
2. Global setting and outlook

Global headline inflation rates retreated from their decades-high levels during the review period thanks to easing commodity prices and normalising supply chains, but core inflation remained firm amid tight labour markets. While the recent emergence of banking stress in the US and Europe has accentuated the trade-off between price stability and financial stability, upside risks to inflation cannot be ruled out, and major central banks may have to keep rates higher for longer than market expectation, which might sow the seeds of disruptive asset repricing going forward.

In emerging Asia, economic growth moderated in late 2022 as export growth slowed along with the global slowdown, while inflationary pressures remained elevated. As global and domestic financial conditions tightened, the region's financial vulnerabilities have been increasingly exposed, with rising downward pressures on housing prices and an increasing debt service burden on indebted sectors. Further intensification of these vulnerabilities may have repercussions for the regional banking sector.

In Mainland China, economic growth slowed in the fourth quarter amid COVID-19 outbreaks and weak property market conditions, after rebounding in the third quarter. Looking forward, while uncertainties surrounding the growth outlook remain high, private consumption and other domestic economic activities are likely to revive following the easing of COVID-19 restrictions and the government's prioritisation of economic stabilisation in 2023.

2.1 External environment

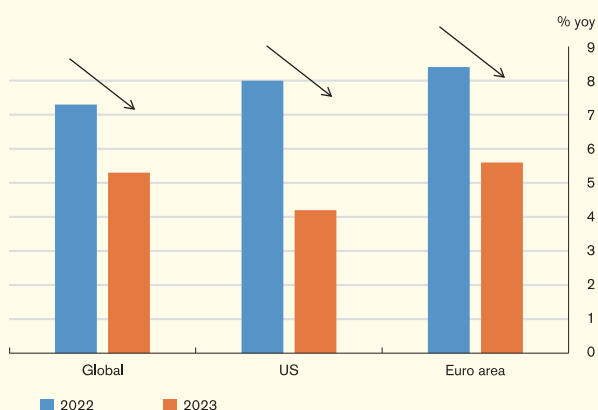
During the review period, headline inflation rates in major advanced economies (AEs) eased from their decades-high levels amid softer commodity prices and normalising global supply chains that alleviated goods inflation. However, services inflation remained elevated as still-tight labour market conditions continued to drive wage growth, suggesting that monetary conditions in major AEs, while having already been tightened significantly since early 2022, were not yet likely to be restrictive enough to curb excess labour demand. Therefore, to ensure well-anchored

inflation expectations, major central banks continued to tighten monetary policy despite the private sector expecting a substantial easing of inflationary pressure in 2023 (Chart 2.1) and increasingly evident signs of slowing growth momentum.

However, the high interest rate environment coupled with the recent emergence of banking stress in the US and Europe with a few domestic US banks failing in March, are increasing uncertainties surrounding the economic outlook and financial markets. Despite the regulators' swift actions in protecting depositors and

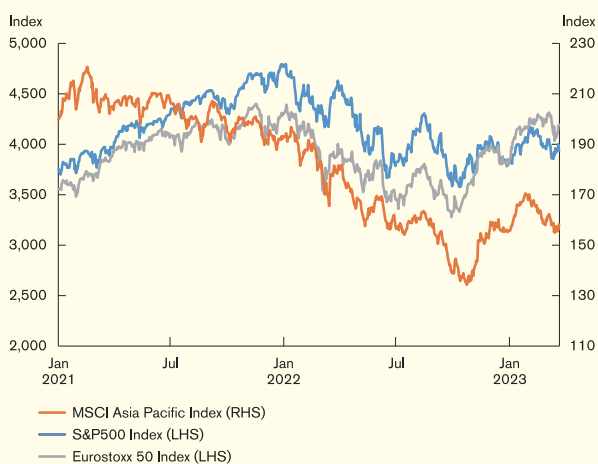
providing funding support to banks, equity markets tumbled on heightened risk aversion, extending the losses since early 2023 due to the stronger-than-expected inflation readings (Chart 2.2).

Chart 2.1
Actual and projected consumer price index (CPI) inflation in selected economies



Source: Consensus Forecasts, March 2023.

Chart 2.2
Selected major equity market indices

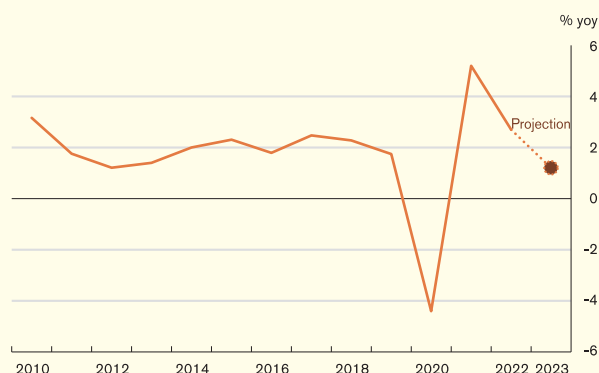


Source: Bloomberg.

Looking ahead, the global monetary policy outlook has become more uncertain as major central banks are confronted with a stark trade-off between price stability and financial stability, which could point to future asset market volatility given several lingering downside risks.

On one hand, there are rising concerns that major AEs such as the US and Europe may experience a sharp economic slowdown in 2023. Reflecting the lagged effect of the cumulative monetary tightening thus far, the International Monetary Fund (IMF) projected in January 2023 that AEs' real gross domestic product (GDP) growth would decelerate from 2.7% in 2022 to 1.2% this year, which would mark the slowest pace of expansion during the past decade (save 2020 when the COVID-19 pandemic emerged) (Chart 2.3). Moreover, pressing ahead with further rate hikes to combat inflation could potentially risk exposing hidden financial vulnerabilities that were accumulated during the low-interest-rate period. All these could weigh on the global economic outlook and entail negative spillover effects on the rest of the world, particularly emerging market economies (EMEs).

Chart 2.3
AE real GDP growth



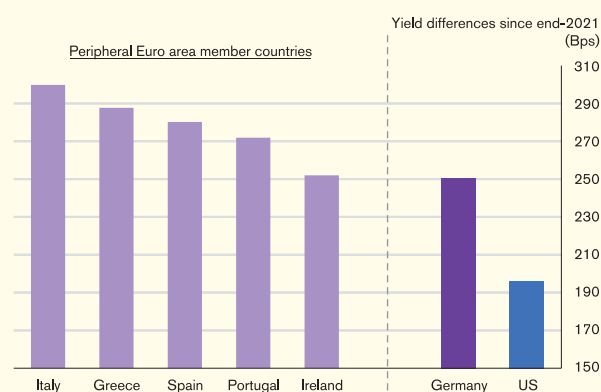
Source: IMF.

On the other hand, it is possible that the pace of disinflation may be slower than expected. For instance, uncertainties surrounding the Russia-Ukraine conflict may trigger renewed increases in global energy and food prices. Meanwhile, the more-resilient-than-expected US labour market thus far and the widespread practice of wage indexation to past inflation across Europe may pose upside risks to labour costs and hence services inflation. In this case, major central banks may have to keep rates higher for longer than market expectations, which, coupled with

weaker growth and earnings outlook as major AEs are expected to experience a marked growth slowdown, might trigger disorderly repricing of risky assets to the detriment of global financial stability. The materialisation of climate risk could also trigger abrupt repricing of related assets. With the promise of financing projects that bring positive environmental benefits, corporate green bond markets have been developed to mitigate climate risk. Box 1 studies whether the issuers have delivered on their promises and the policy implications for fostering a healthier development of corporate green bond markets.

The uncertainty of the global financial conditions would also pose challenges to the debt sustainability of highly-indebted countries, including several peripheral Euro area countries such as Italy and Greece. Indeed, since early 2022 their sovereign yields have increased by a wider extent compared with other AEs in the current rate hike cycle (Chart 2.4), reflecting high credit risk premia required by investors. Should the ECB and the Fed keep their interest rates “higher-for-longer” under the slower-than-expected disinflation scenario, the sovereign spreads of those peripheral member countries could face additional upward pressure as a prolonged period of elevated borrowing costs could place their debt servicing ability under strain. From a broader global perspective, elevated borrowing costs could hurt the repayment ability of public and private debtors alike, while the weak global growth may also risk reversing the recent downtrend in global debt-to-GDP ratios.

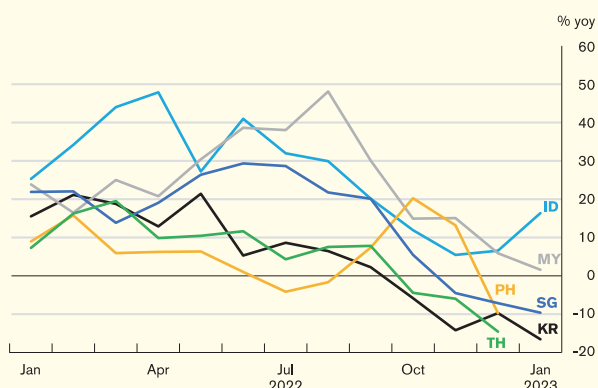
Chart 2.4
Changes in 10-year sovereign yields in selected AEs



Note: Data as of 22 March 2023.
Sources: Bloomberg and CEIC.

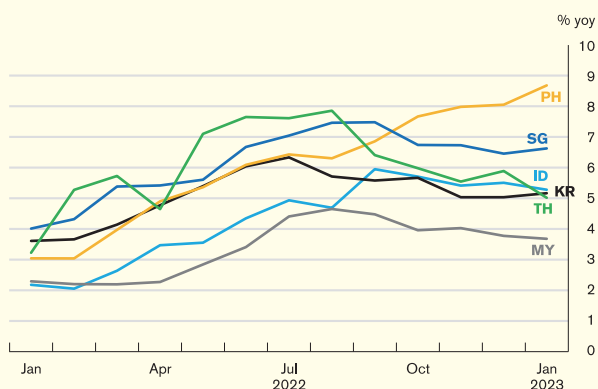
In emerging Asia, economic growth moderated further in the second half of 2022 as export growth fell notably along with the global economic slowdown, and regional exporters of technology products (South Korea and Singapore) were especially hard hit amid the downturn in the tech cycle (Chart 2.5). Meanwhile, inflationary pressures in some regional economies were at high levels due to the global supply disruptions of food and fuel commodities, with the CPI inflation rates hitting multi-year highs in the second half of 2022 before some moderation in late 2022 (Chart 2.6). Although many central banks in the region accelerated their monetary tightening to combat inflation, the rate hike path in the region was outpaced by the aggressive rate hikes taken by the Fed, with the narrowing interest rate differentials vis-à-vis that of the US leading to intense bond fund outflows from the region and currency depreciation until November 2022 when the market started to expect the US Fed to take a “dovish pivot”.

Chart 2.5
Export growth



Source: CEIC.

Chart 2.6
Headline CPI inflation



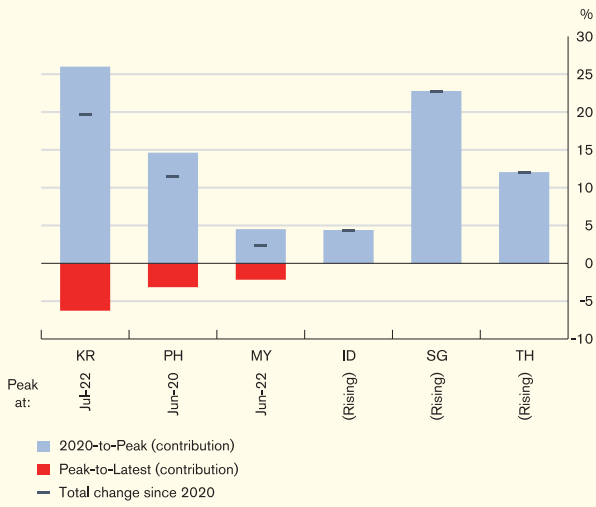
Source: CEIC.

As financial conditions tightened, the region's financial vulnerabilities that were accumulated over the past few years have been increasingly exposed. This is partly manifested in the softening of the region's housing markets amid higher interest rates. While the total change in housing prices since 2020 remains positive for most of the regional economies, many of their housing prices have edged down from their peak levels (Chart 2.7). Given that housing loans account for a significant share of outstanding bank loans in some of these economies (Chart 2.8), further corrections of the housing market should be carefully watched for possible repercussions to their banking systems.

Vulnerabilities are also noteworthy in economies that entered the pandemic with already high debt level and increased borrowing since then amid the extremely low-interest rate environment (Chart 2.9). With the ongoing global monetary tightening, their debt servicing burdens would increase. Debt overhang may pose risks to macro-financial stability through suppressing investment by viable corporates, or misallocating resources to financially unviable corporates. Some of these are also with a significant foreign currency debt and are therefore susceptible to foreign exchange risk. Indeed, Box 2 examines whether these corporates have hedged well against the risk, and how the development of FX derivatives markets in financial centres, such as Hong Kong, has been fostering the use of derivative hedge by corporates in the region.

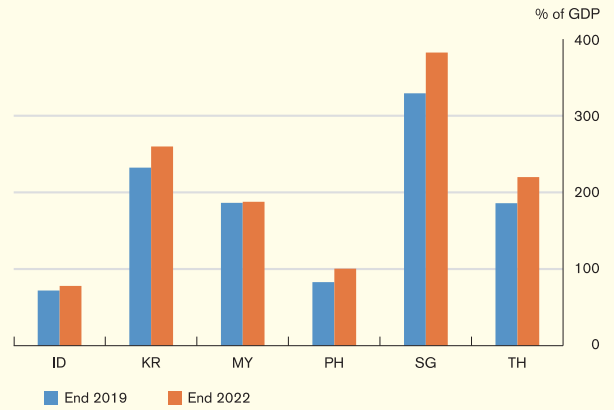
Weakening global demand is another factor that could weigh on the corporate performance and repayment capability of emerging Asia. If the region's export growth continues to lose momentum, this would render less support to the economic growth, therefore undermining firms' earnings and their ability to repay loans. Liquidity challenges facing heavily indebted firms could be further intensified.

Chart 2.7
Housing price changes since 2020



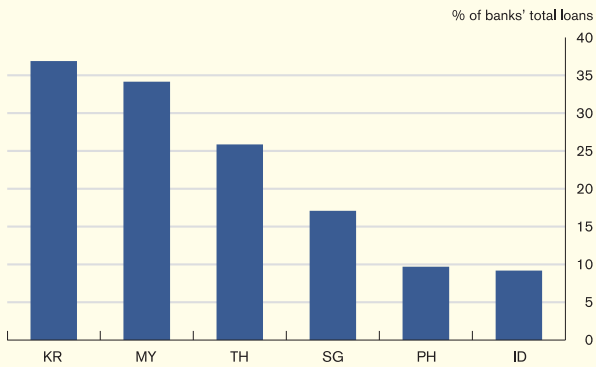
Note: "Peak" means the highest price level since 2020. For KR, the latest observation is Feb 2023; Jan 2023 for TH; Dec 2022 for ID and SG; Sep 2022 for the others.
Sources: CEIC and HKMA staff calculations.

Chart 2.9
Private and public debt since 2020



Note: Private and public debt refers to total debt incurred by households, nonfinancial corporates and governments.
Source: Institute of International Finance.

Chart 2.8
Outstanding housing loans



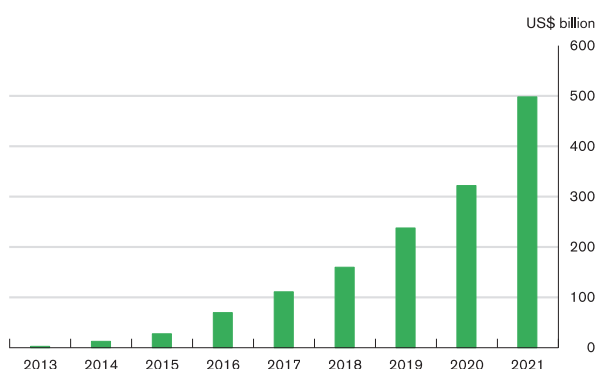
Note: Jan 2023 data for MY; Sep 2022 for PH; Dec 2022 for other economies.
Source: CEIC.

Box 1 Greenwashing in the corporate green bond markets

Introduction²

The global corporate green bond markets have seen rapid development over the past decade, with the outstanding amount of corporate green bonds rising at an annualised rate of 91% on average from US\$2.8 billion at the end of 2013 to US\$498.3 billion at the end of 2021 (Chart B1.1). The sizeable proceeds from green bonds should provide issuers with a large amount of capital to fund projects they pledge to undertake in delivering positive environmental benefits.

Chart B1.1
The outstanding amount of global corporate green bonds from 2013 to 2021



Sources: Bloomberg, Climate Bonds Initiative, Dealogic, Reuters and HKMA staff estimates.

However, it is often pointed out that some firms may engage in “greenwashing”, meaning that they reap the benefits of issuing green bonds (e.g. enjoying a lower cost of funding, building a better corporate image) without delivering on what they have promised. For instance, the United Nations (UN) published a report that criticised greenwashing and provided guidelines to ensure credible net-zero pledges by businesses and other institutions.³

² For details, please refer to Leung et al. (2022): “Greenwashing in the corporate green bond markets”, *HKMA Research Memorandum 08/2022*.

³ For details, please refer to UN’s High-Level Expert Group on the Net Zero Emissions Commitments of Non-State Entities. (2022): “Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions”.

Greenwashing not only impedes progress in combating climate change, but could also pose risks to financial stability, as the unveiling of a firm’s greenwashing behaviour may lead to an abrupt sale and repricing of its green bonds, with possible spill-over to other green assets. Against this backdrop, this box examines the issue of corporates’ greenwashing behaviour by focusing on green bond markets and the policy implications for financial stability.

To what extent greenwashing behaviour prevails in corporate green bond markets?

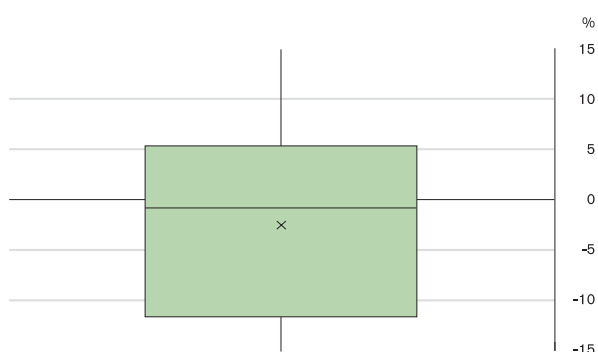
Using our novel dataset that covers 1,371 green bonds issued globally by 371 listed firms from 2013 to 2021⁴, we find that greenwashing is not uncommon in global green bond markets. Chart B1.2 reveals the distribution of change in aggregate greenhouse gas (GHG) emission intensity before and after the corporates issued their initial green bonds between 2013 and 2021.⁵ It could be seen that some firms actually have a higher GHG emission intensity after their initial green bond issuance. As their GHG emission performances are inconsistent with the initiative of green bond issuance, these mixed signals could be taken by market participants as evidence of greenwashing.⁶

⁴ The dataset is constructed based on data from four main green bond data suppliers, Bloomberg, Climate Bonds Initiative, Dealogic and Reuters.

⁵ For instance, assuming a green bond was issued in 2017, we would compare the average GHG emission intensity during 2017-2021 with that during 2013-2016.

⁶ Some might argue that the “green” label may associate only with the use of proceeds from green bond issuance, and hence, there appears to be no commitment to getting “greener” for the overall operations of the company. Yet, from a broader perspective, issuing green bonds could be taken as a signal that the issuers are committed to environmental causes. If they do not take tangible action to cut down GHG emissions, this may be inconsistent with the initiative of the green bond issuance and send mixed signals to the markets. Investors may take this as evidence of greenwashing.

Chart B1.2
Change in average aggregate GHG emission intensity



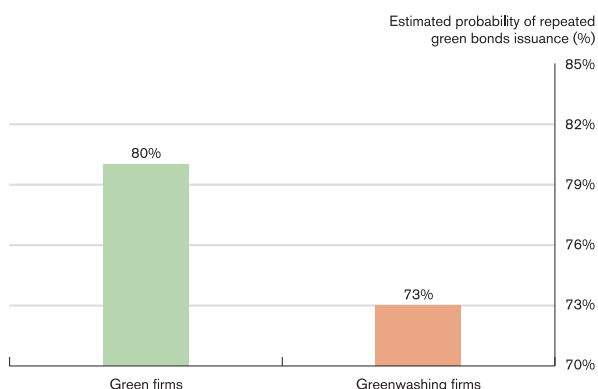
Note: The horizontal line inside the box represents the median value.
Sources: Trucost and HKMA staff estimates.

To what extent could the market identify and penalise the greenwashing behaviour?

With the evidence of greenwashing, we explore whether market participants could identify and penalise this behaviour.

First, our empirical analysis shows greenwashing firms are less likely to re-issue green bonds as compared to green firms. Specifically, the likelihood of re-issuing green bonds is 73% for a greenwashing firm (defined as those green bond issuers that increased the average aggregate GHG emission intensity since its initial green bond issuance), about seven percentage points lower than that for a green firm (Chart B1.3).

Chart B1.3
Probability of repeated green bonds issuance by green firms and greenwashing firms

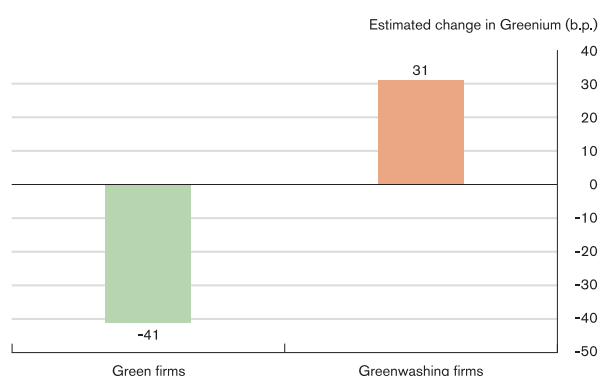


Note: This bar chart depicts the estimated probabilities of re-issuing green bond by green and greenwashing firms, by taking a typical firm (median values for all explanatory variables) for illustration.
Source: HKMA staff estimates.

Second, our empirical analysis shows that contrary to the green firms that can enjoy lower costs of re-issuance (i.e. more negative value of Greenium⁷), greenwashing firms are subject to higher costs in their repeated green bond issuance (Chart B1.4). Such higher issuance costs reflect a less favourable reception by investors, which in turn should act as a disincentive for some greenwashing firms from green bonds re-issuance.

To sum up, these findings suggest that investors may penalise greenwashing firms to some extent by demanding a higher yield. The higher issuance cost and less favourable market responses may also contribute to the lower re-issuance of green bonds by the greenwashing firms.

Chart B1.4
Change in Greenium by green firms and greenwashing firms



Note: The bar chart depicts the estimated Greenium of green bonds re-issued by green and greenwashing firms, by taking a typical firm (median values for all explanatory variables) for illustration. The Greenium is larger if its value is more negative.
Source: HKMA staff estimates.

⁷ Greenium refers to the yield spread of a green bond over a conventional bond with the same characteristics (e.g. same issuer and maturity). It is negative if the yield of a green bond is lower than that of its conventional counterpart, signaling that the firm can enjoy lower costs in issuing green bonds.

What could be done by governments to mitigate greenwashing behaviour?

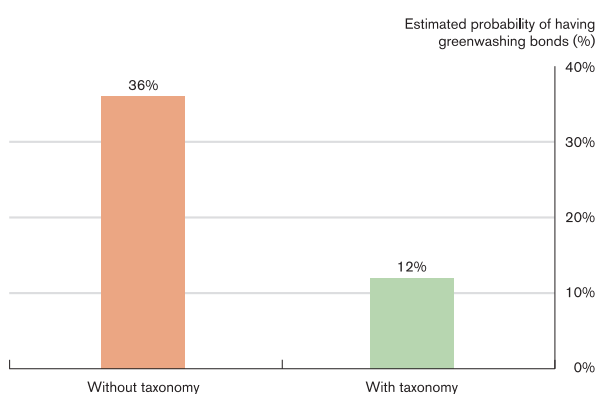
This section will evaluate the effectiveness of two key policies in mitigating greenwashing behaviour in corporate green bond markets, which are setting up green bond taxonomies and tightening environmental disclosure requirement.

1. Setting up green bond taxonomies

Standardisation in the definition and measurement of green bonds would help investors identify genuine green bonds. Therefore, a well-delineated green bond taxonomy may help mitigate greenwashing behaviour. The taxonomy also provides a guidance for issuers under which conditions the use of proceeds would be classified as green bonds.

Our empirical analysis suggests that the probability of having greenwashing bonds in economies with a green bond taxonomy is lower, by 24 percentage points, than those without a taxonomy (Chart B1.5). This suggests that a green bond taxonomy would help mitigate greenwashing behaviour in the green bond market.

Chart B1.5
Probability of having greenwashing bonds by economies with and without a taxonomy



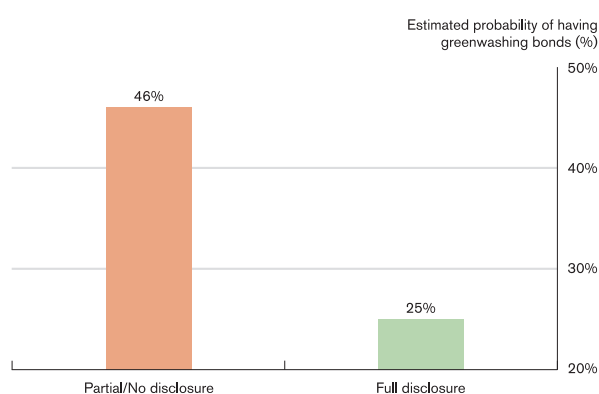
Note: This bar chart shows the estimated probabilities of having greenwashing bonds in an economy with a green bond taxonomy and another one without a taxonomy.
Source: HKMA staff estimates.

2. Tightening environmental disclosure requirements

A loose environmental disclosure requirement may also contribute to greenwashing behaviour, as it may provide a loophole for greenwashing firms to provide misleading information about their environmental performance. A more comprehensive environmental disclosure requirement would help investors to assess the environmental performance of corporates more accurately, thereby identifying greenwashing issuers in green bond markets.

Our empirical results suggest that a more stringent environmental disclosure may help investors make more informed decisions, and therefore could mitigate greenwashing behaviour. Specifically, it is found that the likelihood of having greenwashing bonds issued by firms with full environmental disclosure is about 21 percentage points lower than those with partial or no disclosure (Chart B1.6).

Chart B1.6
Probability of having greenwashing bonds by the extent of environmental disclosure by issuers



Note: This bar chart shows the estimated probabilities of having greenwashing bonds issued by corporates with full environmental disclosure and others with partial or no disclosure.
Source: HKMA staff estimates.

Conclusion and implications

To conclude, we reveal that greenwashing is not uncommon in global green bond markets.

However, we find that the market may penalise greenwashing behaviour to some extent.

Specifically, greenwashing firms are found to be less welcome by investors, as reflected by a lower chance and a higher cost of re-issuance of green bonds by greenwashing firms. Finally, this box also provides empirical support that a well-defined green bond taxonomy and a stricter environmental disclosure requirement would help mitigate greenwashing behaviour.

In line with the above findings, the HKMA has actively collaborated with other agencies under the Green and Sustainable Finance Cross-Agency Steering Group (CASG)⁸ to explore developing a local green classification framework and make progress towards mandating climate-related disclosures aligned with the Task Force on Climate-related Financial Disclosures framework across relevant sectors by 2025. These initiatives would help advance Hong Kong's green and sustainable finance development.

⁸ The CASG was co-chaired by the HKMA and the Securities and Futures Commission. Other members include the Environmental Bureau, the Financial Services and the Treasury Bureau, Hong Kong Exchanges and Clearing Limited, the Insurance Authority and the Mandatory Provident Fund Schemes Authority.

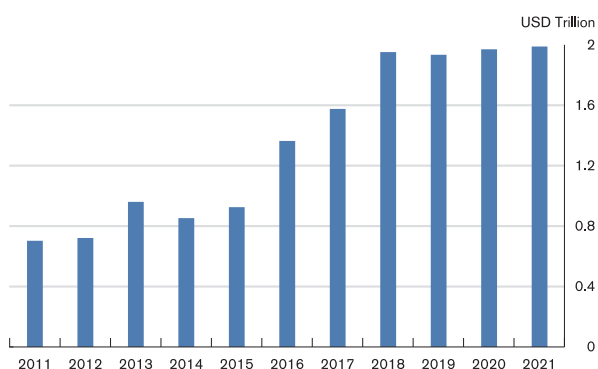
Box 2

Foreign exchange risk and hedging of corporates in the EMEAP economies

Introduction

Under the low interest rate environment, firms in the EMEAP⁹ economies had been able to easily tap funding in foreign currencies (FCs) in the past decade, resulting in a nearly threefold increase in corporate debts in FCs from 2011 to 2021 (Chart B2.1). The sizeable corporate debts in FCs may make EMEAP firms more vulnerable to adverse FX movements.

Chart B2.1
Outstanding amount of EMEAP corporate debts in FCs



Note: This bar chart depicts the outstanding amount of EMEAP corporate debts in FCs. FCs are defined as those other than the currency of a firm's domicile.
Sources: S&P Capital IQ and HKMA staff estimates.

The monetary policy tightening of central banks in major AEs since 2022 has weighed on many EMEAP currencies, potentially making EMEAP firms more difficult to repay their FC debts. This suggests a need for closer monitoring of FX risk management for corporates in the region. The first aim of this study is to investigate the extent to which corporates in the region hedge their FX risks.

⁹ EMEAP, the Executives' Meeting of East Asia-Pacific Central Banks, is a co-operative organisation of central banks and monetary authorities in eleven economies, including Australia, Mainland China, Hong Kong, Indonesia, Japan, South Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand.

This analysis also aims to answer whether, and to what extent, the development of FX derivative markets in the region could encourage corporates to hedge their FX risks using derivatives. Apart from assessing the impact of the development of domestic FX derivative markets on the use of FX derivatives by local corporates, we also examine whether the development of FX derivatives markets in the two financial centres in the region (i.e. Hong Kong and Singapore), which are deep FX hedging markets and offer open access for non-residents¹⁰, may help corporates in other EMEAP economies manage FX risks.

To what extent EMEAP firms prepare for FX shocks?

To hedge against FX risk arising from borrowings in FCs, a firm can hold FC-denominated assets or earn FC revenue to reduce the negative impact of exchange rate fluctuations on repayment of their FC debt (i.e. natural hedge). Corporates may also hedge the FX risks with derivatives (i.e. derivative hedge).

Based on a sample of 2,339 constituents of representative equity indices in the EMEAP economies¹¹, we construct a database of their balance sheet information from 2011 to 2021. We further collect information on corporates' use of FX derivatives by carrying out text-mining analysis on the disclosure of FX risk management in their annual reports. Such disclosure usually

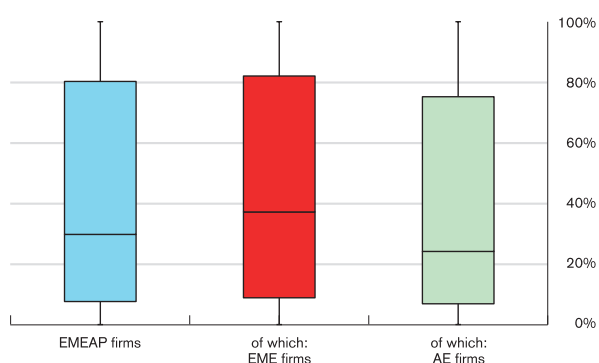
¹⁰ Hong Kong is recognised for its efforts in boasting the most open access to FX hedging for non-residents. For details, please refer to the Bank for International Settlements (2022): "Foreign exchange markets in Asia-Pacific".

¹¹ The data is sourced from S&P Capital IQ. The indices include ASX 300, CSI 300, HSI, IDX Composite, Nikkei 225, KOSPI Composite, KLCI, NZX 50, PSEi, STI and SET 100. Some constituents are not included in our sample due to lack of their balance-sheet data.

contains information on whether they used FX derivatives. If a firm indicates that it held or hedged with FX derivatives, we classify it as an FX derivative user.¹² With this text-based measure, we can estimate how many EMEAP firms hedge with FX derivatives.

Using our novel dataset, we find that at the end of 2021, 79% of EMEAP firms in terms of asset size were exposed to FX risk arising from exchange rate fluctuations, as they had borrowed in FCs. Half of them had over 30% of debts in FCs (blue boxplot, Chart B2.2). Indeed, a quarter of them had over 80% of debt in FCs, suggesting significant FX risk. We also find that firms in EMEs tended to have a larger share of borrowing in FCs (red boxplot) than their counterparts in AEs (green boxplot).

Chart B2.2
EMEAP firms' debts in FCs as a share of their total debts at the end of 2021

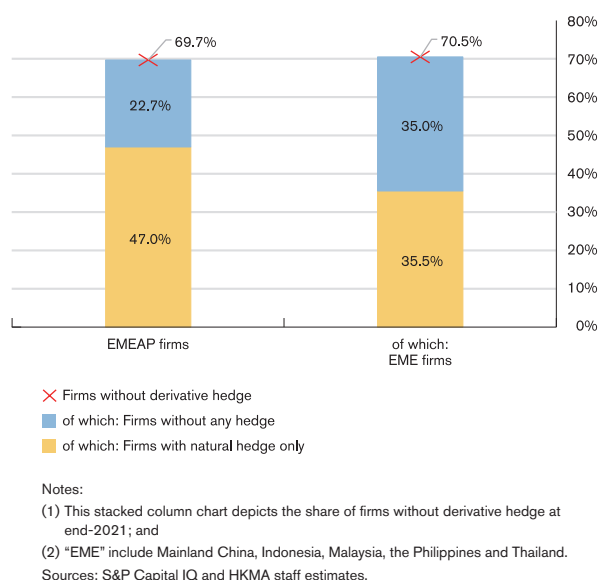


Notes:
 (1) Each boxplot depicts the distribution of debts in FCs as a percentage of total debts for firms at the end of 2021; and
 (2) "EME" includes Mainland China, Indonesia, Malaysia, the Philippines and Thailand, and "AE" refers to other EMEAP economies.
 Sources: S&P Capital IQ and HKMA staff estimates.

Among the firms with FX risk, we find that the use of derivative hedges is not common, with 70% of them not using any FX derivatives (Chart B2.3). In addition, around a quarter of them did not employ either natural or derivative hedges.

Firms that under-hedge against FX risk may be able to withstand adverse FX shocks, if they have strong repayment ability. Our analysis, however, reveals that one-third of the under-hedged firms had their interest coverage ratio lower than one at the end of 2021, indicating that their earnings (as measured by the earnings before interest and tax, or EBITs) were not sufficient to pay for interest expenses. 22% of them even registered negative earnings. Without hedging against FX risk, these firms may be subject to a greater insolvency risk when their local currencies are under pressure.¹³

Chart B2.3
Share of EMEAP firms without derivative hedge at end-2021



Under-hedging is found to be more prevalent among EME firms, with over one-third of them employing neither natural nor derivative hedges. This may be due mainly to the limited international business of EME firms. In fact, we found that 45% of them were without foreign assets (versus 31% for all EMEAP firms).¹⁴ Hence, with a limited natural hedge, a derivative hedge

¹² Firms may hold FX derivatives for non-hedging purposes. In this regard, we follow the literature by limiting our sample to firms with FC debts, which should have hedging needs for holding FX derivatives.

¹³ Our empirical analysis suggests that firms with FX derivatives could mitigate FX loss equivalent to 5.9% of their EBITs. The saving could even reach 9.5% of EBITs for firms with an above-median share of debts in FCs.

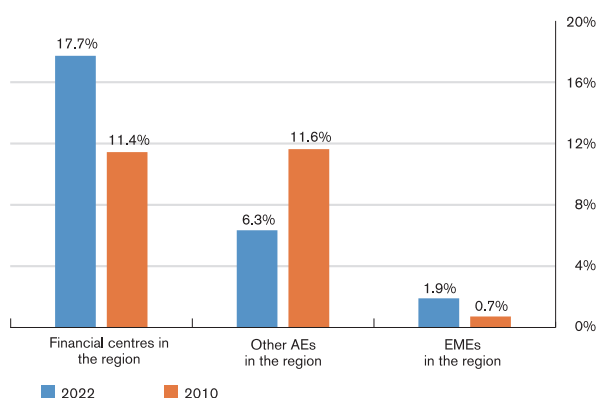
¹⁴ The results are robust if we measure the degree of international business by foreign revenues.

is even more important for their FX risk management. In the following section, we will discuss the growth of FX derivatives markets in EMEAP economies over the past decade, and assess whether they foster the use of a derivative hedge by firms in the region.

How did FX derivatives markets in EMEAP economies develop during the past decade?

Among EMEAP economies, the FX derivatives markets in Hong Kong and Singapore are deep, with daily average transactions accounting for 17.7% of the global aggregate in 2022, up from 11.4% in 2010 (Chart B2.4). Likewise, the EMEs in the region took up a larger share over the same period, but were still thin accounting for only 1.9% of global transactions in 2022.

Chart B2.4
Daily average transaction of FX derivatives as a share of global transaction

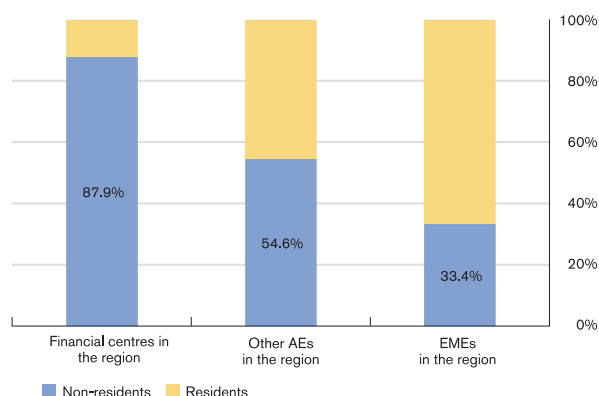


Notes:
 (1) This bar chart depicts daily average transaction of FX derivatives as a share of global transaction in 2010 (orange bars) and 2022 (blue bars), by trading places; and
 (2) "Financial centres in the region" include Hong Kong and Singapore; "Other AEs in the region" cover Australia, Japan, South Korea and New Zealand; and "EMEs in the region" cover Mainland China, Indonesia, Malaysia, the Philippines and Thailand.
 Sources: BIS Triennial Survey and HKMA staff estimates.

FX derivatives markets in the two financial centres in the region are also highly open to non-residents. Specifically, 87.9% of FX derivative transactions were undertaken by non-residents, higher than the shares of other AEs and EMEs in the region (Chart B2.5). The depth and openness of the FX derivatives markets in financial centres in the region suggest that they could provide

alternative access to FX derivatives for firms whose domestic FX derivatives market remains underdeveloped.

Chart B2.5
Share of FX derivatives transacted by residents and non-residents in 2022



Notes:
 (1) This stacked column chart depicts the share of FX derivatives transacted by residents (yellow portions) and non-residents (blue portions) in 2022, by trading places; and
 (2) "Financial centres in the region" includes Hong Kong and Singapore; "Other AEs in the region" covers Australia, Japan, South Korea and New Zealand; and "EMEs in the region" covers Mainland China, Indonesia, Malaysia, the Philippines and Thailand.
 Sources: BIS Triennial Survey and HKMA staff estimates.

Does the development of the FX derivatives market promote the use of FX derivatives by EMEAP firms?

We further examine whether the development of FX derivative markets promotes corporates to employ the derivative hedge.

1. Development of local FX derivatives markets

The development of local FX derivatives markets could provide a deeper pool of instruments to meet corporates' hedging demand. Hence, a more mature local FX derivatives market should promote the use of FX derivatives among the corporates.

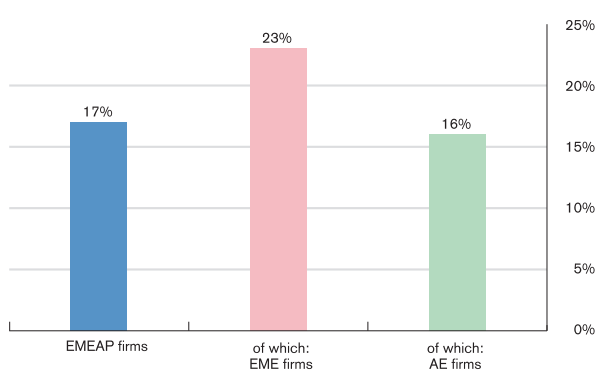
Indeed, our empirical analysis suggests that the probability of firms using FX derivatives would increase by 26% for one percentage point increase in their local market's share of global FX derivative transactions. This shows that, as local derivatives markets mature, more local firms can gain access to FX derivatives for hedging.

2. Development of FX derivatives markets in financial centres in the region

Some EMEs may take time to develop their FX derivative markets. With a limited choice in the local market, the much deeper markets in the financial centres in the region may offer more choices and lower costs for corporates in EMEs within the same region to hedge their FX risks.

Our empirical analysis confirms the above conjecture and suggests that, in the case of EMEAP economies, the likelihood of firms using FX derivatives would rise by 17% for one percentage point increase in financial centres' share of global FX derivative transactions (Chart B2.6). The effect is even more pronounced among EME firms (i.e. 23%), as they tend to be more reliant on financial centres in the region for hedging FX risks. These results suggest a crucial role of the derivative markets in financial centres in the region in facilitating FX risk management of EMEAP corporates, especially for those in EMEs.

Chart B2.6
Estimated change in the probability of firms using FX derivatives, by domicile economies



Note: This bar chart depicts the change in the probability of firms using FX derivatives for a percentage point increase in the share of global FX derivative transactions of the financial centres in the region.

Source: HKMA staff estimates.

Conclusion and implications

To sum up, we reveal that while there has been rapid growth in FC debts among corporates in the EMEAP economies, the hedging of FX risks using derivatives is found to be limited, particularly for those corporates in EMEs, which often have a lesser degree of natural hedge due to limited foreign business. As central banks in major AEs may keep their interest rates high for longer to contain inflation risks, these corporates may face significant pressure in managing their FX risks due to fluctuation in the local currency exchange rate.

Our empirical analysis also shows that the development of FX derivative markets is important for corporates to manage their FX risks. In particular, this analysis provides empirical support that development of FX derivatives markets in financial centres in the region could promote the use of FX derivatives by EMEAP firms, particularly for those in EMEs, thereby strengthening their resilience to FX shocks.

References

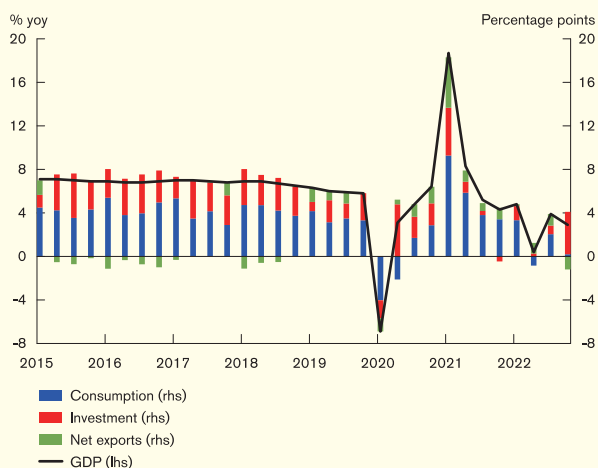
Bank for International Settlements. (2022). *Foreign exchange markets in Asia-Pacific*.

2.2 Mainland China

Economic performance and policy response

Mainland China's year-on-year real GDP growth moderated to 2.9% in the fourth quarter from 3.9% in the third quarter amid nationwide COVID-19 outbreaks following the easing of pandemic controls, prolonged property market downturns and weakened global demand (Chart 2.10). For 2022 as a whole, Mainland China's real GDP growth dropped to 3.0% from 8.1% in 2021 amid various challenges.

Chart 2.10
Mainland China: Contribution to GDP growth by demand component



Sources: CEIC, National Bureau of Statistics of China (NBS) and HKMA staff estimates.

Looking ahead, the resurgence in private consumption following the relaxation of COVID-19 restrictions may fuel an acceleration of Mainland's economic growth in 2023. That said, the pace of the economic recovery remains uncertain, depending much on the COVID-19 situation and the resumption of economic activities. In addition, given the strong linkages between the real estate sector and the rest of the economy, property market conditions may remain weak in the near term and continue to weigh on economic activities before stabilising gradually on the back of the supportive measures

introduced by the authorities. (Box 3 discusses the impacts of the real estate sector slowdown on the other economic segments). Externally, the exports of goods may remain sluggish due to weakening demand from advanced economies where the odds of a recession are rising on monetary policy tightening. The government set the growth target for 2023 at around 5%, while the latest consensus forecasts expected the Mainland economy to expand by 5.2% in 2023.

For inflation, while food (including pork) prices edged up during the second half of 2022, in part due to the low base effect and regional outbreaks of swine diseases, Mainland China's headline consumer price inflation remained subdued at 1.8% year on year in December 2022 partly reflecting weak domestic demand amid the COVID-19 outbreaks. In the period ahead, Mainland's inflationary pressures are expected to edge up along with the easing of COVID-19 restrictions, but will likely remain moderate. The latest consensus forecasts expect Mainland's consumer prices to rise mildly by 2.4% for 2023 as a whole.

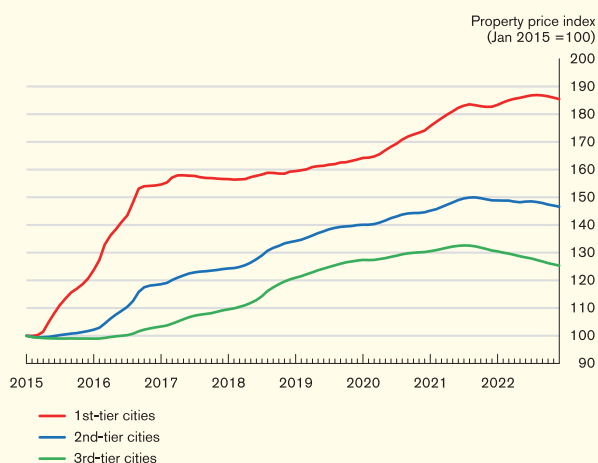
In light of the uncertainties surrounding the growth outlook, the latest Central Economic Work Conference held in December 2022 and the Two Sessions held in March 2023 set stabilising the economy as a top priority for 2023, calling for the shoring up of business confidence by pushing forward structural reforms, such as treating SOEs and POEs equally, and boosting domestic demand especially consumption. The authorities noted that monetary policies should be targeted and forceful, with a focus on providing reasonable and ample liquidity to the real economy, as well as directing financial institutions to step up support for micro and small businesses, technological innovation and green development through structural tools. Fiscal policies will be more forceful and effective with an optimised

combination of deficit, special bonds, interest subsidies and other tools to ensure the quality of economic growth, while maintaining fiscal sustainability and keeping the risk of local government debt under control.¹⁵

Asset and credit markets

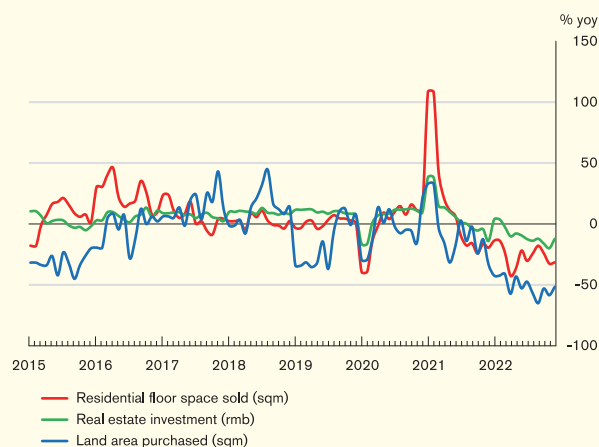
In the second half of 2022, Mainland property market conditions stayed weak, in part because of the still-jittery homebuyers' confidence and the COVID-19 outbreaks nationwide. Housing prices softened in all tiers of cities (Chart 2.11), while residential floor space sold, real estate investment and land area purchases deteriorated further (Chart 2.12).

Chart 2.11
Mainland China: Residential property prices by tier of cities



Sources: CEIC and HKMA staff estimates.

Chart 2.12
Mainland China: Residential floor space sold, real estate investment and land purchase



Sources: CEIC and HKMA staff estimates.

To stabilise the property market, the authorities have introduced comprehensive policy support since the 20th National Congress to mitigate liquidity issues facing developers, secure the delivery of presold housing projects, and support housing demand. For instance, a series of measures dubbed “Three Arrows”, which were aimed to enhance the access of property developers to bank, bond and equity financing,¹⁶ was introduced in the fourth quarter of 2022. To boost housing demand, a tax incentive programme was developed for residents who plan to sell old homes and purchase new homes within one year. At the local level, authorities eased home purchase restrictions and lowered the down payment ratios especially in lower-tier cities, and established a mortgage rate

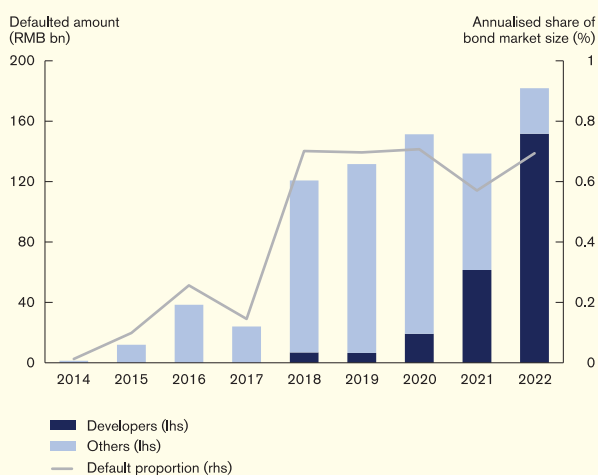
¹⁵ At the end of 2022, Mainland’s local government debt-to-GDP ratio remained low at 29%, despite a mild increase from last year.

¹⁶ More specifically, supportive measures on bank financing include: (1) “16 measures” and comprehensive credit line agreements signed between large banks and developers to provide intentional financing of at least RMB4 trillion, according to market estimates; (2) “window guidance” given to the top four state-owned banks to issue offshore loans to help some developers repay their offshore debt. Measures on bond financing include a RMB250 billion bond programme of the National Association of Financial Market Institutional Investors for POEs. On equity financing, the authorities have lifted the restrictions on restructuring/M&As and equity refinancing of A- and H-share listed developers, and permitted qualified private developers to go public through backdoor listings by acquiring listed developers, as well as restructurings between listed developers and listed companies in property-related sectors.

adjustment mechanism allowing more flexibility for eligible cities to adjust the minimum mortgage rates for first-home buyers.

Amid the mitigating measures rolled out by the government, the total amount of Mainland property developer bond defaults in the onshore market fell to RMB71 billion in the second half of 2022 from RMB81 billion in first half. In 2022, the annualised default rate in the onshore corporate bond market remained low at around 0.7%, with property developers contributing more than 80% of the total onshore bond defaults (Chart 2.13).

Chart 2.13
Mainland China: Bond default size and rate in the onshore market



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

The overall risk in the Mainland banking sector remained under control. The average non-performing loan (NPL) ratio of state-owned banks stayed low and further declined to 1.31% in December 2022 from 1.34% six months earlier (Chart 2.14) partly due to loan write-offs. The provision coverage ratio of large Mainland banks stayed at 245% in December 2022, well above the regulatory requirement. That said, amid increased economic uncertainties and a weak property market, the asset quality pressures facing some smaller banks should not be ignored,

in part due to their higher exposures to the property market. In particular, the NPL ratio of rural commercial banks stayed at a relatively high level of 3.2% in December 2022 despite showing a falling trend over the past year.

Chart 2.14
Mainland China: NPL ratio by bank type

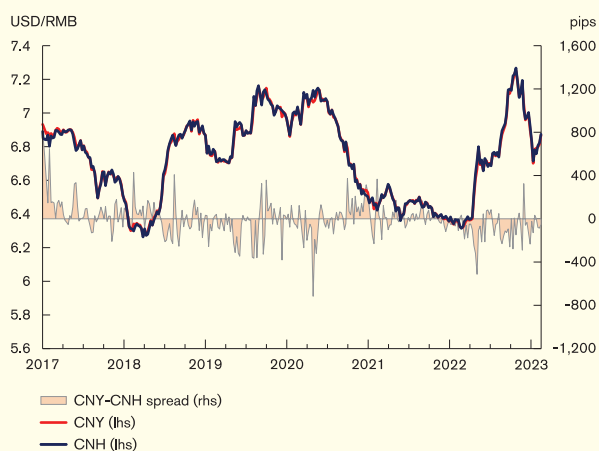


Source: CEIC.

Exchange rate and cross-border capital flows

Amid the expectations of an economic recovery in Mainland China following its adjustment of COVID-19 restrictions and the slower pace of interest rate hikes in the US, the onshore renminbi (CNY) strengthened remarkably against the US dollar in November and December 2022 after hitting a 14-year low in October. However, the appreciation trend had reversed since February amid a stronger US dollar on market expectations of an extended period of US monetary tightening. The offshore renminbi (CNH) exchange rate, in comparison, was traded lower than its onshore counterpart for most of the review period (Chart 2.15).

Chart 2.15
Mainland China: Onshore and offshore renminbi exchange rates against the US dollar



Sources: Bloomberg and HKMA staff estimates.

The latest balance of payments statistics suggested that while rising holdings of overseas security investments by residents as well as the unwinding of the positions in the Mainland bond market by foreign investors had led to increased net capital outflows in the third quarter of 2022, foreign direct investment continued to register net inflows. In tandem with its strengthening currency, capital outflow pressures facing Mainland China have eased since the fourth quarter of 2022, with the official foreign exchange reserves staying above US\$3 trillion at end-February 2023. Looking ahead, short-term cross-border capital flows may remain volatile. On the one hand, the Mainland China-US interest rate gap may persist, due to interest rate hikes in the US and the pro-growth monetary policy stance in Mainland China. On the other hand, the further opening up of the Mainland financial markets, together with the ongoing economic recovery, may continue to attract more capital inflows.

Box 3

Assessing the impact of the property market downturn on the Mainland economy through the input-output linkages

Introduction

The sharp slowdown in the property market was one of the most significant developments of the Mainland economy in 2022. The sector has been a crucial driver of Mainland's economic growth, given its widespread linkages with the rest of the economy.¹⁷ As the downward pressures on the property sector intensified and many developers struggled to repay debts, natural questions arise as to how the upstream and downstream industries of the property sector have been affected by the market downturn, and how large the associated risks could be. This Box sheds some light on these questions by quantifying the linkages of the property sector with the other sectors of the economy using a model-based approach developed by Acemoglu, Akcigit and Kerr (2016).¹⁸

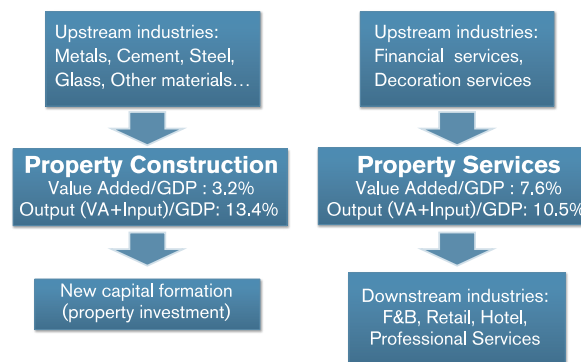
Linkages between the property sector and the rest of the economy

The property sector is typically defined as the combination of property construction, which pertains to the flow of new buildings, and property services, which relates more to real estate sales and management. Some simple calculation based on the 2020 Input-Output table of Mainland China could reveal the size of the linkages between the sector and the rest of the economy: while the whole sector's value added only contributes to 10.8% of Mainland China's GDP, its total output, which is equal to the sum

of the value added and intermediate input expenditure, accounts for almost a quarter (23.9%) of Mainland's GDP.

A closer examination of the linkages of the property sector reveals that the two components, namely property construction and property services, have substantially different upstream/downstream relationships. In particular, Figure B3.1 shows that the linkages of property construction are solely to the upstream as all of its output is converted into new investment, while property services are linked to both upstream and downstream sectors. This suggests that property construction is generally more prone to demand-side shocks which in theory would propagate only to upstream sectors.

Figure B3.1
Input-output linkages of the property construction and property service sector



Sources: NBS and HKMA staff estimates.

In addition, our calculations based on the Input-Output table show that property construction has a much higher output-to-value added ratio of 4.2, compared with 1.4 for property services.¹⁹ This suggests that for a demand shock of the

¹⁷ For example, Yi Gang, the Governor of the PBoC, said at the Annual Conference of Financial Street Forum in November 2022 that “the healthy development of the property sector is of great importance to the overall economy as it is linked to many upstream and downstream industries”.

¹⁸ The model considers a perfectly competitive economy with input-output linkages and standard Cobb-Douglas substitution assumptions. It is adopted as a benchmark framework to model demand-side shocks by Carvalho and Tahbaz-Salehi (2019).

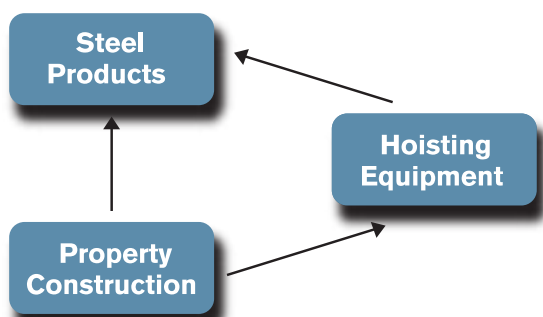
¹⁹ The property construction sector has an output/GDP ratio of 13.4% and a value added/GDP ratio of 3.2%; the property service sector has an output/GDP ratio of 10.5% and a value added/GDP ratio of 7.6%.

same size hitting each sector, property construction can generate an aggregate impact that is about two times larger than that of property services, due to the former's broader and stronger linkages to the upstream sectors.

Model-implied impacts of demand shocks

A demand shock to the property sector, such as a deterioration in homebuyers' confidence, affects the upstream sectors (i.e. suppliers) through both direct and indirect channels as depicted in Figure B3.2. For instance, a decline in property investment triggered by developers' expectations of declining housing demand will not only directly affect the steel sector by reducing construction firms' purchase of steel products, but also indirectly affect the steel sector by reducing its demand for hoisting equipment, which itself is an intensive user of steel inputs.

Figure B3.2
An illustration of direct and indirect effects of a demand-side shock



Our estimated model-implied impacts, which take into account both direct and indirect effects, are presented in Table B3.1 below. In particular, in the face of a hypothetical 100% decrease in property investment, many upstream sectors would suffer severe output losses, among which the most affected industrial sectors are cement (-59%), stone and glass (-49%), and mining (-39%). In comparison, only a few service sectors (i.e. finance (-12.5%), commercial (-11.1%)) would be relatively hard hit if the demand for property services were fully eliminated. These

results demonstrate that property construction is clearly a much more powerful transmitter of demand shocks, thus shaping the overall impact of the property sector downturn on the rest of the economy.

Table B3.1
Model-implied impacts of a hypothetical demand shock to the property sector

	Construction	Services	Overall
Agriculture	-5.4%	-1.3%	-6.7%
Mining	-39.1%	-2.5%	-41.6%
Food	-3.8%	-1.5%	-5.3%
Trad. Manufacturing	-5.4%	-2.9%	-8.3%
Wood	-26.6%	-1.9%	-28.6%
Fuel	-17.4%	-2.2%	-19.6%
Chemical	-13.3%	-1.3%	-14.6%
Cement	-58.9%	-0.2%	-59.1%
Stone & Glass	-48.9%	-0.6%	-49.5%
Steel	-34.8%	-0.7%	-35.4%
Non-ferrous Metal	-18.4%	-1.4%	-19.8%
Other Materials	-28.6%	-2.5%	-31.2%
Equipment & Machinery	-8.6%	-0.9%	-9.5%
Electronics	-5.7%	-1.0%	-6.7%
Recycling & Repair	-25.7%	-1.4%	-27.0%
Electricity & Heat	-16.2%	-2.5%	-18.7%
Decoration	-9.1%	-3.1%	-12.2%
Wholesale & Retail	-12.0%	-1.4%	-13.4%
Transportation	-12.0%	-2.1%	-14.1%
Hotel & Restaurant	-7.6%	-3.5%	-11.1%
Telecommunication	-9.7%	-2.8%	-12.5%
IT	-6.4%	-2.3%	-8.7%
Finance	-11.3%	-12.5%	-23.9%
Rental Trade	-28.6%	-1.8%	-30.4%
Commercial	-10.0%	-11.1%	-21.1%
Professional	-9.1%	-0.6%	-9.7%
Other Services	-1.9%	-0.5%	-2.5%

Sources: NBS and HKMA staff estimates.

The mitigating role of infrastructure investment

Despite the slowdown in property construction activities, upstream industrial suppliers seem to have held up relatively well so far, as reflected by few reported bond defaults observed in those sectors in contrast to the large number of property developer defaults lately. One possible explanation is that the adverse impacts on the upstream sectors may have been offset by the increase in infrastructure investment.

The reason lies in the fact that property and infrastructure construction sectors exhibit: (1) similar linkage patterns as displayed by their respective input coefficients calculated from the 2020 Input-Output Table (Figure B3.3); and, (2) similar output-to-value-added ratio of around four.²⁰ The similarity of their input-output linkages and multiplier effects therefore means that the increase in infrastructure construction could be effective in offsetting the impact of the decrease in property construction on the upstream sectors.

Figure B3.3
Key input coefficients of the property and infrastructure construction sectors

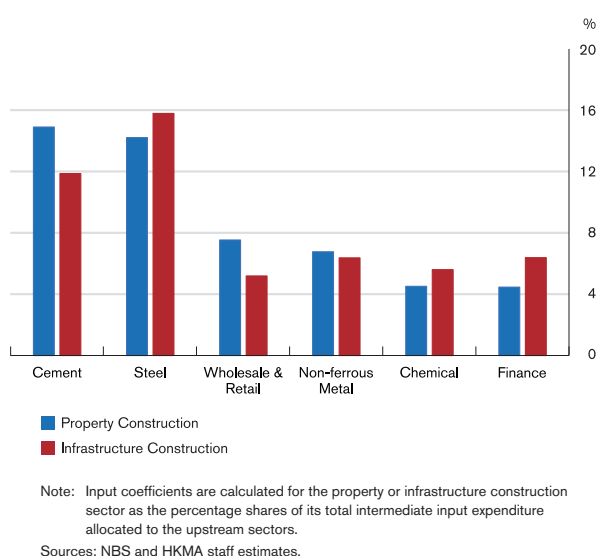


Table B3.2 reports the estimated model-implied impacts on the output of a few selected upstream sectors calculated based on the property and infrastructure investment figures in 2022.²¹ Indeed, the net impacts on some property-sensitive sectors, such as steel and rental trade service, turned out to be quite small, confirming the strong mitigating effects of infrastructure investment. In aggregate, the slowdown in property investment dragged GDP growth down

²⁰ The infrastructure construction sector has an output/GDP ratio of 9.5% and a value added/GDP ratio of 2.4%.

²¹ According to NBS, the 2022 full-year growth rates of property investment and infrastructure investment were -10.0% and +9.4% respectively.

by roughly 1.3%, of which about 0.9% was offset by the growth in infrastructure investment.

Table B3.2
Model-implied impacts on major upstream sectors based on 2022 investment figures

	Property	Infrastructure	Net
Mining	-3.9%	2.6%	-1.3%
Fuel	-1.7%	1.6%	-0.1%
Chemical	-1.3%	0.9%	-0.4%
Cement	-5.9%	3.1%	-2.8%
Steel	-3.5%	2.4%	-1.1%
Non-ferrous Metal	-1.8%	1.1%	-0.7%
Electricity & Heat	-1.6%	1.0%	-0.6%
Decoration	-0.9%	0.9%	0.0%
Transportation	-1.2%	0.7%	-0.5%
Finance	-1.1%	0.9%	-0.3%
Rental Trade	-2.9%	2.0%	-0.8%
Commercial	-1.0%	0.7%	-0.3%
Overall economy (GDP)	-1.3%	0.9%	-0.4%

Sources: NBS and HKMA staff estimates.

In comparison, the adverse impacts from deteriorated business activities in property services can hardly be mitigated by infrastructure spending as the two sectors have substantially different input-output structure. In particular, our calculation suggests that the slowdown in property services had dragged GDP growth by about 0.5% in 2022, which worked mainly through the sector's own high value added (around 0.4%) rather than its demand-side linkages.

Conclusion

Using a model-based approach, this study quantifies how the ongoing property market slump could affect the other segments in the economy through input-output linkages. We find that while the impacts of the decline in property investment were large for some upstream suppliers, much of them were offset by the increase in infrastructure investment due to the similarity in the input-output linkages of the property and infrastructure construction sectors. That said, it appears that public spending on infrastructure alone may not be able to

effectively address the adverse impact from a slowdown in property services.

References

Acemoglu, D., Akcigit, U., and Kerr, W. (2016). "Networks and the macroeconomy: An empirical exploration.", *NBER Macroeconomics Annual*, 30(1), pages 273-335.

Carvalho, V. M., & Tahbaz-Salehi, A. (2019). "Production networks: A primer.", *Annual Review of Economics*, 11, pages 635-663.