



CLIMATE RISK EXPOSURE OF HONG KONG-DOMICILED INVESTMENT FUNDS: AN ASSESSMENT USING PORTFOLIO HOLDINGS DATA

Key points:

- *The climate risk exposures of investment funds could be a source of financial stability risks. This is particularly pertinent for jurisdictions where funds have material global exposures, such as Hong Kong (HK), as cross-border spillover of climate risks could be large. This source of risks has drawn attention internationally. To improve global financial stability surveillance, increasing efforts have been put on resolving data gap issues and designing appropriate climate risk metrics. Two common challenges have been identified: lack of granular data on funds' exposures and undue reliance on backward-looking risk metrics. These preclude an accurate examination of the climate risks of investment funds.*
- *To improve the surveillance work and contribute to international efforts, this study, using HK-domiciled investment funds as an example, shows how the use of granular data can lead to a clearer assessment of climate risks. We also provide an analysis of forward-looking metrics to supplement the analysis of historical metrics.*
- *On the data granularity issue, rather than assessing climate risks of investment funds at the level of exposures to counterparty jurisdictions or to economic sectors, we develop a practical framework to facilitate assessments at the level of the individual companies in which funds have invested (i.e. through using portfolio holdings data), which more accurately measures the underlying climate risks of investment funds.*
- *We show that assessing the climate risks of investment funds at the jurisdictional level could be prone to large inaccuracies in the estimation of risks. Specifically, some existing studies classify Mainland China as an economy with a high exposure to climate transition risks. Additionally, Mainland China accounts for half of HK-domiciled funds' assets under management. However, we find that only around 6% of these funds' Mainland China exposures are towards sectors with high greenhouse gas emissions (e.g. the utilities, materials and energy sectors). This suggests a potentially large overestimation of HK-domiciled funds' climate risks if granular information has*

not been taken into account. Indeed, the average climate risk of the Mainland China exposures of these funds is found to be not particularly high compared to that of other economies.

- *While there is a strong need for developing forward-looking climate risk metrics because climate risks materialise over a long time horizon, our study finds that different forward-looking metrics may capture different forward-looking elements. In particular, by comparing two selected forward-looking indicators – one designed to capture the impact on earnings of future carbon costs due to unpaid current emissions and the other capturing a company’s likely future emissions levels – the latter is found to have a lower correlation with historical metrics, and so provides additional insights to historical metrics.*

- *From our assessment, we have two takeaways for policy implications:*
 - *The use of granular data is important to accurately assess the climate risks of investment funds and the underlying drivers.*

 - *Due to the uncertain and evolving nature of climate risks, policymakers should consider using a range of forward-looking climate risk measures to complement historical metrics, which may enable a more robust and comprehensive assessment of climate risks.*

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<p>The views and analysis expressed in this paper are those of the authors, and do not necessarily represent the views of the Hong Kong Monetary Authority.</p>

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I. INTRODUCTION

The climate risk exposures of investment funds may pose risks to financial stability. A shift in investors' perception about climate risk, triggered by climate events or climate transition policies, may lead to a repricing of securities issued by companies that are exposed to climate risks. Funds with large investments in these companies may face lower returns and outflows. Initial shocks could be amplified with systemic implications if many funds have common investments in these companies and if they react to shocks in similar ways, e.g. liquidating those assets simultaneously.

Such financial stability concerns are especially pertinent to jurisdictions in which investment funds have material global exposures, as cross-border spillover of climate risks could be large. Given Hong Kong's status as an international financial centre, HK-domiciled investment funds have global investment portfolios and are exposed to industries sensitive to climate transition all around the world. With around 85% of assets under management (AUM) invested in companies outside of Hong Kong, initial climate-related shocks in one region can be transmitted across borders to another region via changes in these funds' portfolios.

This source of risks has drawn attention internationally. To improve global financial stability surveillance, international financial authorities have been assessing the financial sector's exposure to climate-related risks, including investment funds. However, there remain limitations and gaps in data availability that preclude an accurate examination of climate-related financial risks. Two common challenges have been identified. First, there is a lack of granular data on financial institutions' exposures to climate risks. The Financial Stability Board (FSB) highlighted that a lack of granular data on financial institutions' exposures may prevent the assessment of climate-related risks, and that these data need to be sufficiently granular to capture the differences between entities' locations and activities at the level of individual firms and sectors (FSB, 2021). Second, there is an undue reliance on backward-looking climate risk metrics. The FSB has noted that further work is needed to develop forward-looking metrics of climate-related risks, as historical data may be a poor guide to the nature and scale of future risks.

To improve the surveillance work and to contribute to international efforts, we undertook an assessment of the climate risk exposure of HK-domiciled investment funds based on granular data and incorporating forward-looking climate risk metrics. This serves as an example of how the use of granular data and forward-looking metrics may lead to a clearer and more comprehensive assessment of climate risks. We did this through two avenues.

- **First**, we analysed a measure of the portfolio climate transition risk of individual funds – readily available from a data provider – to understand the level of climate risk exposure of HK-domiciled funds and how it compares with funds in other jurisdictions. This measure is granular, as it reflects the climate risk of individual

companies in the portfolios. The measure also factors in forward-looking elements, as it evaluates how much unmanaged climate risk remains in a fund's portfolio after accounting for the risk-mitigating management activities by companies in which the fund has invested. However, without analysing funds' portfolio holdings data, this avenue may not shed light on the drivers of the overall climate risk exposure.

- **Second**, to understand the jurisdictional and sectoral contributions to the climate risk of HK-domiciled funds, we build a new dataset by gathering data on their portfolio holdings as well as the climate risk measures of individual companies in their portfolios, including historical measures such as greenhouse gas (GHG) emissions intensity as well as some forward-looking metrics.

The rest of this study proceeds as follows: section II provides an overview of the datasets used, sections III describes our observations using the first avenue, Section IV describes our observations using the second avenue, and section V concludes and draws out our key takeaways.

II. DATA

2.1 *Portfolio climate risk measure of investment funds*

In the **first** avenue, we analyse the **Morningstar Portfolio Carbon Risk Score**,¹ which summarises the overall climate risk of each investment fund.² It is an asset-weighted **Sustainalytics Carbon Risk Rating** of companies held in a portfolio,³ which indicates the risk that the companies face from the transition to a low-carbon economy.

The Sustainalytics Carbon Risk Rating evaluates how much unmanaged carbon risk remains for a company after accounting for its management activities that mitigate overall carbon risk exposure.⁴ The rating ranges from 0 to 100 and is sorted into five risk categories: negligible (0), low (0-10), medium (10-29), high (30-49) and severe (50+). Companies with high and severe carbon risk are those for whom transition risk poses a more serious financial threat.

¹ Morningstar's data providers do not guarantee the accuracy, completeness or timeliness of any information provided by them and shall have no liability for their use.

² The data are retrieved from Morningstar Direct and consist of all open-ended and exchange-traded funds for which the Morningstar Portfolio Carbon Risk Score was available as of Q3 2022 (8,479 funds) from 10 Asia-Pacific economies.

³ Sustainalytics' Carbon Risk Rating is only available for (long) equity and corporate bond holdings. At least 67% of these holdings must have a Carbon Risk Rating in order for a Morningstar Portfolio Carbon Risk Score to be calculated.

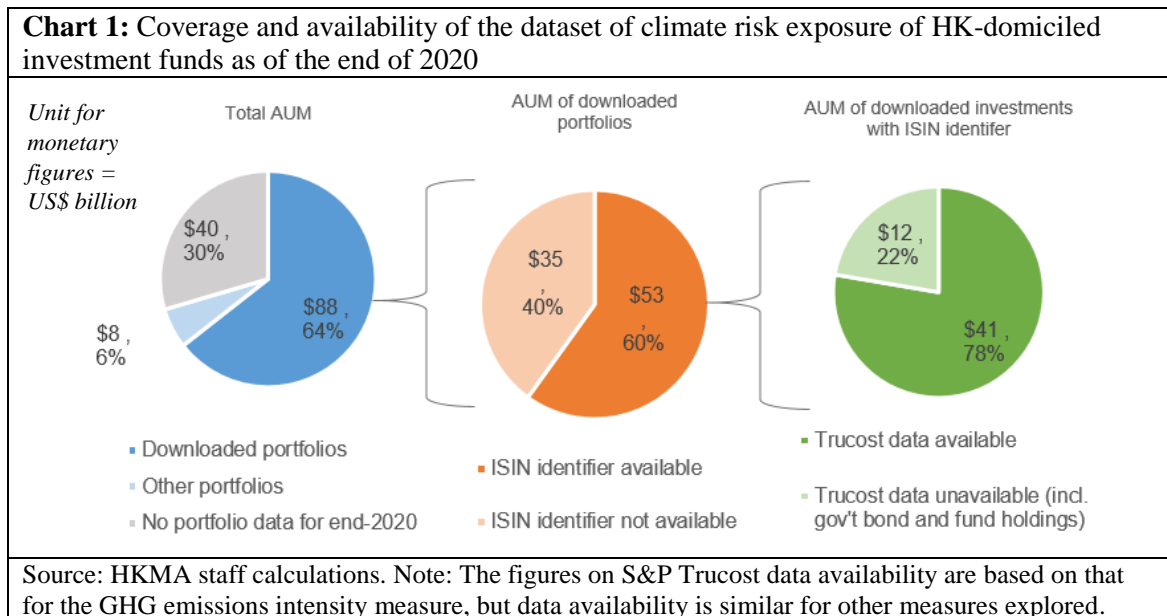
⁴ The Carbon Risk Rating is based on assessments on carbon risk exposure and carbon risk management. Exposure is a measure of the degree to which carbon risks are material across the firm's supply chain, its own operations, and in its products and services. Management is a measure of the firm's ability to manage, and the quality of the management approach, to reduce emissions and related carbon risks. Further details can be found in Morningstar Research (2018).

However, the Morningstar Portfolio Carbon Risk Score is a measure of the overall climate risk of an investment fund. Without data on each fund’s portfolio holdings, we are not able to analyse the jurisdictional or sectoral contributions to climate risks.

2.2 Portfolio holdings data and company-level climate risk measures

In the **second** avenue, we compiled a dataset of the climate risk exposure of HK-domiciled funds as of the end of 2020 by combining Morningstar portfolio holdings data with S&P Trucost’s climate risk data on individual companies within the portfolios.

From Morningstar, we downloaded portfolio holdings data of 93 HK-domiciled funds. This covers the largest funds and most of the AUM for which portfolio data as of the end of 2020 are available, representing 64% of the total AUM of HK-domiciled funds as of the end of 2020. Within the downloaded portfolio holdings, 60% of AUM contain a unique International Securities Identification Number (ISIN) identifier, which enables us to accurately identify the issuing company for each security and match it to the S&P Trucost database. Finally, S&P Trucost climate risk measures were available for 78% of the AUM of downloaded portfolio holdings with ISIN identifiers;⁵ overall, this covers 30% of the total AUM of HK-domiciled funds. See **Chart 1** for a summary of the data coverage.



For S&P Trucost climate risk measures, we first assessed **GHG emissions intensity**, which measures the magnitude of GHG emissions normalised by revenue. We took into account scope 1 and 2 GHG emissions following the GHG Protocol – a global standardised framework for emissions accounting – where scope 1 emissions are from directly emitting sources that are owned or controlled by a company and scope 2 emissions

⁵ The majority of AUM for which S&P Trucost measures are unavailable are investments in government bonds and other investment funds. In other words, we assessed funds’ climate risk exposure from their direct holdings of securities, but not from their indirect holdings of securities through their investments in other investment funds.

are from the consumption of energy generated from a company's direct operations. A higher emissions intensity means that a company uses more carbon-intensive processes per unit of revenue and is therefore likely to be at a higher risk of experiencing disruption to its business or deterioration of profitability in the event of an abrupt climate transition shock.

However, emissions intensity is a historical indicator of climate risk and so does not capture the potential future financial impact of a company's climate risk exposure or strategies that it may have in place to manage climate risk, e.g. through reducing emissions. A company with a high degree of emissions intensity at present does not necessarily mean that it poses a high degree of future financial risk. Because of this, we explored two forward-looking datasets from S&P Trucost: Trucost Carbon Earnings at Risk, and Trucost Paris Alignment.

Carbon Earnings at Risk measures a company's *current* ability to absorb *future* carbon prices. It is the unpriced carbon cost expressed as a percentage of current earnings before interest, taxes, depreciation and amortisation (EBITDA), where the unpriced carbon cost is defined as the difference between what a company pays for carbon today and what it may pay at a given future date based on its sector, operations and a given price policy scenario. For our analysis, we opted for S&P Trucost's estimates of carbon earnings at risk for the year 2050 under a 2°C-aligned scenario.⁶ Further details can be found in S&P Trucost (2019).

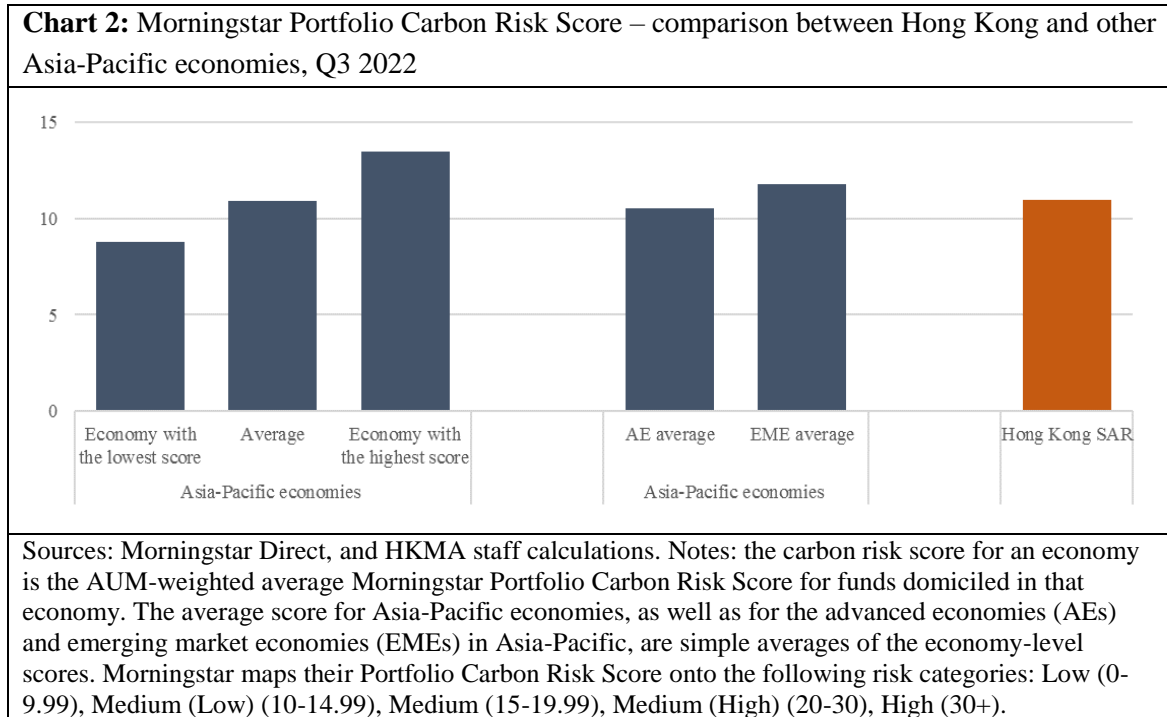
The Trucost **Paris Alignment** dataset provides a forecast to the year 2030 of (i) a company's GHG emissions, based on information such as disclosed emissions reduction targets or emissions trends; and (ii) the GHG emissions level of a company that would be aligned with the Paris Agreement goal of limiting climate change to 2°C above pre-industrial levels. Further details can be found in S&P Global (2020) and S&P Global (2022). For each company, we calculated an **emissions gap** by taking the difference between (i) and (ii), and expressing the difference as a percentage of (ii). A *positive* gap means a company's forecasted emissions levels are *above* that required for meeting the Paris Agreement goal, and so do *not* align with the Paris Agreement.

These two forward-looking measures capture different aspects of forward-looking climate risk. The carbon earnings at risk measure projects *future* carbon prices but applies them to the *current* emissions. In other words, it captures the potential future financial impact of current emissions but does not consider potential changes in emissions in the future. Meanwhile, the emissions gap measure projects likely *future* emissions of a firm but does not consider the potential future financial impact of emissions.

⁶ The year 2050 is the furthest year available for S&P Trucost's Carbon Earnings at Risk projections. The 2°C-aligned scenario is a high carbon price scenario assuming full implementation of policies in line with the Paris Agreement goal of limiting climate change to 2°C above pre-industrial levels by 2100.

III. OBSERVATIONS FROM ANALYSIS OF THE MORNINGSTAR PORTFOLIO CLIMATE RISK SCORE

This section reports the key observations from our analysis of the Morningstar Portfolio Carbon Risk Score (i.e. the first avenue). We find that the climate risk of HK-domiciled funds ranks in the middle of the investment funds domiciled in Asia-Pacific (**Chart 2**). HK-domiciled funds on average have a ‘Medium (Low)’ climate risk according to Morningstar’s risk category.



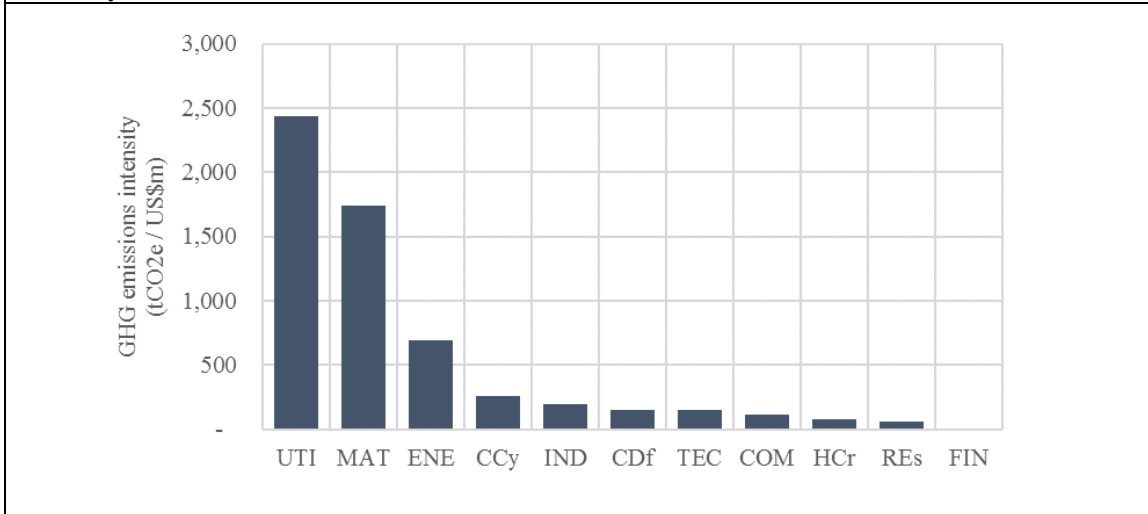
IV. OBSERVATIONS FROM PORTFOLIO HOLDINGS DATA AND COMPANY-LEVEL CLIMATE RISK MEASURE

This section reports the key observations from our analysis of the portfolio holdings data of investment funds domiciled in Hong Kong and the different climate risk measures (i.e. the second avenue).

4.1 GHG scope 1 and 2 emissions intensity

We analysed the emissions intensity of the companies in which HK-domiciled funds have invested. The utilities, basic materials and energy sectors have the highest emissions intensities (**Chart 3**), with an average of nearly 2,500, 1,750 and 700 tonnes of carbon dioxide equivalent per US\$1 million in revenue (tCO₂e / \$m) respectively. Meanwhile, the financial services, real estate and healthcare sectors have the lowest emissions intensities.

Chart 3: GHG scope 1 and 2 emissions intensity of HK-domiciled funds' investments at end-2020, by sector



Sources: Morningstar Direct, S&P Trucost, and HKMA staff calculations. Notes: The label and name of the sector: UTI=Utilities, MAT=Basic Materials, ENE=Energy, CCy=Consumer cyclical, IND= Industrials, CDf=Consumer defensive; TEC=Technology, COM=Communication services, HCr= Healthcare, REs=Real Estate, FIN=Financial services.

We also assessed the climate risks of HK-domiciled funds by jurisdiction. We found that assessing funds' climate risks at the jurisdictional level could be prone to large inaccuracies in the estimation of risks.

Specifically, as about half of the total AUM of HK-domiciled funds are invested in Mainland China, it is natural that these funds would be particularly exposed to climate transition risks there (**Chart 4**). Since some studies classified Mainland China as a jurisdiction with a high exposure to climate transition risks, an assessment of HK-domiciled funds' climate risks using data at the jurisdictional level would likely lead to the conclusion that HK-domiciled funds are exposed to a high level of climate transition risks.^{7, 8}

However, our analysis using granular portfolio holdings data shows that Mainland China's contribution to HK-domiciled funds' aggregate emissions intensity (43%) is proportional to Mainland China's share of the total AUM of HK-domiciled funds (**Chart 5**). This is because the average emissions intensity of the invested companies in Mainland China is not particularly high compared to that in other jurisdictions (**Chart 6**). This in turn partly reflects that high-emitting sectors account for a relatively small share (about 6%) of HK-domiciled funds' investments in Mainland China (**Chart 7**). All these suggest a potentially large overestimation of HK-domiciled funds' climate risks if granular information is not taken into account.

⁷ The World Bank Group (2022) notes that China accounts for a third of the world's GHG emissions, and the carbon intensity of China's gross domestic product remains relatively high. They also note that achieving China's climate goals will be uniquely challenging: it will require decoupling economic growth and emissions at a faster pace and at a lower income level than in advanced economies. They note that this will entail fundamental structural changes of the economy.

⁸ The report by Germanwatch et al. (2022) on the annual results of the Climate Change Performance Index (CCPI) ranks China 51st out of 63 countries.

Chart 4: Breakdown of total AUM of HK-domiciled funds by jurisdiction, end-2020

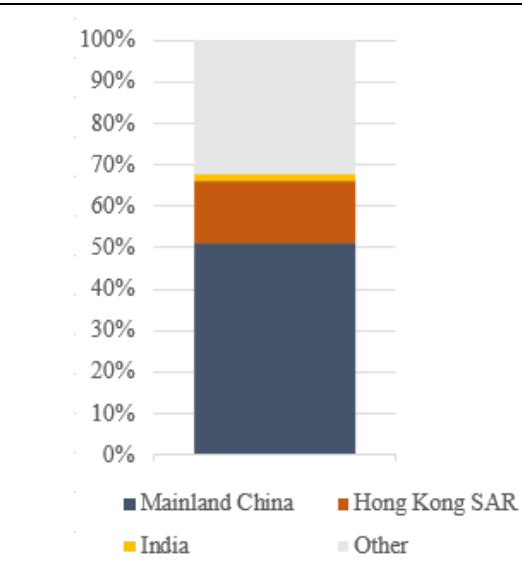
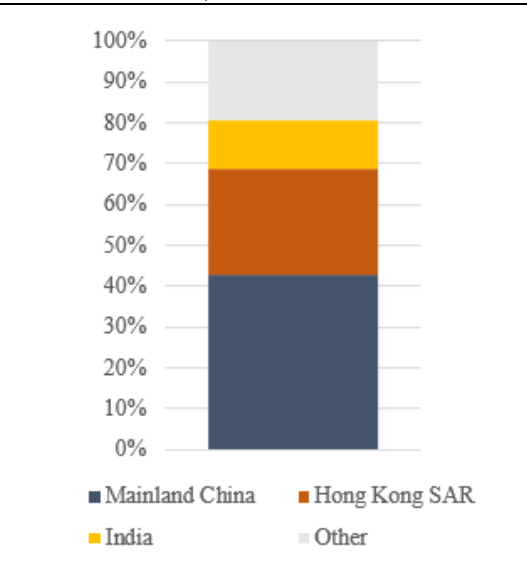


Chart 5: Jurisdictional contribution to aggregate GHG emissions intensity of HK-domiciled funds, end-2020



Sources: Morningstar Direct, S&P Trucost, and HKMA staff calculations. Notes: The individual jurisdictions shown are those with the largest contributions to aggregate GHG emissions intensity. Chart 4: the sample includes all downloaded data, i.e. including those without ISIN and without Trucost data, but excluding unidentified jurisdictions in the data. Chart 5: each jurisdiction’s contribution is calculated by multiplying the jurisdiction’s average emissions intensity (shown in Chart 6) by the AUM invested in the jurisdiction.

Chart 6: GHG emissions intensity by jurisdiction (HK-domiciled funds, end-2020)

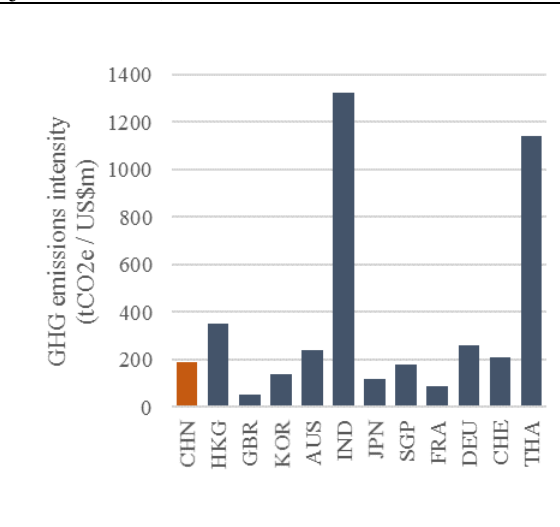
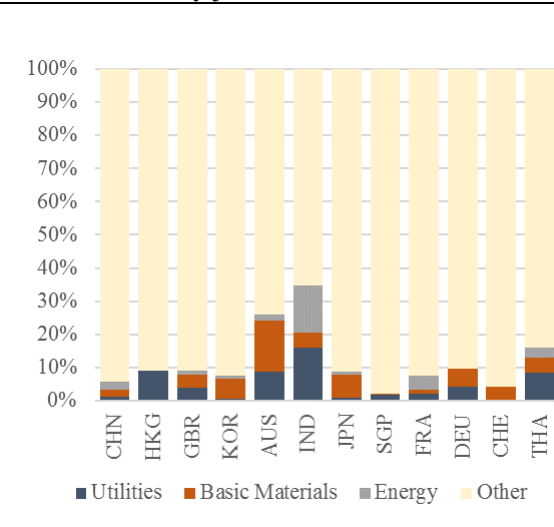


Chart 7: Sector breakdown of HK-domiciled funds’ AUM, by jurisdiction, end-2020



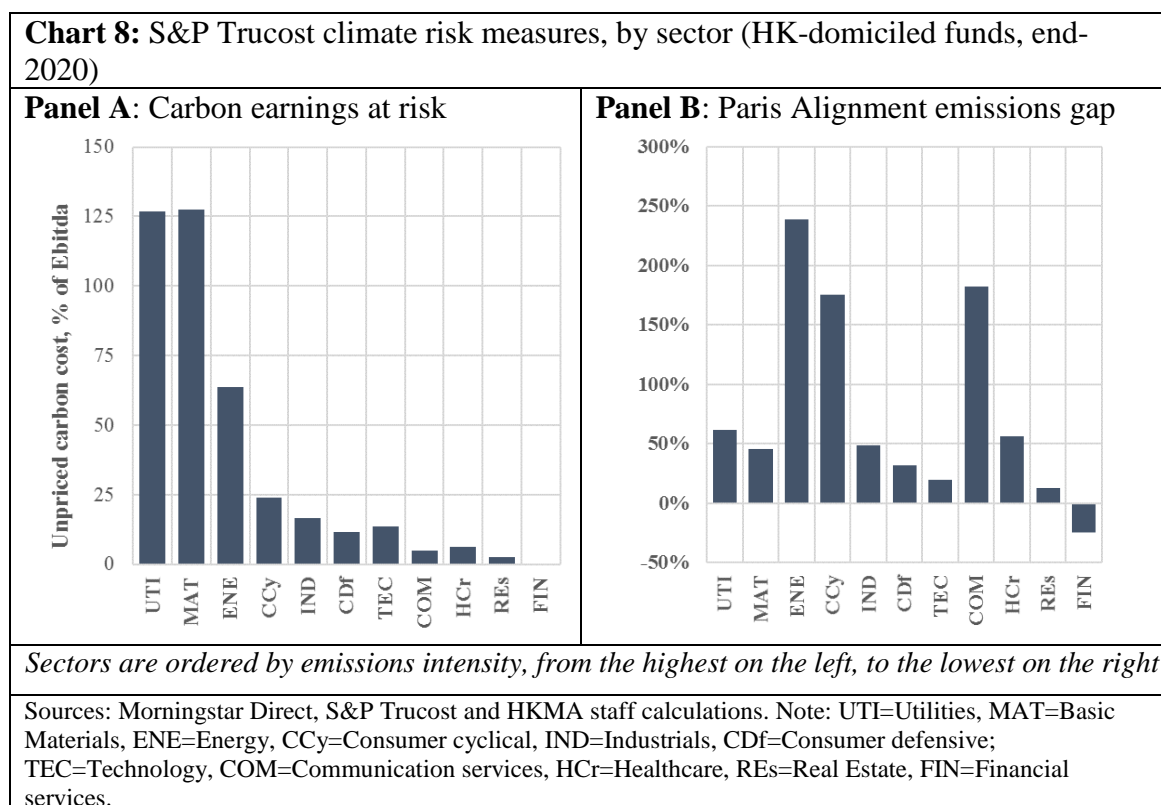
Sources: Morningstar Direct, S&P Trucost, and HKMA staff calculations. Note: The label and name of the jurisdiction: CHN=Mainland China, HKG=Hong Kong SAR, GBR=UK, KOR=South Korea, AUS=Australia, IND=India, JPN=Japan, SGP=Singapore, FRA=France, DEU=Germany, CHE=Switzerland, THA=Thailand. The jurisdictions are ranked by AUM (largest from the left); we excluded some jurisdictions due to the lack of ISIN/CUSIP identifiers and/or emissions data. For Chart 7, the sample includes all downloaded data, i.e. including those without ISIN and without Trucost data, but excluding unidentified jurisdictions and sectors.

4.2 Forward-looking climate risk measures

As climate risks will materialise over a long time horizon, it is important to develop forward-looking climate risk metrics for financial stability surveillance. In this subsection, we explore two forward-looking climate risk measures available from S&P Trucost – carbon earnings at risk and Paris Alignment emissions gap.

We find that while sectors with the highest emissions intensities also have the highest carbon earnings at risk (**Chart 8A**), high-emitting sectors do not necessarily have a larger Paris Alignment emissions gap (**Chart 8B**).⁹ The lower correlation between emissions intensity and future emissions gap may be because some companies in the high-emitting sectors are more likely to have already put in place strategies and targets to tackle climate risk and reduce emissions, as they are more likely to be affected by risks from climate change and be subject to policies on climate transition.

Our observation shows that a company that has a high emissions intensity at present may not necessarily pose a high degree of financial risk in the future. When assessing climate transition risks, we would also want to consider, for example, whether the company has put in place an adequate strategy to deal with climate risk, and whether the company is on track to reduce emissions to levels that are aligned with achieving Paris Agreement goals. Our analysis also shows that different forward-looking measures may capture different forward-looking elements. Hence, evaluating a range of forward-looking indicators may provide additional insights in climate risk assessment.



⁹ In our calculations, we winsorised the Paris Alignment emissions gap data at the 5th and 95th percentiles to reduce the impact of outliers on summary statistics.

V. CONCLUSION

In summary, we made an assessment of the climate risk exposure of HK-domiciled investment funds based on granular data and using both historical and forward-looking measures of climate risk.

Using a measure of the portfolio climate transition risk of individual investment funds, we find that the climate risk of HK-domiciled funds is in line with funds domiciled in other Asia-Pacific economies.

We analysed the portfolio holdings of HK-domiciled funds and the climate risk measures of individual companies in their portfolios. While Mainland China accounts for half of HK-domiciled funds' AUM, and while some existing studies classify Mainland China as a jurisdiction with high climate transition risks, we find that the average climate risk of the Mainland China exposures of HK-domiciled funds is not particularly high compared to that of other jurisdictions. This partly reflects that only a relatively small share of HK-domiciled funds' Mainland China exposures is invested in high-emitting sectors. A takeaway from this is that it is important to use granular data to accurately assess investment funds' climate risk exposures and the underlying drivers.

We also explored some forward-looking measures of climate risk. While the carbon earnings at risk measure is highly correlated with emissions intensity and offers similar observations, the Paris Alignment emissions gap measure has a low correlation with emissions intensity and so provides additional insights. Due to the uncertain and evolving nature of climate transition risks, policymakers can consider examining a range of forward-looking climate risk measures to complement historical metrics, which may enable a more robust and comprehensive assessment of climate risks.

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