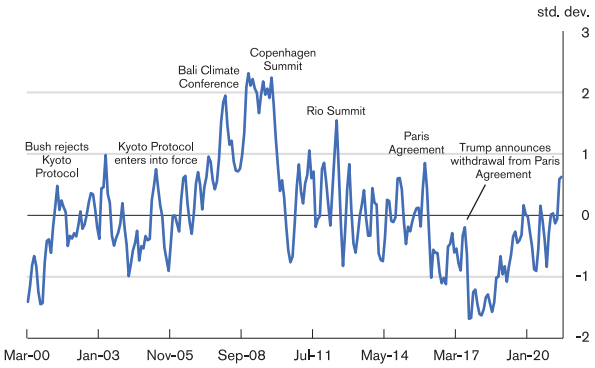


Chart B2.2
Global transition risks index



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

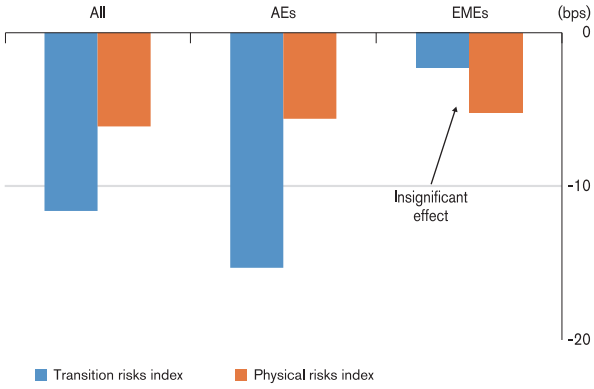
Using the indices outlined above, we estimate investor sensitivity to climate risks and firms' environmental performance with a stock returns model. Specifically, we regress monthly stock returns for a global sample of firms between January 2000 and May 2021 on changes in our two climate indices, their 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 firms[18].

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

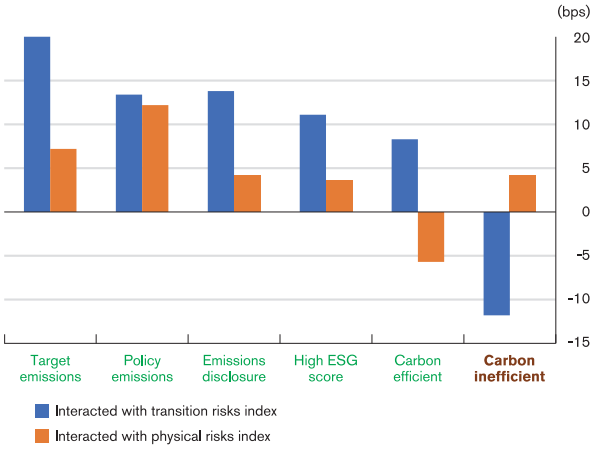
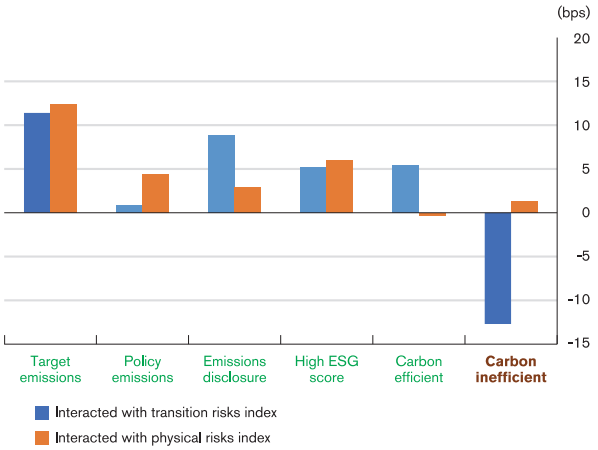


Chart B2.5
Stock price reaction of EME firms to rises in climate risk indices: green versus brown firms



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.

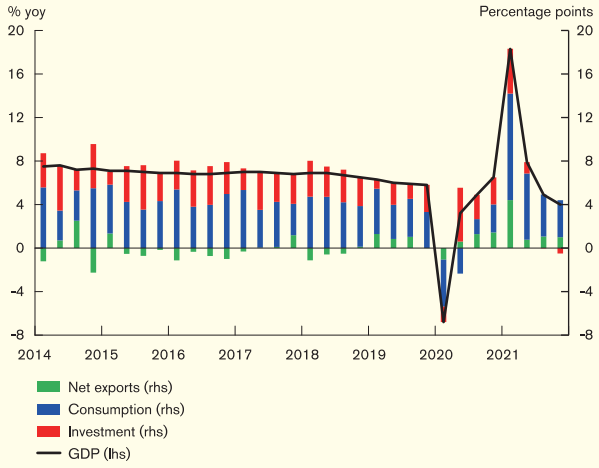
[18] See, for example, Pastor, L., Stambaugh, R. F., & Taylor, L. A. (2020) "Sustainable Investing in Equilibrium", *Journal of Financial Economics*, https://doi.org/10.1016/j.jfineco.2020.12.011.

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



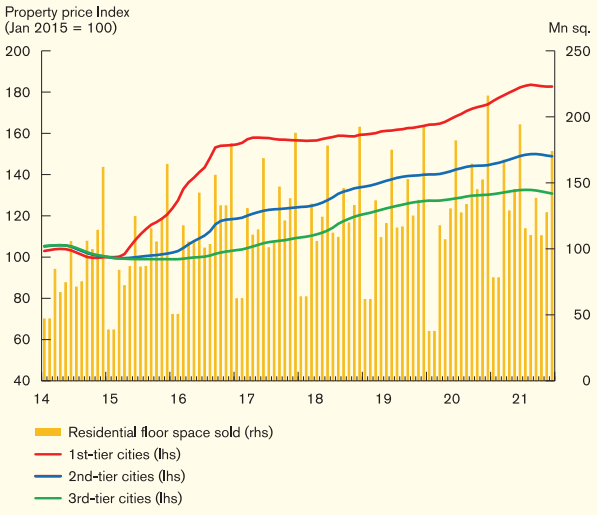
Sources: CEIC, National Bureau of Statistics and HKMA staff estimates.

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

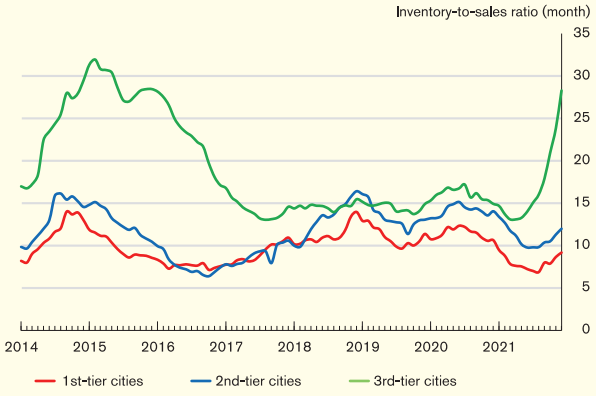
In the second half of 2021, Mainland property market activities contracted notably amid the tightening measures in place. While housing prices have eased across all tiers of cities, the cumulative decline in housing prices remained mild so far (Chart 2.8). Meanwhile, with weak market sentiment, residential 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

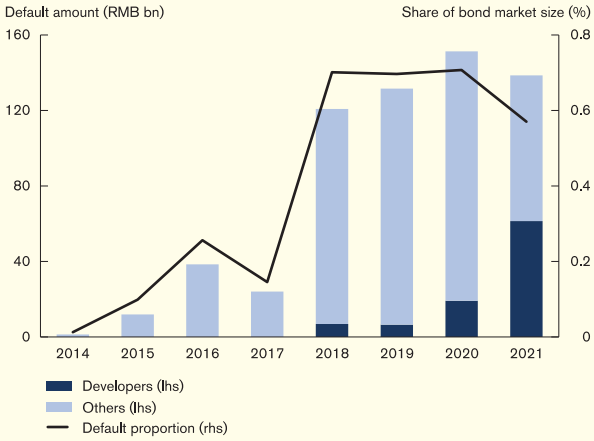


Sources: Wind and HKMA staff estimates

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 buyers[19]. 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



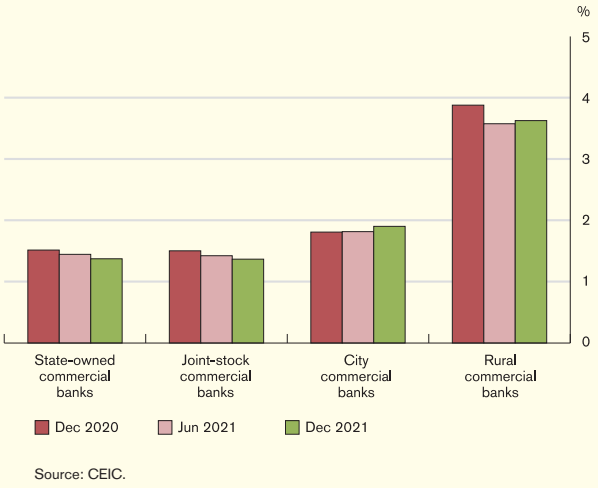
Note: Repeated defaults of the same bond are only counted once.
Sources: Wind and HKMA staff estimates.

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.

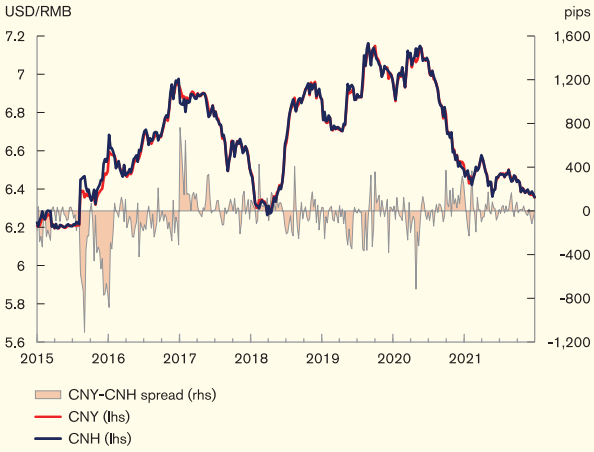
[20] Data covers enterprise and corporate bonds, medium-term notes, short-term commercial papers and private placement notes listed in both the interbank market and exchanges.

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



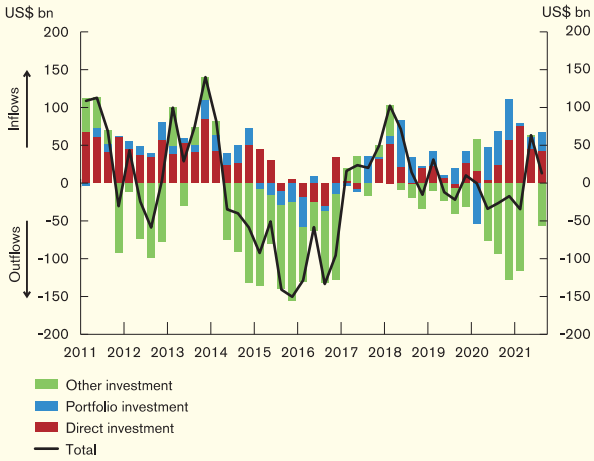
Sources: Bloomberg and HKMA staff estimates.

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-CNH 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.

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.

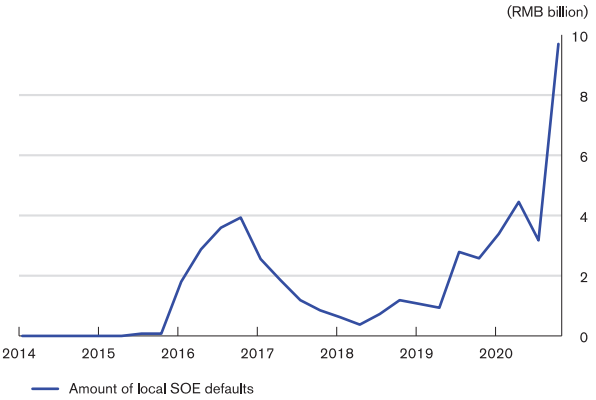
Despite the expansionary fiscal policy stance, the overall risk of local government debt remained manageable, with Mainland local government debt-to-GDP ratio remaining low at 27% in 2021, similar to that in 2020, but some local governments with relatively weaker economic fundamentals may warrant closer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

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



Note: Amount of local SOE defaults is calculated as the four-quarter moving average of local SOE bond defaults.
Sources: Wind and HKMA staff estimates.

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 $\varepsilon_{i,p,t}[k]$:

$$Spread_{i,p,t}[k] = \beta_0 + \beta_1 \overbrace{X_{i,p,t}[k]}^{\substack{bond\\risk}} + \beta_2 \overbrace{F_{i,p,t}}^{\substack{issuer\\risk}} + \overbrace{\boldsymbol{\beta_3} Z_{p,t}}^{\substack{province\\premium}} + S_i + \lambda_t + \varepsilon_{i,p,t} \quad (1)$$

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.

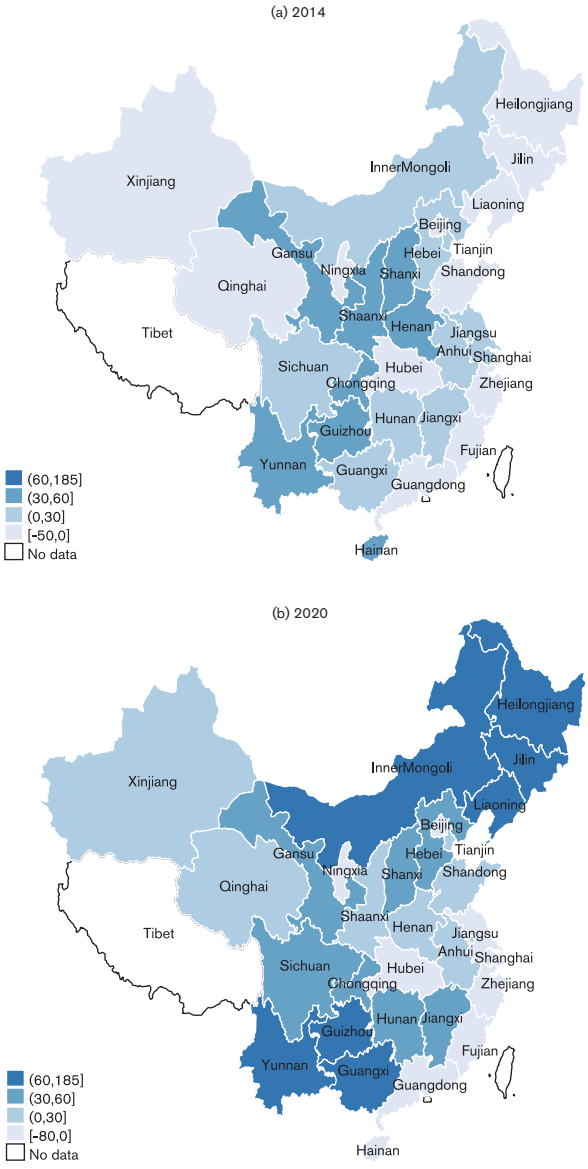
$\widehat{\boldsymbol{\beta}}_{\boldsymbol{3}}$ is estimated at the quarterly frequency to capture the changing *province premium* while ensuring enough observations for each province.[21]

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

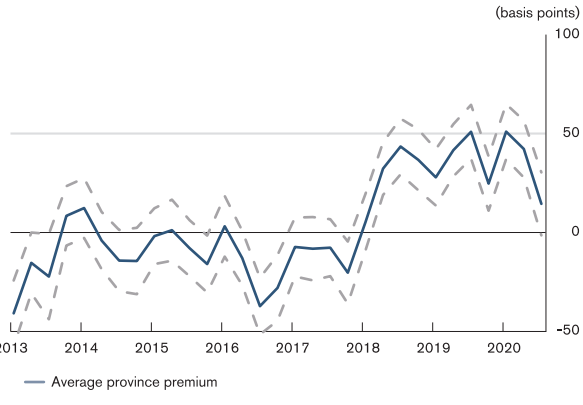


Empirical results and policy implications

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.

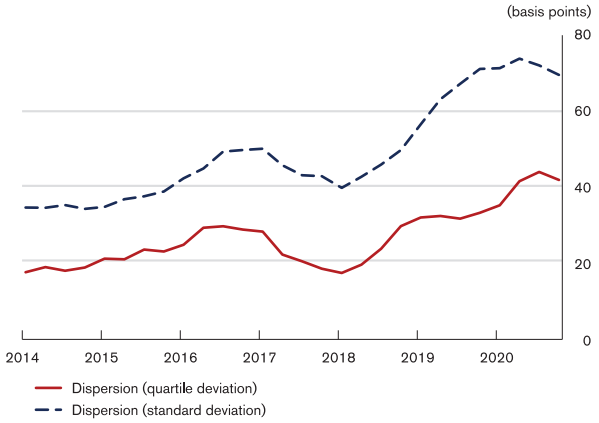
At the national level, the estimated average *province premium* also increased: it was roughly below 10 bps before picking up notably in 2018, and then hovered at 20-70 bps in recent years (Chart B3.3). Much of the increase was actually owing to the rising credit differentials, evidenced by a similar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



Note: Estimated province premium in each province is relative to the reference group - central SOEs and the base quarter is 2013Q1.

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



Note: Quartile deviation is defined as (75th percentile – 25th percentile)/2.

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 premia* in Mainland China

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