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THE ROLE OF BANKS' BOND UNDERWRITING ACTIVITIES IN THE TRANSITION TO A LOW-CARBON ECONOMY: EVIDENCE FROM THE ASIA-PACIFIC REGION

Key points:

- *Apart from providing loans, banks play a crucial role in facilitating capital market access for corporates through activities such as underwriting of bonds, which are off banks' balance sheets. In the context of climate change, however, banks' climate-related commitments usually do not apply to their bond underwriting businesses. Against this backdrop, this study assesses the extent to which Asia-Pacific (APAC) banks' bond underwriting activities are contributing towards the transition to a low-carbon economy, an area that has not been examined extensively in the literature.*

- *The findings of this study suggest that bond underwriting activities of APAC banks are playing a part in supporting the transition to a low-carbon economy, while further efforts to rein in facilitated emissions are warranted.*

  - *The broad picture at a sectoral level reveals that bond issuances arranged by APAC banks for the three high-emitting sectors (namely utilities, energy and materials) have not grown in value terms since around 2015, when the Paris Agreement was reached, with their sizes relative to other sectors falling slightly. At the same time, an increasing share of issuances arranged for these sectors have been green and sustainability bonds, more so for utilities firms than energy and materials firms.*

  - *Importantly, a deeper analysis of climate metrics for bond issuers, based on their current and projected emissions, finds that a sizeable portion of bonds arranged by APAC banks for the three high-emitting sectors were issued by firms classified as "green" (5%) and "transitioning" (30%), thereby supporting the decarbonisation of high-emitting sectors. However, a significant share was also arranged for "non-transitioning" firms.*

  - *Furthermore, APAC banks are found to have arranged bond financing for firms engaging in "green-enabling" activities which may be high-emitting but are*

nevertheless essential for the economy's green transition. Although existing climate metrics may not effectively identify such bond issuers, an analysis of the textual information disclosed by bond issuers reveals that APAC banks have significantly arranged bond issuances for firms in the supply chain of electric vehicles (EVs), accounting for 36% of bonds arranged in the materials sector. Importantly, around a fifth of these EV-related firms are classified as "non-transitioning" based on their own climate metrics. This highlights the challenges in identifying green-enabling firms due to substantial data and methodology gaps.

- *These findings yield several policy implications:*
  - *First, although APAC banks are already arranging a sizeable portion of bonds for green and transitioning firms, there is scope to further scale up transition finance. Policymakers may advance the development of transition taxonomies to help the financial sector identify transitioning firms and activities. In this respect, the ongoing efforts in Asia (including Hong Kong) in developing relevant taxonomies are helpful. Meanwhile, improving interoperability of these taxonomies would be conducive to cross-border flows of transition finance.*
  - *Second, in view of the challenges facing some energy and materials firms in issuing project-based green bonds, it is important to improve the development of other financing instruments to facilitate a firm-wide transition, such as sustainability-linked bonds.*
  - *Finally, as existing climate metrics may not effectively identify green-enabling activities, developing relevant guidance and methodology and improving disclosure may allow for easier identification of such activities and facilitate their financing, e.g. what activities are considered as green-enabling, and metrics to measure their contributions to the climate transition.*

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1. INTRODUCTION

Climate change is widely regarded as one of the key challenges facing the global economy today. To achieve the overarching goal of the Paris Agreement of holding the increase in the global average temperature to well below 2°C relative to pre-industrial levels, a significant amount of financing is required to support the transition to a low-carbon economy, in particular the transition of carbon-intensive activities to lower-carbon practices. It is estimated that the Asia-Pacific (APAC) region will require US$66 trillion of climate investment during 2020-2050.[1]

Banks have a vital role to play in facilitating APAC's transition to a low-carbon economy. In addition to providing direct financing for corporates through lending, banks are crucial in facilitating capital market access for corporates through activities such as underwriting bond issuances, which are off banks' balance sheets. In the context of climate change, the transition to net zero requires reductions in both carbon emissions financed by lending – "financed emissions" – and emissions facilitated by bond underwriting and other capital market activities – "facilitated emissions".

Indeed, while banks have been making climate-related commitments to contribute to the transition to a net-zero economy and mitigate transition risks (e.g. setting net-zero targets and/or excluding the financing of high-emitting projects), the literature suggests that usually these commitments apply to banks' financed emissions through lending activities, but do not appear to be applicable to facilitated emissions through broader funding activities such as bond underwriting.[2] In this connection, institutions like the International Monetary Fund (IMF) and European Central Bank (ECB), as well as pressure groups, have suggested that major banks need more ambitious commitments and actions to align with net-zero targets.[3]

Against this backdrop, this study examines the evolution of bond underwriting activities by APAC banks in recent years amid the region's transition journey – an area that has not been examined extensively in the literature. The focus is on bond underwriting for carbon-intensive activities, as the transition of these activities is particularly crucial to the transition to a low-carbon economy. Specifically, this study explores the following questions:

(i) How have bond underwriting activities of APAC banks for high-emitting sectors changed in recent years?

[1] See Asia Securities Industry and Financial Markets Association (ASIFMA) and Future of Sustainable Data Alliance (FoSDA) (2020).
[2] For example, see European Central Bank (ECB) (2023) and the Banking on Climate Chaos (2024).
[3] ECB (2023) recommends that net-zero targets should encompass capital market activities and all facilitated transactions that may be responsible for additional emissions. See also IMF (2023) and Banking on Climate Chaos (2023). It is worth noting that the Net-Zero Banking Alliance (NZBA) – a group of global banks committed to financing climate action to transition the real economy to net-zero emissions by 2050 – recently included underwriting activities in the new NZBA Guidelines (see Banking on Climate Chaos (2024) and United Nations Environment Programme Finance Initiative (UNEP FI) (2024)).

(ii) To what extent are bond underwriting activities of APAC banks financing the green transition of firms in high-emitting sectors?

For the first question, we present a broad picture on bond underwriting activities from a sector-level perspective; then for the second question, we exploit granular firm-level climate-related data to investigate whether these bonds underwritten are facilitating the green transition of high-emitting firms. The paper is organised as follows: Sections 2 and 3 explore the two research questions in turn, including the data and methodologies used, while Section 4 provides concluding remarks and implications.

2. HOW HAVE BOND UNDERWRITING ACTIVITIES OF APAC BANKS FOR HIGH-EMITTING SECTORS CHANGED IN RECENT YEARS?

In this section, we assess the recent evolution of bond underwriting activities of APAC banks for the high-emitting sectors – namely utilities, energy and materials (**Table 1**).[4] Analysis by S&P Global (2023) shows that these three sectors have the highest greenhouse gas (GHG) emissions and emissions intensities, and together account for over 80% of total emissions of firms covered by S&P Global (scopes 1 and 2) in 2021. Thus, reducing emissions of these three high-emitting sectors is crucial for the transition to a low-carbon economy. Consequently, they are often the focus of climate-related regulations and are subject to greater scrutiny of environmental advocacy groups.

Table 1: Description of the high-emitting sectors

Sector	Description
Utilities	• Utility companies such as electric, gas and water utilities; independent power producers & energy traders. • Companies that engage in generation and distribution of electricity using renewable sources.
Energy	• Companies engaged in exploration & production, refining & marketing, and storage & transportation of oil & gas and coal & consumable fuels. • Companies that offer oil & gas equipment and services.
Materials	• Companies that manufacture chemicals, construction materials, forest products, glass, paper and related packaging products. • Metals, minerals and mining companies, including producers of steel.

Source: S&P Global.

This study uses data on bond underwriting deals from Dealogic, which provides detailed information about the characteristics of the bonds issued and the issuers.[5]

[4] This study applies the first level of sectors under S&P Global's Global Industry Classification Standard (GICS), except for the industrial sector, which is further broken down into transportation, capital goods and commercial & professional services. Other sectors include consumer discretionary, consumer staples, health care, information technology, communication services, and real estate. For details, see S&P Global: https://www.spglobal.com/spdji/en/landing/topic/gics/.

[5] Although Dealogic may not cover the whole universe of bonds issued, it is a commonly used data source for research studies and reports on bond markets (e.g. Sze et al (2021)), International Capital Market Association (ICMA) (2024b)).

For the purposes of our analysis, we select all bond tranches arranged by banks in one of the 11 APAC jurisdictions in our sample for private non-financial corporates (NFCs).[6] In line with the methodology adopted by the International Capital Market Association (ICMA) (2024b), a bond is considered as arranged in the location where the majority of its arranging activities take place. This is defined as the location where more than 50% of the lead banks of a deal are based. If two jurisdictions tie for a deal, both jurisdictions will be attributed by taking an average of the nominal amount of the bond. For simplicity, we do not include "consortium" deals where there are no dominant jurisdictions.[7]

2.1 Key observations

Overall, bonds arranged for the three high-emitting sectors have declined in importance in APAC banks' bond underwriting business. In aggregate, the amount of new bond issuances underwritten by APAC banks for the three high-emitting sectors has plateaued since around 2015 – the year when the Paris Agreement was reached, while issuances arranged for other sectors continued to grow until 2022 with the tightening of monetary policies globally (**Chart 1**). Accordingly, relative to total bond issuances in APAC, the share of issuances underwritten for high-emitting sectors has actually declined from 30% of total issuances in 2015 to 23% in 2023 (**Chart 2**). The decline was driven by decreasing shares of bonds arranged for the energy and materials sectors. These trends imply that high-emitting sectors are becoming less important in APAC banks' bond underwriting business, although the absolute amount of bond issuances arranged for them has not changed much.

Chart 1: Bond underwriting by APAC banks for private NFCs, by sector type and bond type

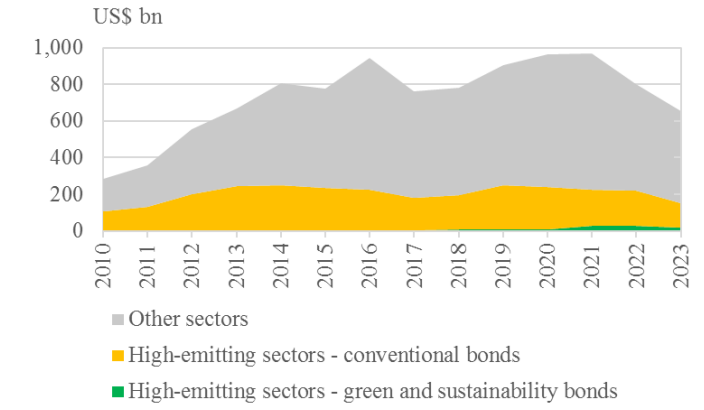
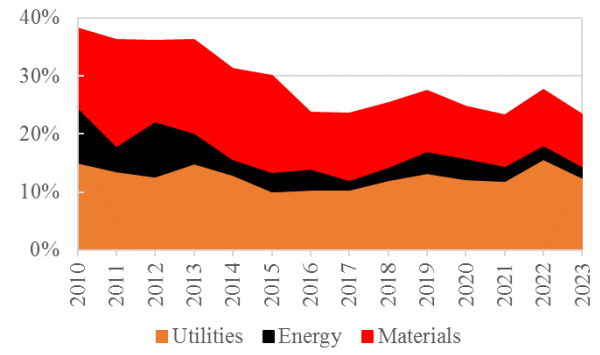


Chart 2: Bond underwriting by APAC banks for the three high-emitting sectors, as share of total



Note: High-emitting sectors are the utilities, materials and energy sectors.
Sources: Dealogic and HKMA staff calculations.

According to the literature (e.g. Fatica et al (2019)), Dealogic has better coverage of bond characteristics, compared with other bond data sources.

[6] Our sample of APAC region includes 11 economies: Australia, China, Indonesia, Hong Kong, Japan, South Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand. See Annex 1 for the number of sample banks by jurisdiction.

[7] This exclusion ought not have a material impact on our findings as these deals only account for 5% of the issuance amount in 2023 (or less than 1% if we only consider deals where the majority of banks are based in APAC).

At the same time, bonds underwritten by APAC banks geared towards green and sustainable purposes have grown, thereby contributing to the climate transition. We find that an increasing proportion of the bond issuances arranged by APAC banks for high-emitting sectors were green and sustainability bonds, though the level remained relatively modest overall at just over 10% of total issuances by high-emitting sectors in recent years (**Chart 3**).[8] Among them, the share of green and sustainability bonds arranged for the utilities sector (nearly 20% of total issuances) was much higher than those for the energy and materials sectors (less than 5%). Indeed, the utilities sector also accounted for a disproportionately large share of green and sustainability bonds identified in our sample (**Chart 4**).

It is noteworthy that green and sustainability bonds are usually projects-focused debt instruments, with the use of proceeds earmarked for green and sustainable projects undertaken by the issuing firms. The limited use of green and sustainability bonds by the energy and materials sectors could be partly due to the challenges related to identifying eligible green projects (e.g. for firms engaged in steel production) (Climate Bonds Initiative (CBI) 2022), and the cautious market views towards green bonds issued by such entities as oil and gas companies.[9] Besides, the earlier development of detailed standards and guidance, including sector-specific pathways, for key renewable power generation (e.g. solar and wind) may have also favoured green and sustainability bond issuances by utilities firms (CBI 2024b).[10]

Chart 3: Share of green and sustainability bonds arranged by APAC banks for private NFCs, by sector, rolling 3-year average

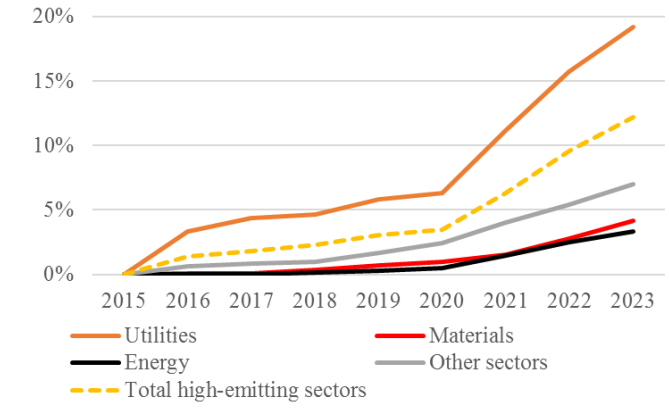
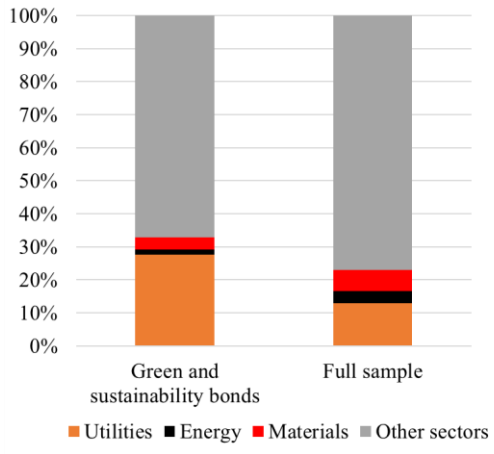


Chart 4: Green and sustainability bonds and all bonds arranged by APAC banks, by sector, 2016–2022



Note: High-emitting sectors are the utilities, materials and energy sectors.
Sources: Dealogic and HKMA staff calculations.

[8] Green and sustainability bonds as identified by Dealogic.
[9] For instance, an early green bond issuance by an oil company was not included in the CBI green bond listings, though it was assessed to have met the green bond principles of the ICMA. The bond was also excluded from a number of green indices. See CBI (2017), Capital Monitor (2021) and Reuters (2021).
[10] Detailed guidance was produced for key renewable powers, such as solar and wind, around 2014–2016, whereas for steel and cement, tools and guidance were developed and published over the past few years, starting with the 2020 International Energy Agency roadmap (CBI 2024b).

While the broad picture reveals that bond underwriting by APAC banks for the three high-emitting sectors has declined relative to other sectors, **a just and orderly transition to a low-carbon economy does not mean simply cutting the funding of high-emitting sectors outright, but more importantly financing the green transition of high-emitting firms.** It is crucial that the high-emitting firms that are paying efforts to the green transition have access to financing for their decarbonisation journey. To this end, we need to distinguish green and transitioning firms from others in order to assess the "greenness" of financing facilitated by APAC banks for these firms, which is elaborated in the next section.

3. TO WHAT EXTENT ARE BOND UNDERWRITING ACTIVITIES OF APAC BANKS FINANCING THE GREEN TRANSITION OF FIRMS IN HIGH-EMITTING SECTORS?

To assess the extent to which bond underwriting arranged by APAC banks is financing the transition of high-emitting sectors, we need to first identify those green and transitioning firms among them. This entails a forward-looking perspective by considering individual bond issuers' plans and efforts with respect to the green transition, in addition to current or historical emissions. The focus should be on the *dynamic process* of becoming sustainable, rather than an assessment of what is already sustainable (Organisation for Economic Co-operation and Development (OECD) 2022).

3.1 Data and methodology

3.1.1 Climate metrics

While the relevant guidance and taxonomies differ in the exact definitions and assessment criteria of transitioning firms or activities, a common thread is the climate-related targets (e.g. GHG emissions pathway) aligned with the goals of the Paris Agreement, underpinned by a credible plan and actions. For example, the ICMA Climate Transition Finance Handbook underlined the importance of the credibility of an issuer's GHG emissions reduction strategy, commitments and practices, with the goal of realising the objectives of the Paris Agreement (ICMA 2024a); Climate Bonds Initiative (2022) lists five hallmarks of a credible company climate mitigation transition – Paris-aligned targets, robust plans, implementation action, internal monitoring and external reporting.[11]

In line with these, this study makes use of firm-level data on forecast emissions and Paris-aligned emissions levels obtained from S&P Trucost to determine the

[11] Other examples of guidance concerning transition finance: the OECD (2022) proposes that transition finance must be grounded in credible corporate climate transition plans, in line with the temperature goal of the Paris Agreement; ASEAN Capital Markets Forum (2024) highlights two main elements of a credible transition – sufficient climate ambition aligned with the objectives of the Paris Agreement, and robustness of the entity's ability to deliver on said ambition.

extent to which a firm is transitioning towards the Paris Agreement goals, in addition to assessing its historical emissions (also from S&P Trucost).[12] Specifically, we look at the following two climate indicators:

(i) **GHG emissions intensity**, expressed as tonnes of carbon dioxide equivalent (tCO_2e) GHG emissions normalised by revenue in millions of US dollars (tCO_2e/US$m). This measures the emissions level incurred to produce a unit of revenue.[13]

(ii) **Paris alignment** (PA) **emissions gap** measures how far a firm's emissions path is from the level aligned with the Paris Agreement goal of limiting the average global temperature increase to 2°C relative to pre-industrial levels. This is calculated for the year 2030 (the end point of S&P Trucost's projection for this dataset) as

$$\frac{Forecast\ GHG\ emissions\ at\ year\ 2030 - GHG\ emissions\ level\ at\ year\ 2030\ aligned\ with\ PA}{Forecast\ GHG\ emissions\ at\ year\ 2030},$$

where the forecast GHG emissions at year 2030 are estimated by Trucost based on information such as disclosed firm emissions reduction targets or sub-industry historical emissions trends.[14] Here, we introduce a 0% floor to the indicator, such that firms whose forecast emissions in 2030 are lower than Paris Agreement-consistent levels would have a 0% gap.[15] **In the context of this study, a small emissions gap indicates that a firm may be transitioning towards the Paris Agreement goal**.

To assign the above climate indicators to each bond issuer, we match the issuers in the Dealogic dataset with the corresponding ones in the S&P database by making use of the unique ISIN reported in Dealogic. In cases where the ISIN is not available, the matching is done by looking at firm names, the parent company names and economic sector(s).[16] For the matched firms, we then look for the corresponding climate data in the S&P Trucost database. It turns out that we are able to match climate data for 1,680 issuers

[12] S&P Trucost contains quantitative information on the environmental performance of over 15,000 of the world's largest listed companies. The indicators used in this study cover scopes 1 and 2 emissions, as there is limited availability of scope 3 emissions data. For details, see S&P Global Market Intelligence (2020).

[13] While some firms actually measure their emissions intensity per unit of product (e.g. per kilowatt-hour of electricity generated or per tonne of manufactured products), the emissions intensity scaled by revenue (the so-called "economic intensity") that we use in this study could be applied across different economic sectors and is commonly used in the literature (e.g. Ehlers et al. (2021)).

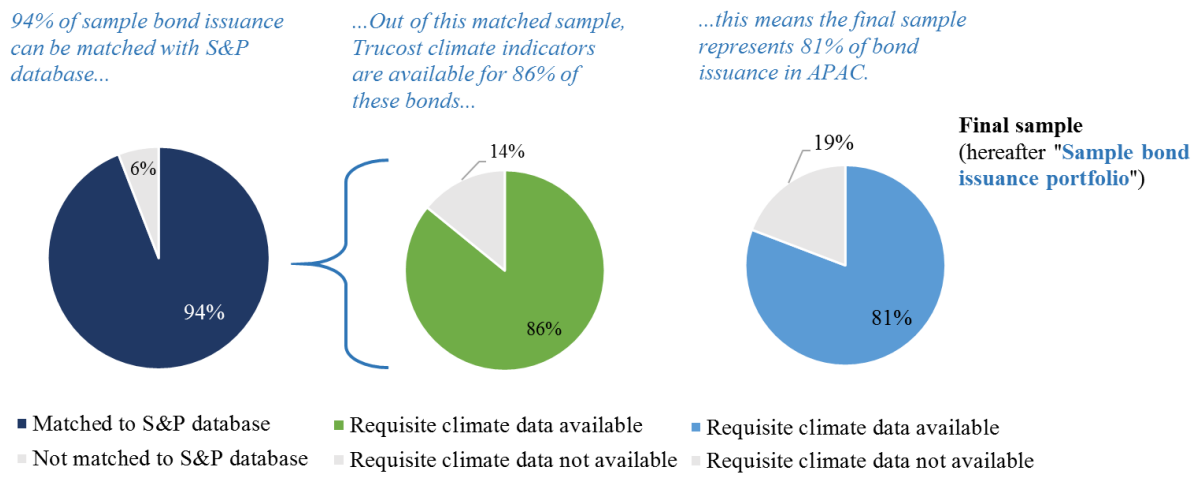
[14] Similar metrics were also used in recent HKMA research pieces, e.g. Leung et al. (2023), albeit for assessing transition risk. Regarding emissions pathways, for firms that have not disclosed emissions targets, S&P Trucost estimated their emissions pathways using sub-industry trends. Though imperfect, this is a fairly granular approach, taking into account the business nature of a firm. There are over 150 sub-industries in S&P's industry classification framework, and "sub-industry" is the most granular level within the framework.

[15] The 0% floor facilitates chart presentation by avoiding the large negative numbers in cases where firms are expected to reduce emissions to levels much lower than the Paris Agreement-consistent levels. After all, from a climate change perspective, we are more concerned about firms whose emissions are above the Paris Agreement-consistent levels.

[16] The name-matching process is facilitated by a tool developed by S&P Capital IQ and computer programming by HKMA staff, supplemented by manual adjustment and checking.

(about one-third of the sample issuers), with their bonds underwritten by APAC banks amounting to US$2.96 trillion (or 81% of bonds in the sample) during 2019-2022 (**Chart 5**).[17]

Chart 5: The process of matching Dealogic tranche-level bond issuance data with S&P Trucost firm-level climate data



Sources: Dealogic, S&P Trucost and HKMA staff calculations

3.1.2 Climate transition categories

Bond issuers during 2019-2022 in our final sample are classified into different climate transition categories, using the two climate indicators described in section 3.1.1. Considering the limited climate data availability in the earlier years in the sample and the potential volatility of the climate indicators from year to year, this study evaluates each issuer's climate performance by using the average of the climate indicators over the recent years – 2018-2022 for emissions intensity and 2021-2022 for PA emissions gap.[18]

The classification scheme relies on distributional statistics of the two climate indicators. Emissions intensity is considered low if it is in the lower quartile of the full sample of all issuers, and high if in the upper quartile. Meanwhile, we evaluate each issuer's PA emissions gap relative to peers in the same sector rather than all issuers in the full sample, considering that the starting points, transition pathways and stages of the transition vary across sectors.[19] For instance, for sectors with hard-to-abate activities (e.g. materials), the

[17] We use climate indicators of the borrowing entities where available; otherwise, we use the climate indicators of the appropriate parent firms, taking into account the activities and economic sectors of the borrowing entities and the parents. The coverage of S&P Trucost climate data is better in the later years in the data sample; therefore, we focus our analysis on bond issuances during 2019-2022.

[18] PA emissions gap data is only available from 2021. The data limitations also preclude meaningful comparisons or analyses across the time dimension.

[19] ICMA (2023a) acknowledges that emissions reduction pathways should be tailored to the sector and operating geographies of an issuer, as issuers generally have different starting points and are at different transition stages and on different pathways.

technologies required to operate in line with PA emissions pathways are not yet sufficiently developed, whereas the technological options to reduce emissions are more mature for some other sectors (e.g. the real estate sector).

Specifically, the classification scheme is as follows (see also **Table 2**):

- "**Green**" firms – issuers whose emissions intensities fall below the lower quartile in our sample of issuers, and whose PA emissions gaps fall below the median among issuers belonging to the same sector.
- "**Transitioning**" firms – issuers with moderate to high emissions intensities currently but whose future emissions are likely to be broadly consistent with the Paris-aligned pathways. We define "transitioning" firms as issuers whose emissions intensities are above the lower quartile in our sample of issuers, and whose PA emissions gaps are below the lower quartile among issuers belonging to the same sector.
- "**Non-transitioning**" firms – issuers whose emissions intensities are above the upper quartile in our sample of issuers, and whose PA emissions gaps are above the upper quartile among issuers in the same sector.
- "**Other**" firms if they do not belong to the above categories. These firms have diverse climate transition profiles. For simplicity, we do not further categorise them.[20]

Table 2: **Summary of major climate transition categories**

Category	Emissions intensity[21]	PA emissions gap[22]
Green firms	Below the *lower* quartile of the full sample of issuers	Below the *median* among issuers in the same sector
Transitioning firms	Above the *lower* quartile of the full sample of issuers	Below the *lower* quartile among issuers in the same sector
Non-transitioning firms	Above the *upper* quartile of the full sample of issuers	Above the *upper* quartile among issuers in the same sector

Before presenting the key observations, some caveats should be noted. First, the thresholds to classify different types of firms inevitably involve judgement, and using different thresholds would alter the categorisation of some firms. But we assess that the

[20] These "other" firms include those with moderate to high emissions intensities and moderate PA emissions gaps, and those with low emissions intensities but large PA emissions gaps. In terms of climate transition assessment, these firms should perform better than "non-transitioning" ones but worse than "green" and "transitioning" ones.
[21] For emissions intensity, the lower quartile, and upper quartile of the full sample are 33 tCO_2e/US$m and 228 tCO_2e/US$m respectively.
[22] See Annex 2 for the quartile values of PA emissions gap by sector.

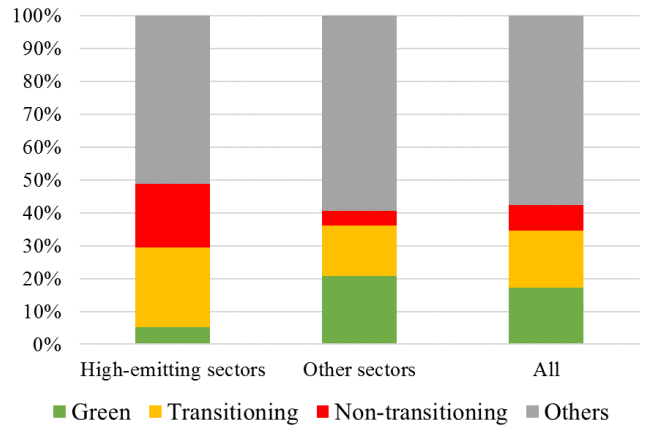
main conclusions of this paper remain valid with some reasonable shifts of thresholds.[23] Second, our methodology does not capture other elements of credible transition, e.g. credible transition plans and their implementation, which are harder to quantify and deployed in a sample with a large number of firms.[24] Though imperfect, we consider our methodology simple and intuitive to operationalise the concepts of green and transitioning.

3.2 Key observations

3.2.1 Bond underwriting for firms in the high-emitting sectors by climate performance

With the methodology above, we classify our sample of firms, for which APAC banks have arranged bond financing during 2019-2022, into different categories. **Chart 6** below contrasts the distributions of firms between the three high-emitting sectors and other sectors. Unsurprisingly, the picture suggests that a smaller share of firms in the high-emitting sectors are classified as green, while a larger share are classified as non-transitioning, as compared with other sectors. Yet, **a silver lining is that about a quarter of firms in the high-emitting sectors are assessed to be transitioning, i.e. they are expected to be aligned with (or close to) the goals of the Paris Agreement in 2030**.

Chart 6: Distribution of firms across categories (firm count)



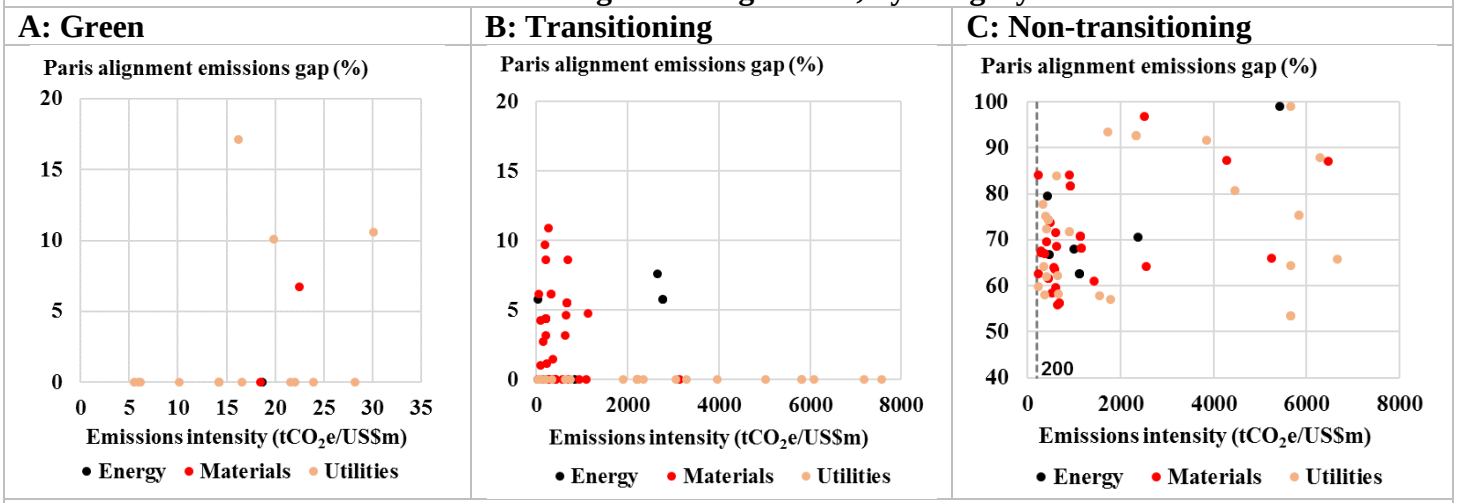
Note: High-emitting sectors are the utilities, materials and energy sectors.
Sources: Dealogic, S&P Trucost and HKMA staff calculations.

In fact, most of the **transitioning firms** in the three high-emitting sectors are assessed to have PA emissions gaps of less than 10%, although some of them have fairly high emissions intensities today (**Chart 7, panel B**). This implies that these firms may have

[23] More stringent thresholds would modestly reduce the number of firms classified as "green" and "transitioning", while moving some firms classified as "others" to the "non-transitioning" category. But overall these do not change the main conclusions of this paper.
[24] An ideal approach would be to undertake detailed analysis of each bond issuer and bond deal in order to assess whether the firm and its usage of the funds raised are devoted to the purposes of green transition. However, this is not feasible in our study, in part due to the large number of firms in our sample.

already been managing their emissions paths towards the goals of the Paris Agreement, and some of them need only modest additional adjustment in order to become aligned with the Paris Agreement. Meanwhile, **green firms** in our sample have low emissions intensities today, although some have modest PA emissions gaps (**Chart 7, panel A**). Most of these green firms are from the utilities sector, e.g. those that engage in the generation and distribution of electricity using renewable or cleaner energy sources. At the other end of the spectrum, **non-transitioning firms** have high emissions intensities today (above 200 tCO_2e/US$m) and large PA emissions gaps of over 50% (**Chart 7, panel C**). This means that their emissions reduction plans, if any, are not sufficiently ambitious, and more forceful efforts are needed to further cut their future emissions (at least by half of the projected emissions).

Chart 7: Climate metrics of firms in the high-emitting sectors, by category



Note: A floor of 0% is imposed for PA emissions gap. For panel B, two firms with emission intensity above 8000 are not shown. These two firms have a very small PA emissions gap (less than 2%). For panel C, a few firms with an emission intensity above 8000 are not shown.
Sources: Dealogic, S&P Trucost, and HKMA staff calculations.

With the above classification of firms, we return to examine bond underwriting. **We find that APAC banks arranged a sizeable amount of bonds for green and transitioning firms during 2019-2022**. For the three high-emitting sectors, the share of bonds arranged for green and transitioning firms amounted to 35% – somewhat lower than other sectors (**Chart 8**). Consistent with the distribution of firms across categories presented above, **relatively more bond financing arranged for high-emitting sectors was towards transitioning firms (about 30%), while that towards green firms was rather limited (about 5%).** The opposite is true for other sectors. On the other hand, however, bonds arranged for non-transitioning firms in high-emitting sectors took up about 14% of issuances, higher than the corresponding share for other sectors (less than 5%). Taken together, these findings suggest that transition finance needs are more apparent for high-emitting sectors, as fewer firms in these sectors have already transitioned to green.

Zooming into the three high-emitting sectors, we find that bond financing arranged for green firms in these sectors was mainly towards utilities firms (Chart 9). Bonds underwritten for green firms in the utilities sector took up about 8% of bonds arranged for this sector, higher than the corresponding shares in the energy and materials sectors (less than 3%), while those arranged for transitioning firms took up similar shares across the three sectors. Again, these are roughly proportionate to the distribution of these firms in the three high-emitting sectors.

Chart 8: Share of bond issuances, breakdown by climate transition profile of firms

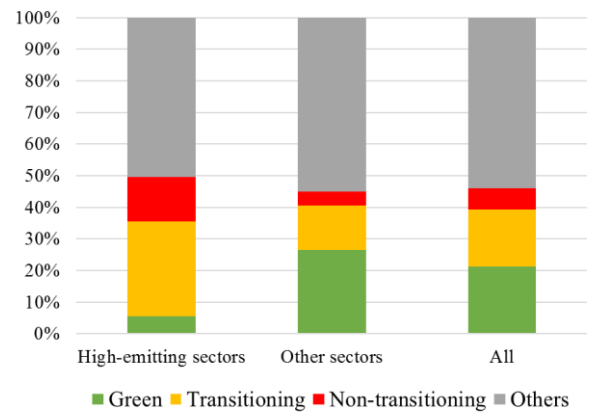
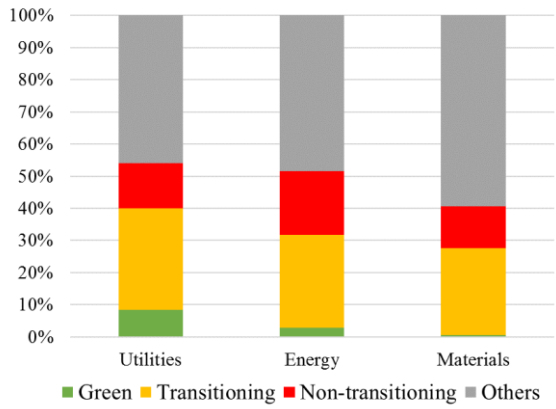


Chart 9: Share of bond issuances within high-emitting sectors, breakdown by climate transition profile of firms



Sources: Dealogic, S&P Trucost and HKMA staff calculations.

3.2.2 Bonds arranged for firms engaging in green-enabling activities

While the methodology adopted in this study helps to distinguish green and transitioning firms from others, assessing the "greenness" of financing towards some firms may not be straightforward, for example, firms that engage in so-called "green-enabling" activities which may be high emitting. The activities of these firms – though polluting and hard to abate at present – are nevertheless essential in enabling activities and technologies that are central to the transition to a net-zero economy. By facilitating financing for these firms, banks are also contributing to the green transition.

Firms that manufacture critical materials for electric vehicles (EVs) are an obvious example of such green-enabling firms. EV batteries need materials such as nickel, manganese, cobalt, lithium and graphite, the mining and refining processes of which are high-emitting. Nevertheless, EVs are considered important in the economy's transition to net-zero. To gauge the extent to which APAC banks' bond underwriting business is supporting green-enabling activities, we analyse the textual information available in the annual reports or websites of about 150 materials firms in the sample, and assess whether

these firms are involved in the supply chain of EVs, with the aid of web scraping and generative artificial intelligence (AI) tools.[25]

The analysis finds that among the material firms that APAC banks have arranged bond financing, **40 of them (or 26%) were involved in the supply chain of EVs, amounting to 36% of bond financing arranged for this sector (Chart 10)**. These include firms engaged in producing materials for EV batteries, and other materials used as parts of EVs (e.g. rubber for fuel-efficient tires). According to our categorisation above, **around a fifth of these EV-related firms are classified as non-transitioning** (**Chart 11**).

Chart 10: Identifying bonds arranged for materials firms in the EV supply chain

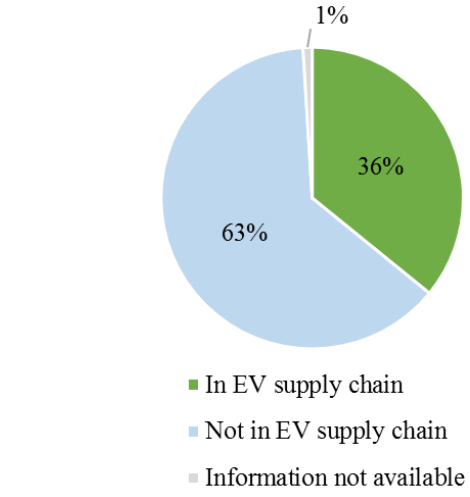
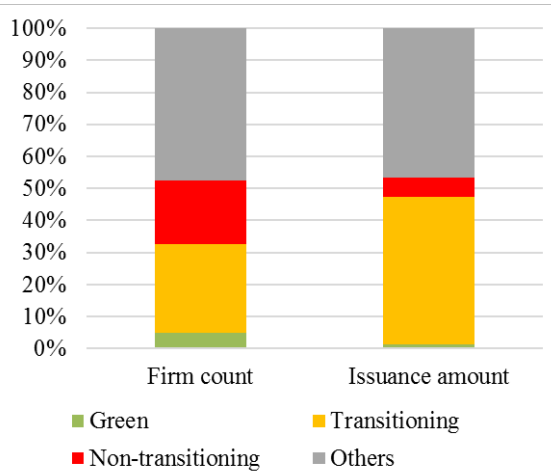


Chart 11: Distribution of materials firms in the EV supply chain, by climate transition profile



Sources: Dealogic, firms' annual reports and websites, S&P Trucost and HKMA staff calculations.

An implication here is that metrics which measure a firm's own emissions (historical and projected) may overlook the contributions of financing provided for green-enabling firms to the economy-wide decarbonisation. In this connection, some market participants and firms have started to look beyond the conventional scopes 1-3 emissions and estimate "***avoided emissions***" – emission reductions that occur outside of a product's life cycle or value chain, but as a result of the use of that product.[26] The methodology of measuring avoided emissions remains fluid, however, with a number of conceptual, data and methodological challenges to be addressed, e.g. how to allocate the emissions avoided along the supply chain (Goldman Sachs 2023).

[25] Specifically, we first used web scraping tools to auto-download a firm's annual report and auto-search keywords related to EVs (e.g. "EV batteries", "lithium ion batteries", "EV supply chain"). We then inputted the relevant pages to AI chatbots to analyse whether a firm belongs to the EV supply chain. For firms without annual reports, we looked at their websites. We manually verified the resulting list of firms in the EV supply chain.

[26] Definition of avoided emissions from the World Resource Institute (2013). For methodologies and applications of avoided emissions in investment analysis, see, for example, GIC and Schroders (2021) and Goldman Sachs (2023).

4. CONCLUDING REMARKS AND IMPLICATIONS

Focusing on the bond underwriting activities, this study finds evidence that APAC banks are playing a part in supporting the transition to a low-carbon economy. At the sector level, bonds arranged for the three high-emitting sectors (utilities, energy and materials) have fallen as a share of total bond issuances, and green and sustainability bonds arranged for these sectors have grown. Importantly, using firm-level metrics based on current and projected emissions, we assess that about one-third of bonds arranged for these high-emitting sectors were towards green and transitioning firms. In addition, APAC banks' bond underwriting has supported firms engaging in green-enabling activities, such as those producing critical materials for EVs. **That said, further efforts to rein in facilitated emissions associated with bond underwriting are warranted**, given that the share of bonds arranged for non-transitioning firms in the high-emitting sectors was not insignificant. In this regard, banks could play a role in facilitating transition of such firms, for example, by taking account of a client's transition plan in their business decisions.[27]

The findings of this study yield several policy implications. First, while the methodology employed by this study is useful for operationalising the climate transition concept, advancing the development of transition taxonomies would further help the financial sector identify transitioning firms and activities, thus scaling up transition finance. This may entail, for example, sector/industry-specific guidance regarding transition activities, credible transition elements and trajectories for hard-to-abate activities. In fact, authorities in Asia are increasingly incorporating transition elements in their green and sustainable finance taxonomies, including the ASEAN taxonomy and the enhancement of the Hong Kong Taxonomy for Sustainable Finance to include transition activities.[28] Meanwhile, as financial institutions may operate across borders and need to navigate multiple taxonomies, improving interoperability of taxonomies across jurisdictions would be conducive to cross-border flows of transition finance.[29]

Second, in view of the challenges facing some high-emitting industries in issuing "use of proceeds", project-based green bonds, improving the development of other financing instruments may help cater for their demand for transition finance. For instance, *sustainability-linked bonds* (SLBs) could be a complementary, entity-based instrument to facilitate firm-wide transition, as the proceeds raised could be used for general corporate purposes, not ring-fenced to green projects. To this end, concerns over credibility

[27] Meanwhile, the risk dimension should not be overlooked, although this is not the focus of this paper. While underwriting of bonds, which are off banks' balance sheets, may not entail as much climate-related credit and market risks as on-balance sheet items, banks need to be vigilant against reputational and litigation risks if their business portfolios, whether on- or off-balance sheet, go against the societal goals of net-zero transition or the banks' own climate pledges. In fact, recent years have seen climate-related protests and lawsuits against financial institutions (Deloitte 2024).

[28] Some other examples of incorporating transition elements include the taxonomies developed by Japan, Singapore, Malaysia and Thailand.

[29] For instance, taxonomies may differ in their design, categorisation of activities, and level of granularity (e.g. principles-based versus more specific technical guidelines). See Wong (2024).

and greenwashing related to SLBs need to be addressed in order to grow this market segment (CBI 2024a; Maino 2022; see also Annex 3).

Lastly, as existing climate metrics may not effectively identify green-enabling activities, efforts to develop relevant guidance and methodology and improve disclosures may allow for easier identification of these activities. While this study employs textual analysis to identify those firms engaged in the EV supply chain, policymakers may consider providing more guidance on what activities are considered as green-enabling to facilitate financing of these activities.[30] Going forward, more research and analytical work to examine the role of green-enabling but high-emitting activities to the climate transition would be useful, for example, exploring methodology and metrics to measure the benefits brought by green-enabling activities (e.g. avoided emissions).

[30] Recent guidance by the ICMA on green enabling projects is helpful in this regard (ICMA 2024c).

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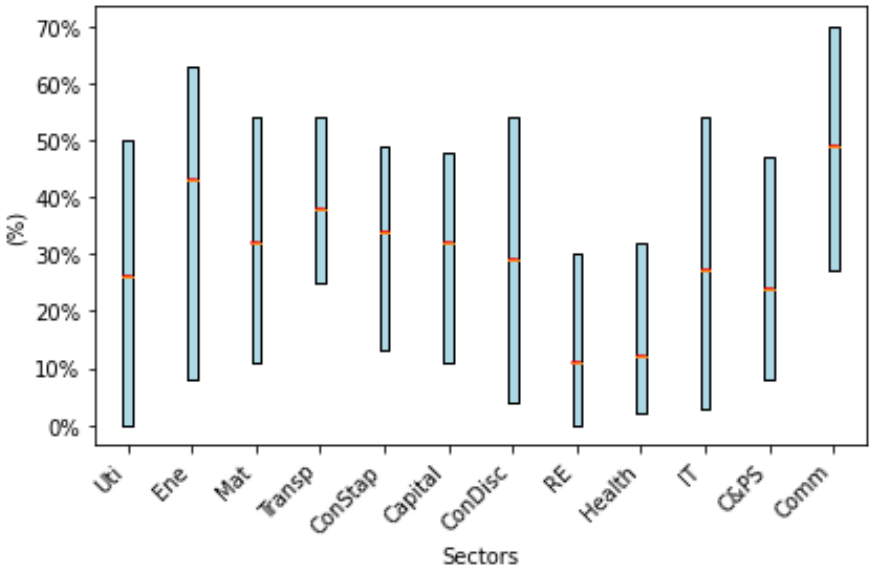
ANNEX 1: NUMBER OF SAMPLE ASIA-PACIFIC BANKS BY JURISDICTION[31]

Jurisdiction	Number of banks
Australia	16
China	96
Hong Kong, China	37
Indonesia	24
Japan	24
Malaysia	24
New Zealand	7
Philippines	22
Singapore	16
South Korea	41
Thailand	17
Total	324

ANNEX 2: DISTRIBUTION OF CLIMATE METRICS

Chart A1: Quartiles of Paris alignment emissions gap, by sector



Note: The two ends of the bars show the 25th percentile and 75th percentile while the red dot indicates the median. Uti = utilities, Ene = energy, Mat = materials, Transp = transportation, ConStap = consumer staples, Capital = capital goods, ConDisc = consumer discretionary, RE = real estate, Health = health care, IT = information technology, C&PS = commercial and professional services, Comm = communication services.

Sources: Dealogic, S&P Trucost, and HKMA staff calculations.

[31] Banks are defined following Dealogic's definition and may include both banks and financial securities firms. Most of the financial securities firms in our sample are subsidiaries of larger banking groups. Jurisdiction is defined as the location of the subsidiary rather than the parent banking group. Therefore, banks that employ separate subsidiaries for different jurisdictions will appear more than once in the table. Multiple subsidiaries that belong to the same banking group operating within the same jurisdiction are counted as one bank.

ANNEX 3: SUSTAINABILITY-LINKED BOND MARKET

Sustainability-linked bonds (SLBs) are a bond instrument for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined sustainability/ESG objectives (ICMA 2023b). SLBs are usually designed to have coupon payments linked to predefined key performance indicators (KPIs) related to sustainability – coupon step-down if the KPIs are met or step-up if the KPIs are not met. In theory, such structure could incentivise issuing firms to improve climate performance.[i]

SLBs could be considered as firm-based instruments, as the proceeds raised could be used for general corporate purposes or other purposes, not ring-fenced to green projects, whereas green bonds are more project-based, with use of proceeds exclusively financing green projects. SLBs therefore offer more flexibility to issuers, especially those finding it difficult to identify eligible green projects.

However, the development of the SLB market has been slow, compared with green bonds. According to ICMA (2024a), SLBs accounted for only 6% of green and sustainable bonds outstanding (as of January 2024), and about 60% of SLBs were climate related (carbon/GHG emissions, renewable energy). Fossil fuels and hard-to-abate industries, e.g. chemicals, metals and mining, cement, steel (corresponding to energy and materials sectors in this paper), as well as the transport industry are relatively more reliant on SLBs. These industries together took up 20% of the SLB market, compared with only 2% in the broader green and sustainable bond markets (ICMA 2024a).

While the still nascent SLB market (as compared with the green bond market) may partly explain the smaller amount outstanding, the development of the SLB market has also been impeded by concerns over credibility and greenwashing, as well as inadequate incentives embedded in product design. Many early examples of SLBs did not have material or ambitious targets (CBI 2024b). Meanwhile, incentives offered could be small, with penalties mostly within 25 basis points (IMF 2022). The callable feature of some SLBs even weakens the financial incentive further – some callable dates are before the KPI assessment date and issuers can choose to call back the bond if they expect the targets are not met (Maino 2022).

Still, SLBs are considered a useful financing instrument to facilitate climate transition going forward. To this end, the impediments discussed above need to be addressed, e.g. through more credible and material KPIs, increased transparency and more guidance/rules for SLB structuring and disclosures (World Economic Forum 2022; CBI 2024a).

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[i] For more details of SLB structure, see, for example, CBI (2024a), ICMA (2023b) and Maino (2022).