Reading the Tea Leaves: What are ASEAN+3 Bond Auctions Saying?[1]

May 23, 2022

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"Straws show how the wind blows."

~ Æsop, storyteller in Ancient Greece

I.   Introduction

1.   **Over the course of the COVID-19 pandemic, ASEAN+3 governments implemented extraordinary policy measures, including sizable fiscal spending, to save lives and livelihoods.** The unprecedented fiscal support led to a marked widening of fiscal deficits, financed by increased issuances of domestic government debt securities (Table 1). Consequently, net domestic government bond issuances were materially higher in 2020 and 2021, compared to their 2019 amounts. And with fiscal deficits expected to remain high in most economies as they struggle to establish a sustained recovery, the need for financing is expected to remain elevated in 2022 and beyond.

2.   **A variety of factors has enabled these debt securities to be easily absorbed by markets during 2020 and 2021.** Despite intermittent bouts of risk-aversion, driven by resurgent waves of the pandemic, regional bond auctions have registered solid demand overall (Figure 1). Key reasons include: (1) very easy liquidity conditions in the banking system in the wake of liquidity support measures by central banks, as well as subdued demand for credit by the private sector; (2) low inflation and low yields in advanced economy (AE), which have contributed to making the valuations of regional bonds attractive; (3) easy global financial conditions, which have incentivized risk-taking and investments in emerging market (EM) assets; and (4) support for the bond markets, including through private placements, by several of the region's central banks, to ensure their smooth functioning. There were periods when the demand for bonds weakened—for example, when US Treasury yields rose in Q1 2021 as markets started pricing in eventual tightening by the US Federal Reserve ("Fed")—but most countries were generally able to meet their issuance requirements in 2020 and 2021.

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Table 1. Fiscal Balance and Net Domestic Government Bond Issuances in Regional Economies

	Fiscal balance (as percent of GDP)				Net government bond issuance (domestic)**			
	2019	2020	2021	2022 (budgeted)	Units	2019	2020	2021
Brunei	-5.6	-20.1	-9.1					
Cambodia	-0.6	-5.3	-9.2	-7.0				
China	-4.9	-6.2	-3.8	-2.8	Billions of CNY	1,666	4,130	3,094
Hong Kong, China	-0.4	-8.7	0.7	-3.1	Billions of HKD	-5.7	16.4	51.7
Indonesia	-2.2	-6.1	-4.6	-4.8	Billions of IDR	398,733	1,105,992	797,300
Japan*	-3.1	-10.0	-9.4	-7.4	Billions of JPY	14,726	21,349	40,077
Korea	-0.6	-3.7	-4.4	-3.3	Billions of KRW	44,500	115,300	116,900
Lao	-3.3	-5.2	-2.0					
Malaysia	-3.4	-6.2	-6.4	-6.0	Billions of MYR	45	86	99
Myanmar*	-3.6	-6.2	-8.6		Billions of MMK	2,256	3,402	-361
Philippines	-3.4	-7.6	-8.6	-7.7	Billions of PHP	359	1,104	1,630
Singapore	0.2	-10.8	-0.9	-0.5	Billions of SGD	9.2	12.4	12.8
Thailand*	-3.0	-5.2	-4.7	-4.1	Billions of THB	202	641	762
Vietnam	0.3	-3.5	-4.1	-4.0	Billions of VND	49,544	248,243	122,922

Sources: CEIC; Haver Analytics; national authorities; and authors' compilations.
Note: * Fiscal balance is for fiscal year (FY). FY runs from October 1 to September 30 for Thailand and Myanmar. For example, FY2021 are from October 1, 2020, to September 30, 2021. FY runs from April 1 to March 31 for Japan. For example, FY2021 are from April 1, 2021, to March 31, 2022. ** The net government bond issuance indicates all domestic bond issuances and is not restricted to bonds issued through auctions alone.

Figure 1. Share of Net Domestic Government Bond Issuance Absorption by Investor Type
(Percent of net government bond issuance)
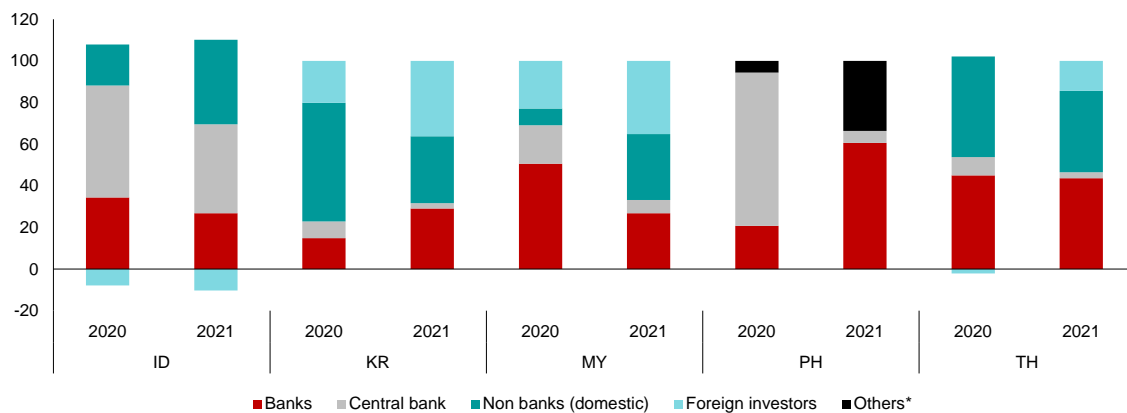
Sources: CEIC; Haver Analytics; national authorities; and authors' calculations.
Note: The data include IDR-denominated tradable government debt for Indonesia, treasury bonds for Korea, government bonds and bills for Malaysia, gross domestic central government debt for the Philippines, and government bonds and bills for Thailand.
* Others is relevant for the Philippines only and includes both non-bank and foreign investors.
** The bond outstanding and holdings data for Philippine government bonds are not available. Net issuance for the Philippines is calculated from the change in the government's domestic debt stock. The net issuance absorbed by banks and the central bank are calculated from the change in claims on government. Central bank claims on government are adjusted to exclude the short-term loan of PHP 540 billion in 2020.

3. **However, many of these factors are turning and may create unfavourable conditions for the absorption of bond issuances going forward.** Specifically:

- The recent upsurge in inflationary pressures globally has increased the probability of concerted rises in bond yields, making this asset class a less attractive investment in the near term.

- The Fed has become more hawkish in recent months, and the anticipated front-loading of rate hikes has driven a steep rise in US Treasury yields. Together, these

developments have led to a deterioration in bond valuations in the ASEAN+3 region. The bigger risk is Quantitative Tightening (QT) by the Fed, which could start as early as May, and have a direct impact in tightening global financial conditions—this reduction in the "quantity" of liquidity will likely have a larger impact on EM bond markets than the rising "cost" of liquidity through UST yields. Domestically, inflationary pressures could lead to increased expectations of monetary tightening.

- Credit growth will likely pick up as economic recovery from the pandemic gains traction, and may constrain the capacity of banks to absorb bond supply.

4.   **In this note, we present the AMRO Bond Auction Tracker (BAT), a framework for identifying any build-up of stress in government bond markets.** We analyse trends in the supply and demand of bonds that could potentially serve as early warning indicators of any deterioration in market sentiment toward particular government issuances. We focus on the ASEAN-4 (Indonesia, Malaysia, the Philippines, Thailand), Vietnam, and Korea (Appendix I).

II. Understanding the Indicators

5.   **Governments adopt diverse strategies when planning the issuance of local currency bonds but certain considerations are *sine qua non*.** These inevitably include: (1) the timing of issuance (issuance calendar); (2) the amount to be issued (auction size); and (3) the tenor of issuance (Table 2). That said, issuing authorities usually allow themselves sufficient flexibility to tweak supply based on financing requirements and market conditions.

6.   **Consequently, there are standard key indicators that may be used to gauge supply pressures.** They comprise:

- ***Gross issuance—the total amount of government bonds issued.*** Bonds may be issued through regular auctions, private placements, greenshoe auctions, and so forth, and all of these modes of issuance contribute to the gross issuance amount, which is the absolute amount of bond supply that the market absorbs.

- ***Net issuance—gross issuance less redemptions and buybacks.*** Investors holding government bonds to maturity typically receive cash. This cash—after giving due consideration to the risk profile[2]—may be reinvested in other bonds, either in the primary or secondary market. The net supply (attributed to net issuance) pressures are generally calculated over a period of time (say a week, month, or quarter), given that it is highly unlikely that auction dates are precisely matched to the maturity dates of existing bonds. In this regard, having information on upcoming maturities is also useful for the authorities when planning forthcoming issuances.

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[2] The risk profile referred here is the "duration" risk, that is, the price sensitivity of a bond to changes in yield levels. Bonds that are closer to maturity have lower duration risk than those with longer maturity. In this context, a bond that is maturing has practically no duration risk but when investors make the decision to reinvest, they give due consideration to the duration risk of the bond in which they would reinvest the proceeds.

- ***Issuance tenors—the amount of gross issuance for each tenor.*** Investors pay close attention to the issuance tenors given that different types of investors may have preferences for different maturities (for example, pension funds prefer very long tenors).[3] From a supply perspective, the annual maturity calendar plays an important role in deciding the issuance tenors. Authorities usually avoid issuing at tenors where redemptions are high, to better manage the gross supply pressures that could emerge in the future.

Table 2. Selected ASEAN+3: Announcements of Government Bond Auction Details

Economy	Auction Calendar	Tenors	Security(ies) to be Auctioned	Auction Size	Comments
Indonesia	Annual	Annual	6-7 days before auction	6-7 days before auction, but not at security level	The total issuance target is announced before each quarter
Korea	Monthly	Monthly	Monthly	Monthly	A summary of issuance target is published annualy, with estimates of issuance by tenor.
Malaysia	Annual	Annual	Annual	6-7 days before auction	The amount for private placement is also announced with the auction size
Philippines	Monthly	Monthly	6-7 days before auction	Monthly	
Singapore	Annual	Annual	Annual	7 days before auction	Mini-auctons are also conducted and announcements for tenors, security may be announced with the auction calendar or with the amount 7 days before the auction.
Thailand	Quarterly	Quarterly	Quarterly	Quarterly	
Vietnam	Annual	5-7 days before auction	5-7 days before auction	5-7 days before auction	The total issuance target for the quarter [year], broken down by tenors are publshed at the start of the period.

Sources: National authorities; and authors' compilations.

7. **Auction results are a rich resource for understanding the demand for a country's government bonds.** There are two categories of statistics for this purpose:

- ***Volume-based indicators, which provide a comparison between the issuance target, bids received, and amount issued.*** The most commonly used indicator is the bid-to-cover (BTC), which is a ratio of the amount of bids received to the amount of bonds issued. A higher BTC is normally seen as a sign of strong demand. However, this number changes based on the preference of authorities to over- or under-issue based on their evaluation of yields received in the bids. We propose an indicator bid-to-target (BTT), which compares the market's appetite to absorb the announced supply irrespective of the yield level.

- ***Yield-based indications, which are based on yields of bids received in the auction and prevailing market yield.*** The absolute level of yield (cut-off or weighted average) provides little information about the demand for bonds seen at auctions and should be considered in the context of prevailing market conditions. The most commonly used is the tail-of-the-auction ("tail"), defined as the difference between the cut-off yield (or highest yield of a successful bid) and the weighted average yield of successful bids in the auction. A larger tail is generally associated with poor demand—it implies that some bidders in the auction are able to procure the bonds at a cheaper price than the average successful bidder. In the case of multi-price

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[3] See Culbertson (1957).

auctions, information on the cut-off yield and weighted average yield are available and hence calculation of the tail is straightforward. However, some of the auctions in the ASEAN+3 region are either single-price (Korea, Vietnam) or the cut-off yields are not published (Indonesia sukuks). In such cases, we assume that the distribution of bids is uniform and calculate the tail by dividing the range of successful bids (defined by the lowest and highest yields of successful bids) by two.

8.   **Our framework parses the aggregate demand statistics to facilitate analyses.** The key auction statistics—BTC, BTT, and tail—reflect the decisions and perceptions of both investors and issuers and hence can be misleading when considered in isolation. For example, if there are differences in perceptions across investors as to what constitutes the fair value yield, a situation could arise where the BTT is high but the tail is long. Alternatively, if there is no pressing need for funds, the issuer may decide to under-issue (BTC larger than BTT). We offer various scenarios showing the confluence of demand and supply side factors (Table 3). The listed reasons are not exhaustive and the typical values of BTT, BTC, and tail vary across markets and time periods. Hence, the application of this framework would require some degree of expert judgement.

Table 3. Possible Scenarios Showing Confluence of Demand and Supply Side Factors

Auction Statistics		Bid-to-Target		Auction Statistics	
		Low	High		
Tail	Long	Supply pushed, wide range of valuation estimates	Overvalued bond	Low	Bid-to-Cover
		Poor demand, but no urgency to issue	High proportion of bargain hunters	High	
	Short	Supply pushed, but valuations are fair	Proactive issuance amid strong demand	Low	
		Poor demand but valuations seen as fair	Price sensitive issuer or no urgency to issue	High	

Source: Authors.

9.   **The framework could also be extended to auctions across tenors to obtain a more granular picture of supply and demand.** The statistics are aggregated by tenor over a longer period (1-year) to better assess trends. Concurrently comparing the bids received, amounts issued and the tail, helps to identify any supply-demand mismatch in any of the tenors. We also separately analyse the annual distribution of the share of bids and issuances at each tenors to identify the differences between the market's appetite and the issuer's tenor preference.

III. Analyzing the Indicators

10.   **There are some peculiar *gross and net issuance* trends in the AEAN+3 region, which have evolved as a result of various supply and demand trends over many years:**

- Gross issuance in Indonesia, for instance, exhibits some seasonality as the authorities have maintained the policy of frontloading issuances in the first half of the year. This policy provides immense flexibility to the authorities to scale up issuances, if needed, in the second half. December 2021 seems to have been an aberration as gross issuance shot up. However, these bonds were privately placed with Bank Indonesia as part of the agreed upon burden sharing and were not issued to the market. Issuance targets have since picked up but public demand has weakened somewhat following the strong interest observed in January 2022, which was likely driven by pent-up demand.

- Korea's gross issuance also tapered towards the end of 2021 as higher than projected revenue for the government reduced the need to issue bonds. The net issuance pressure shows seasonality and reduces around quarter ends, with Korean Treasury bond maturities bunched in March, June, September, and December.

11.   **The *redemption profile* is an important tool for both markets and authorities.** The former tracks the redemption calendar to gauge potential trends in liquidity and bond demand while the latter uses it to identify windows during which to issue bonds and the tenors in which to issue. Markets are generally vigilant about bond maturities given that bond redemptions inject liquidity into the system that may subsequently be channeled back into either further demand for bonds or other assets:

- Markets may also monitor bond redemptions for other reasons. Anecdotal evidence suggests that the Malaysian ringgit experienced larger depreciation pressure on days with sizeable bond maturities following the central bank's announcement of foreign exchange (FX) measures in November 2016. Foreign positioning in Malaysian bonds was high at the time and upon redemption, foreign investors reportedly preferred to withdraw their proceeds from the country. More generally, recent data suggest that Malaysia's gross issuance tends to be higher in months when there are sizable redemptions.

- Authorities may prefer to smooth the annual redemption profile but there could be exceptions. Vietnam's issuances are concentrated at the 10-year tenor, which portends large maturities in 2030 and 2031 as the government ramped up bond issuances to support the economy during the pandemic.

12.   *Auction statistics* **provide useful information on bond supply and demand dynamics.** The bid-to-target ratio has trended lower during the past 3-4 months in most markets under consideration but the bid-to-cover ratio has not fallen as much (they actually trended higher in Vietnam), intimating that the authorities have not seen the need to push supply and have been comfortable issuing less than their announced targets. In other words, issuances were adjusted to alleviate any excess supply pressures on the market when demand was weak. That said, the changes could have implications on future supply if the need to compensate for the shortfall in recent auctions arises.

13.   **The *amount issued at each tenor* is largely dependent on expected demand, the redemption profile and prevailing market conditions:**

- Larger issuances at tenors where demand is weak usually result in more expensive debt and distortion of the yield curve—yields for this tenor would rise and larger tails would be evident at auctions. Therefore, tenors that have shorter tails and higher BTTs are typically preferred by authorities for larger issuance amounts. The converse is also true—for example, the tail of 50-year Korean bond auctions is relatively long, and it is also the tenor with the least supply. Similar trends have been observed in other markets to varying degrees.

- Issuing authorities may prefer to have a more even redemption profile. It would naturally influence decisions around the amount of issuance at the various tenors.

- Prevailing market conditions also play an important role in determining the tenors. For example, Indonesia, Philippines and Vietnam have been focusing on relatively larger shares of issuances (as compared to the bids received) at longer tenor bonds, in 2022. However, there has been no clear indication of strong demand—such as high BTC, high BTT, or shorter tails—for longer-tenor bonds, suggesting that the authorities may be seeking to lock-in interest rates (while they are still relatively low) for longer periods. As yields across the world rise, there could potentially be a shift in preference toward issuances of shorter tenor securities, which normally offer lower yields than longer-tenor securities. Demand for these tenors would also govern the amounts that governments issue.

14.   **Analyses of the *types of investors* in a country's bond issues are informative for anticipating future demand trends.** Generally, diverse investors are an indication of greater bond market stability, while concentrations of holdings by particular classes of investors could signal potential vulnerabilities to sudden stops or reversals:

- As an example, large foreign ownership of Indonesian government bonds in the pre-pandemic era was often cited as one of the risks to both bond and FX markets. However, foreign participation has declined since then. Additionally, the holdings of long-term foreign investors, such as sovereign wealth funds and central banks, have increased. These investors are generally less sensitive to short-term market volatility and consequently, have contributed to greater stability in Indonesia's bond and FX markets.

- More broadly, sovereign bond issuances in foreign currencies, which are typically held by foreign investors, help to diversify funding sources. Over the past decade, such issuances have also been made to take advantage of global low interest rates. However, in periods of market stress, any rise in investor perception of sovereign default risks, which is generally accompanied by weaker domestic exchange rates, may create difficulties in servicing, rolling over, or repaying the maturing debt.

IV. Conclusion

15.   **Bond auction and issuance statistics provide important information about the supply and demand backdrop of government bonds.** In this regard, AMRO's BAT presents a range of useful derived data and infographics for both official and private sector users. The BAT is a top-down framework for assessing trends in the supply and demand of

sovereign bonds at the more granular, country level. The framework starts with an overview of gross and net issuance statistics and then drills down into the details of individual auctions (supply side). It also takes into account the investors in those issuances (demand side) to provide a more complete perspective. That said, as with most tools, interpretation of these statistics also require expert judgement.
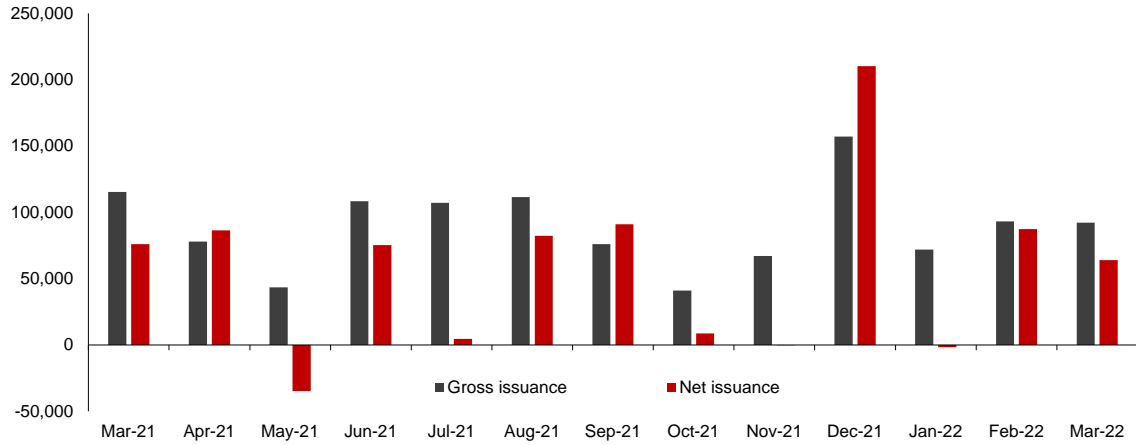
References

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Appendix I. AMRO Bond Auction Tracker

Appendix Figure 1. Indonesia

Indonesia: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Indonesia: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)
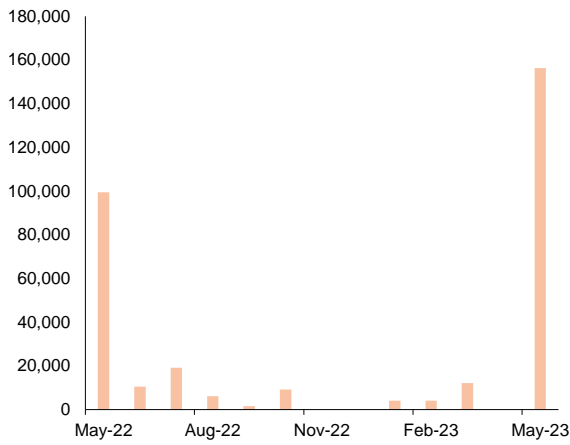
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Indonesia: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)
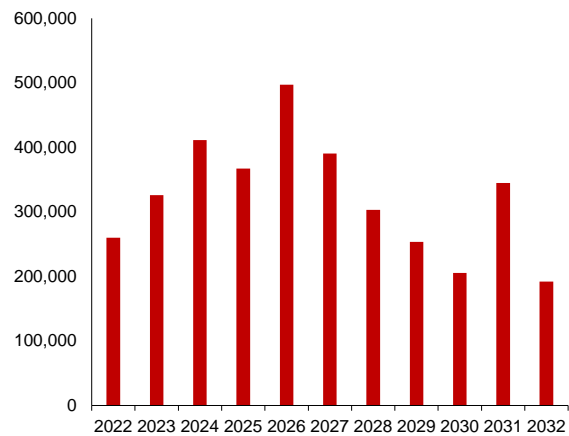
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Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Indonesia: Weekly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
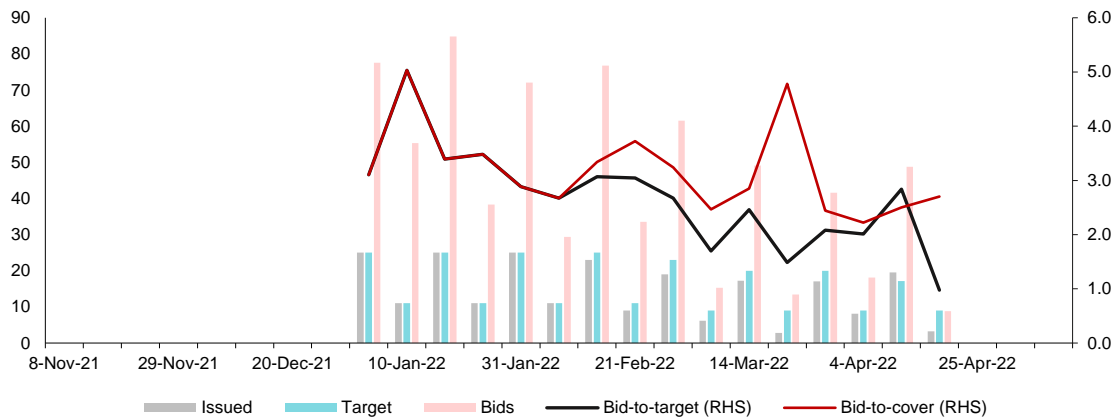
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippines, and Thailand, and only bonds for Vietnam.

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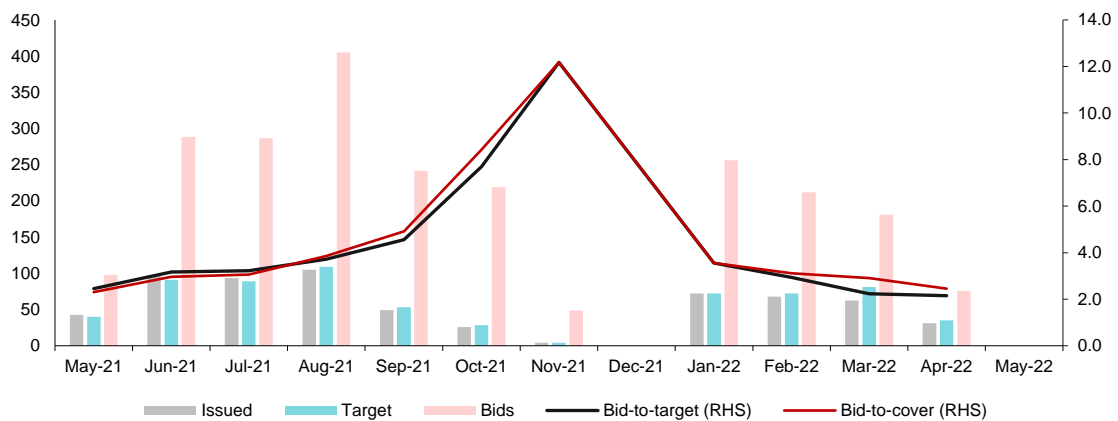
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippine, and Thailand, and only bonds for Vietnam.

Indonesia: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor

(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
3m	*From: 15-Feb-22 To: 12-Apr-22*			
6m	*From: 22-Feb-22 To: 19-Apr-22*			
9m	*From: 21-Jul-21 To: 26-Oct-21*			
12m	*From: 15-Feb-22 To: 12-Apr-22*			
2y	*From: 22-Feb-22 To: 19-Apr-22*			
4y	*From: 22-Feb-22 To: 19-Apr-22*			
5y	*From: 15-Feb-22 To: 12-Apr-22*			
7y	*From: 21-Sep-21 To: 19-Apr-22*			
10y	*From: 15-Feb-22 To: 12-Apr-22*			
13y	*From: 22-Feb-22 To: 19-Apr-22*			
15y	*From: 15-Feb-22 To: 12-Apr-22*			
17y	*From: 05-Oct-21 To: 05-Apr-22*			
20y	*From: 15-Feb-22 To: 12-Apr-22*			
25y	*From: 22-Feb-22 To: 19-Apr-22*			
30y	*From: 15-Feb-22 To: 12-Apr-22*			

Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Indonesia: Summary of Bids and Issuances of Sovereign Bonds by Tenor
(Billions of LCY)
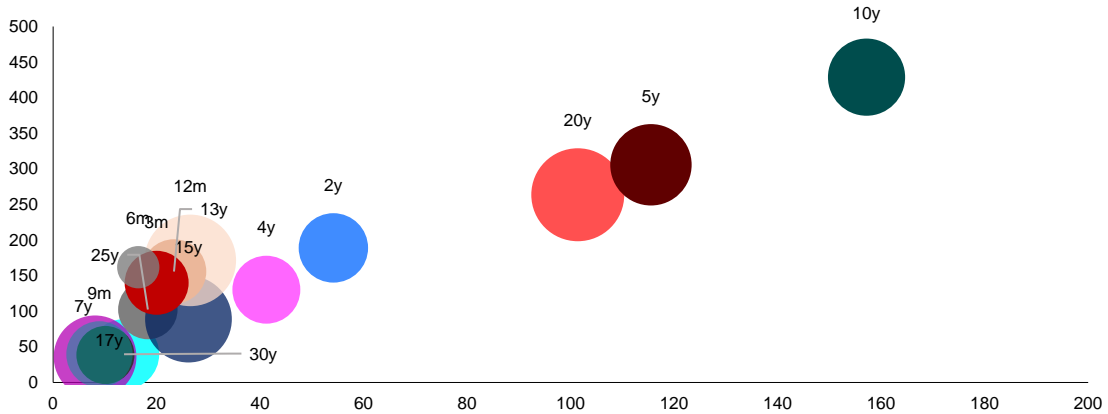
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is a weighted average (by issuance amount) of all auctions for a particular tenor.

Indonesia: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022
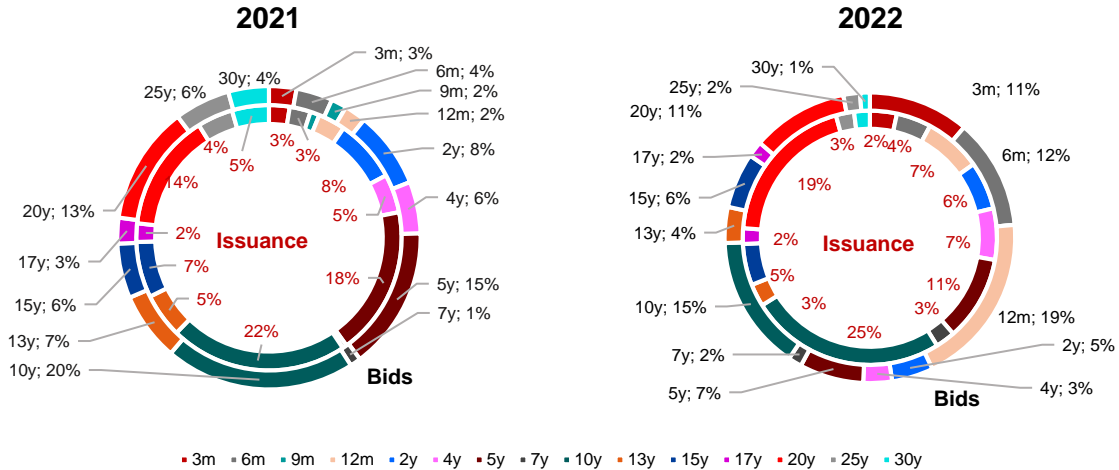
Sources: National authorities; and authors' calculations.

Indonesia: Ownership Share of Outstanding Sovereign Bonds
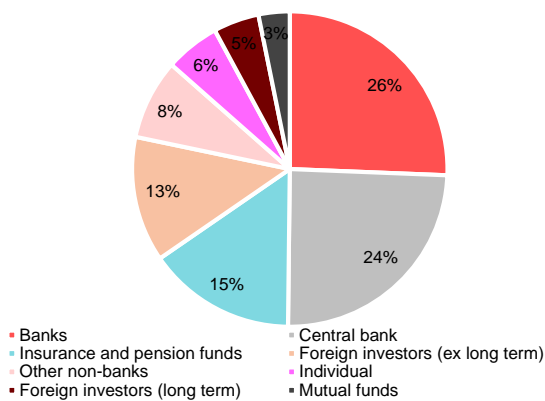
Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The ownership pattern shows the local currency government bond holdings by investor type for Malaysia and Thailand, and all local currency tradable government securities for Indonesia. The estimates for Korea and the Philippines are based on published balance sheet statistics for selected major investors. There is no information available for Vietnam.

Indonesia: Distribution of Outstanding Sovereign Bonds by Currency
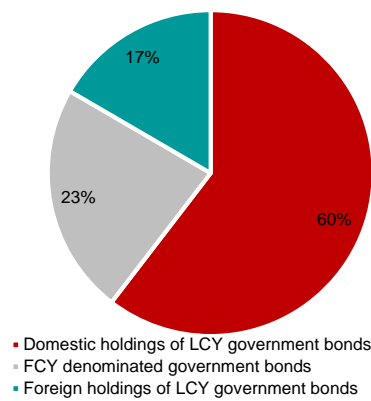
Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.

Appendix Figure 2. Korea

Korea: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)
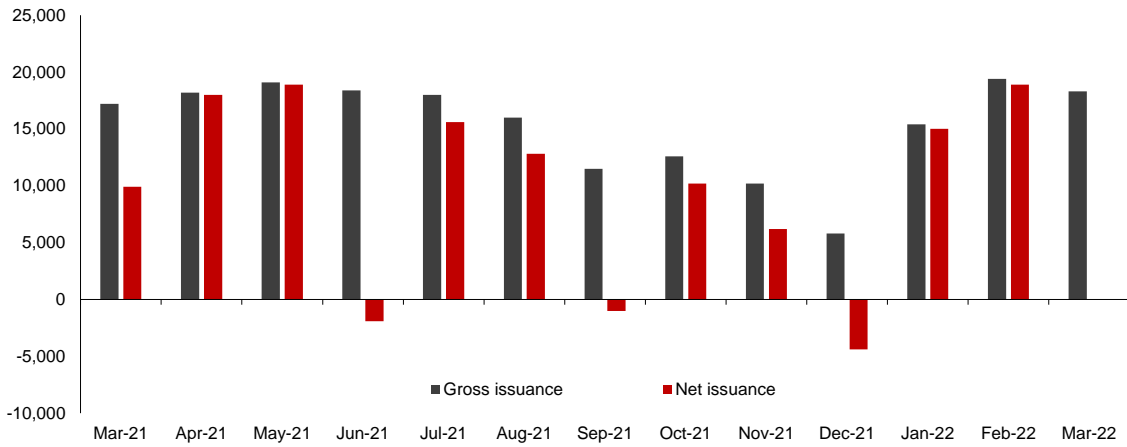
Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Korea: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)
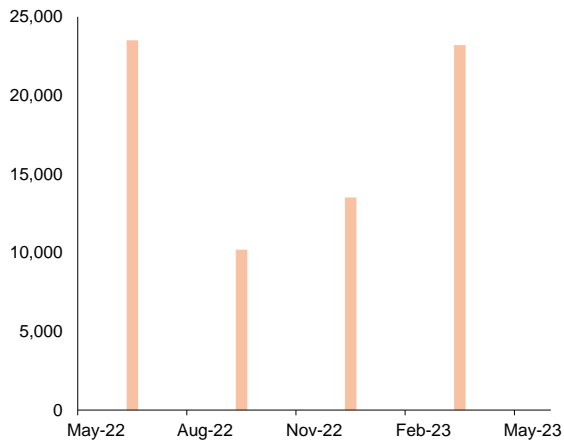
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Korea: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)
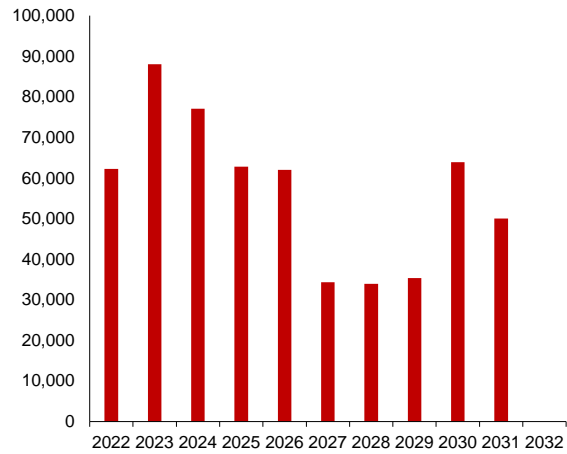
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(Ratio; billions of LCY)
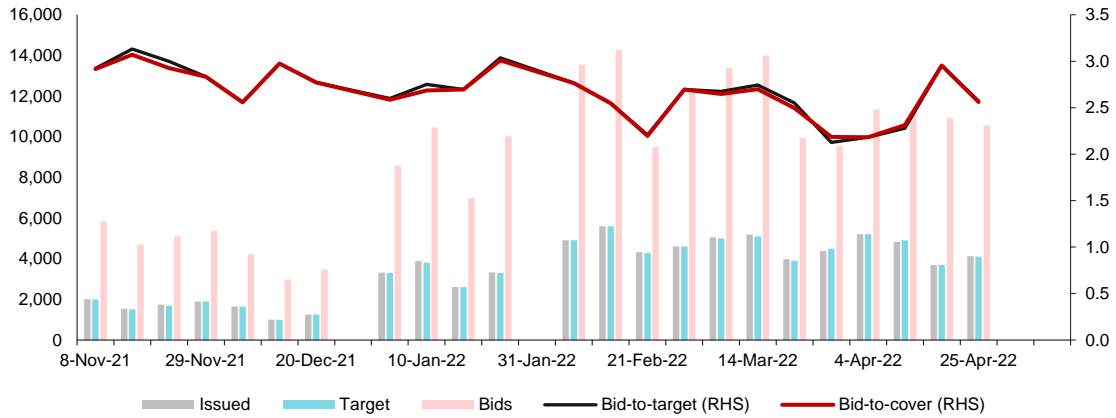
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippines, and Thailand, and only bonds for Vietnam.

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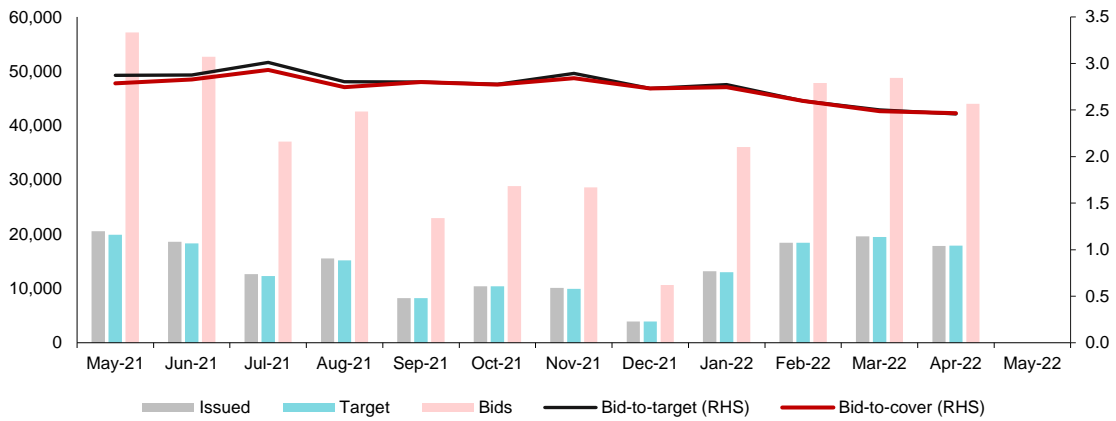
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Korea: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor
(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
63d	*From: 30-Mar-22* *To: 27-Apr-22*			
2y	*From: 11-Jan-22* *To: 12-Apr-22*			
3y	*From: 10-Jan-22* *To: 11-Apr-22*			
5y	*From: 24-Jan-22* *To: 25-Apr-22*			
10y	*From: 17-Jan-22* *To: 18-Apr-22*			
20y	*From: 21-Dec-21* *To: 26-Apr-22*			
30y	*From: 03-Jan-22* *To: 04-Apr-22*			
50y	*From: 10-Dec-21* *To: 15-Apr-22*			

Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Korea: Summary of Bids and Issuances of Sovereign Bonds by Tenor
(Billions of LCY)
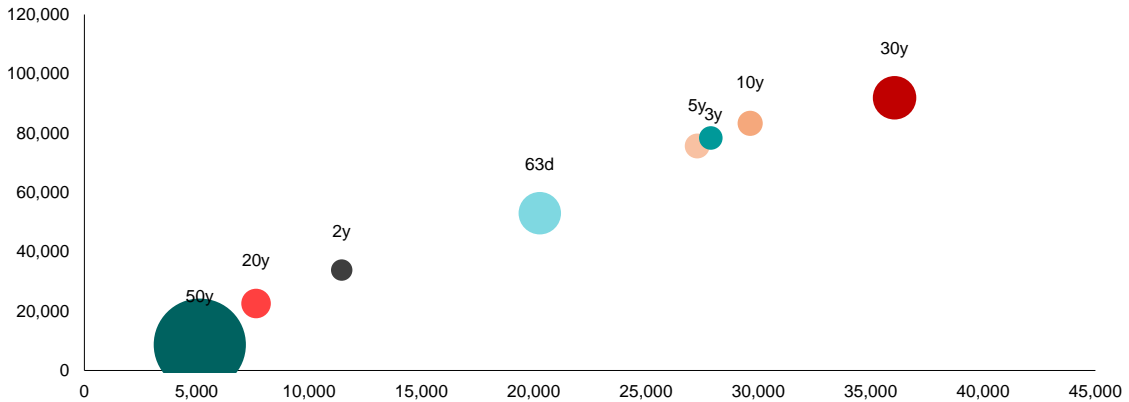
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is a weighted average (by issuance amount) of all auctions for a particular tenor.

Korea: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022

63d ■ 2y ■ 3y ■ 5y ■ 10y ■ 20y ■ 30y ■ 50y

Sources: National authorities; and authors' calculations.

Korea: Ownership Share of Outstanding Sovereign Bonds
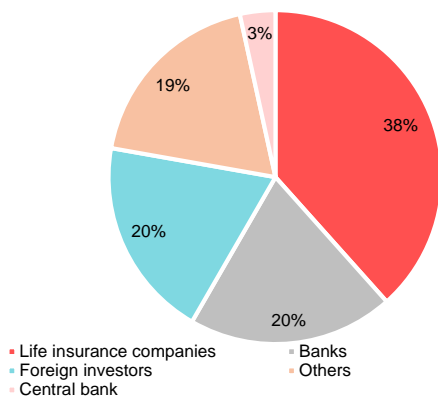
■ Life insurance companies ■ Banks
■ Foreign investors ■ Others
■ Central bank

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The ownership pattern shows the local currency government bond holdings by investor type for Malaysia and Thailand, and all local currency tradable government securities for Indonesia. The estimates for Korea and the Philippines are based on published balance sheet statistics for selected major investors. There is no information available for Vietnam.

Korea: Distribution of Outstanding Sovereign Bonds by Currency
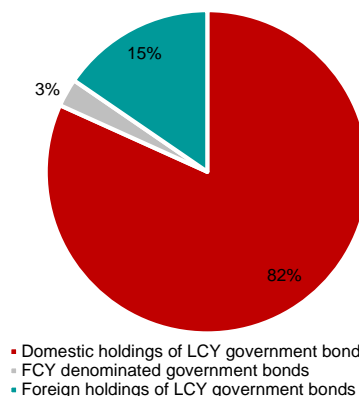
■ Domestic holdings of LCY government bonds
■ FCY denominated government bonds
■ Foreign holdings of LCY government bonds

Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.

Appendix Figure 3. Malaysia

Malaysia: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)
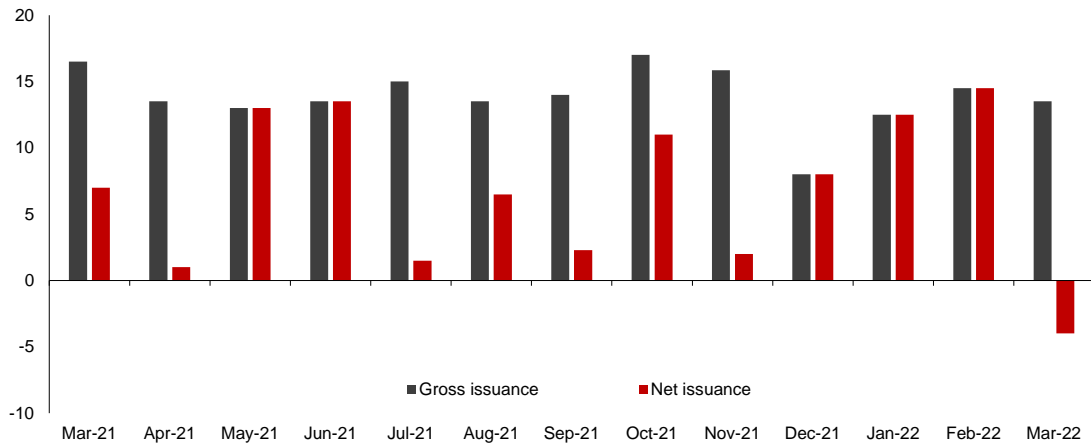
■ Gross issuance   ■ Net issuance

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Malaysia: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)
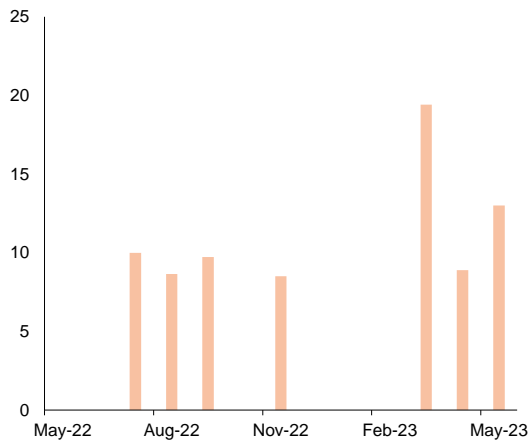
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Malaysia: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)
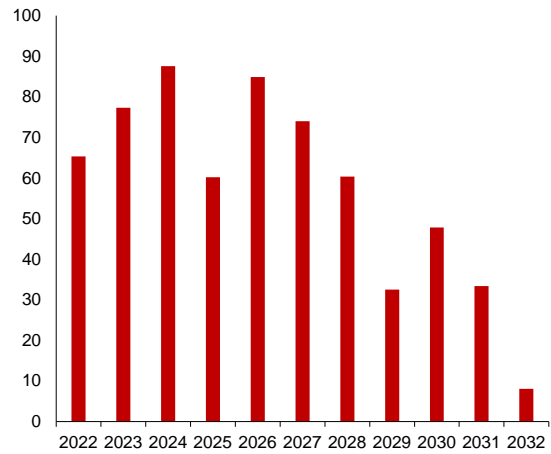
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Malaysia: Weekly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
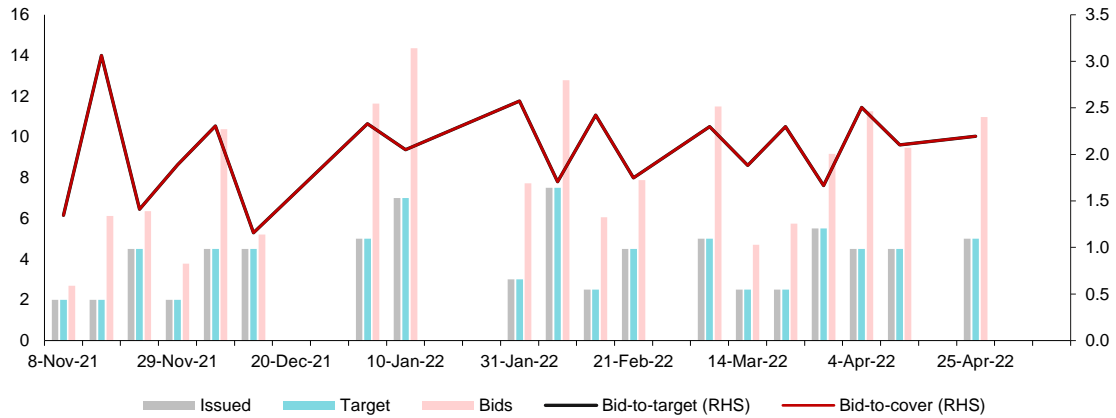
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippines, and Thailand, and only bonds for Vietnam.

Malaysia: Monthly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
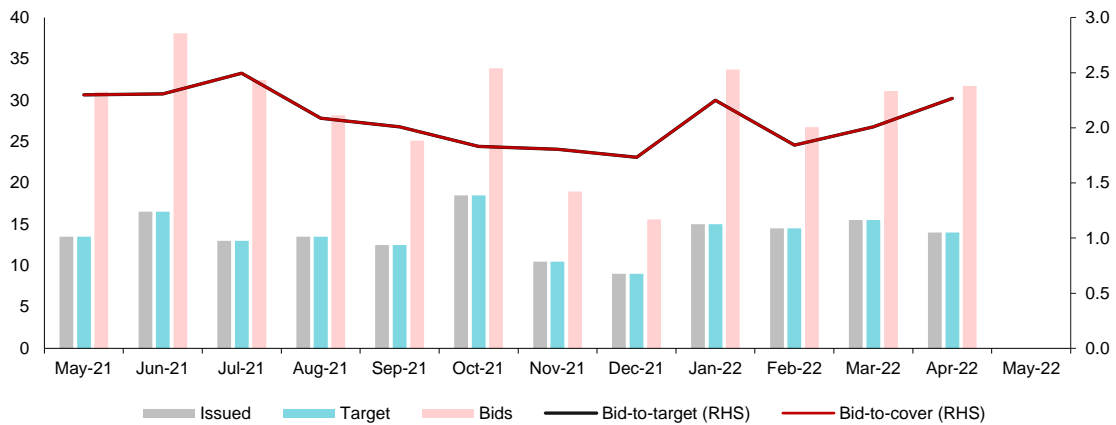
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippine, and Thailand, and only bonds for Vietnam.

Malaysia: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor

(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
3m	*From: 03-Apr-20 To: 12-Jul-21*			
6m	*From: 19-Apr-21 To: 11-Apr-22*			
9m	*From: 09-Feb-21 To: 25-Mar-22*			
12m	*From: 24-Sep-21 To: 10-Feb-22*			
3y	*From: 23-Jun-21 To: 31-Mar-22*			
5y	*From: 23-Jul-21 To: 08-Feb-22*			
7y	*From: 18-Aug-21 To: 29-Apr-22*			
10y	*From: 30-Jul-21 To: 07-Apr-22*			
15y	*From: 20-May-21 To: 07-Mar-22*			
20y	*From: 30-Jun-21 To: 14-Apr-22*			
30y	*From: 08-Mar-21 To: 15-Feb-22*			

Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Malaysia: Summary of Bids and Issuances of Sovereign Bonds by Tenor
(Billions of LCY)
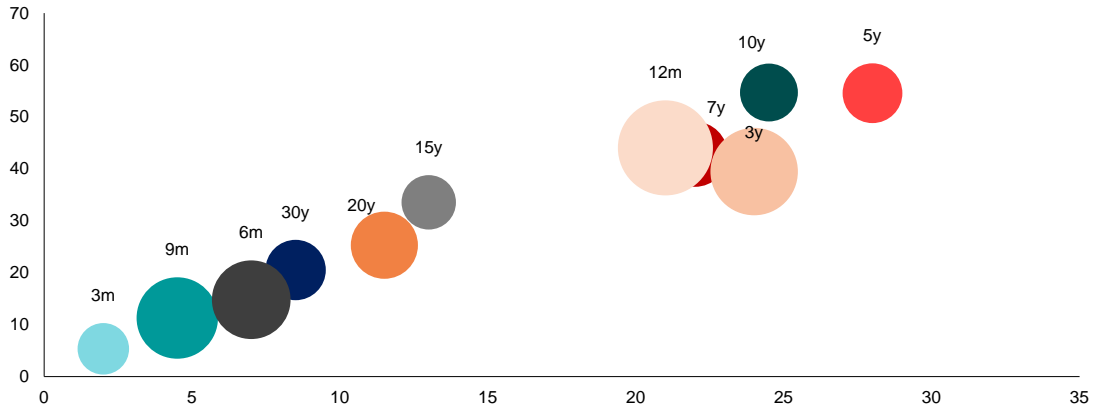
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is a weighted average (by issuance amount) of all auctions for a particular tenor.

Malaysia: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022

■ 3m ■ 6m ■ 9m ■ 12m ■ 3y ■ 5y ■ 7y ■ 10y ■ 15y ■ 20y ■ 30y

Sources: National authorities; and authors' calculations.

Malaysia: Ownership Share of Outstanding Sovereign Bonds
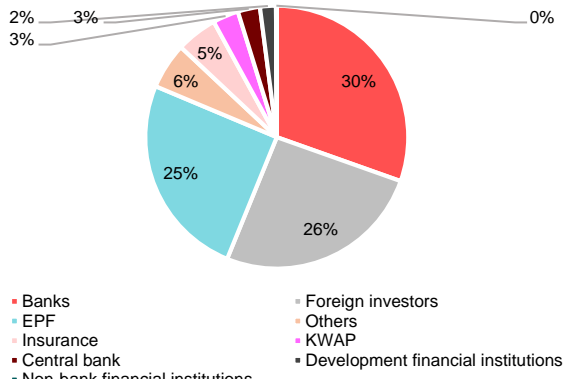
■ Banks   ■ Foreign investors
■ EPF   ■ Others
■ Insurance   ■ KWAP
■ Central bank   ■ Development financial institutions
■ Non-bank financial institutions

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The ownership pattern shows the local currency government bond holdings by investor type for Malaysia and Thailand, and all local currency tradable government securities for Indonesia. The estimates for Korea and the Philippines are based on published balance sheet statistics for selected major investors. There is no information available for Vietnam.

Malaysia: Distribution of Outstanding Sovereign Bonds by Currency
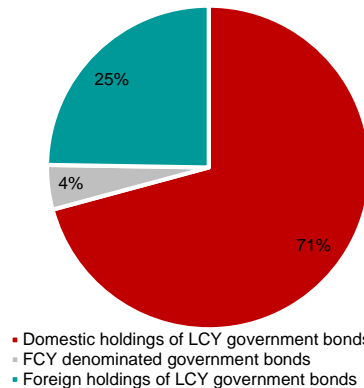
■ Domestic holdings of LCY government bonds
■ FCY denominated government bonds
■ Foreign holdings of LCY government bonds

Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.
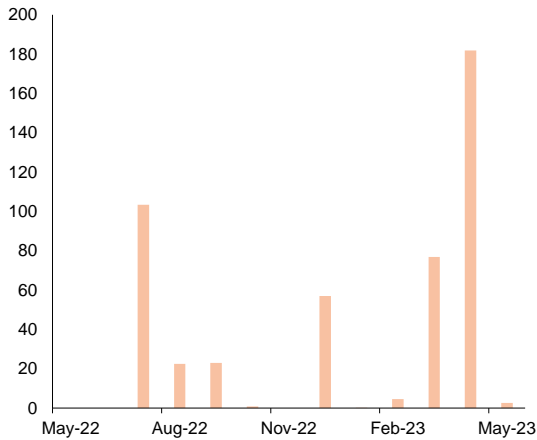
Appendix Figure 4. Philippines

Philippines: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)
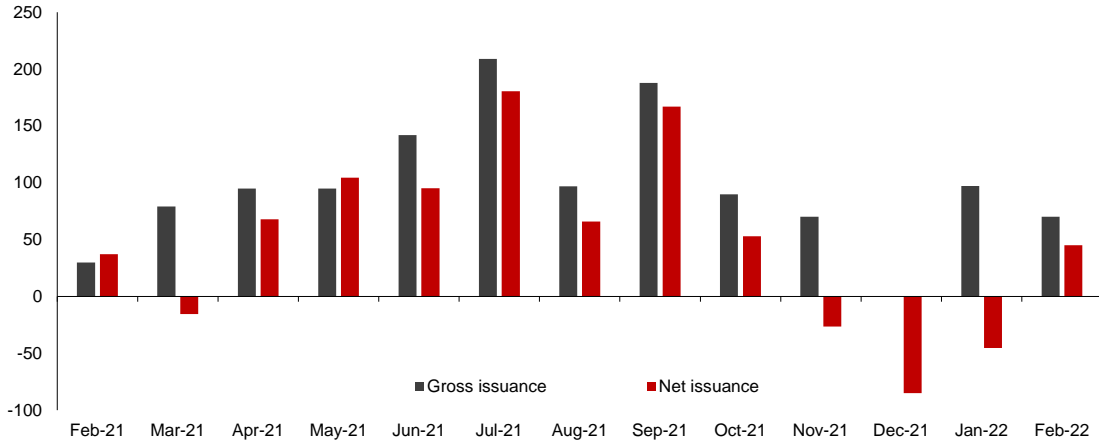
Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.
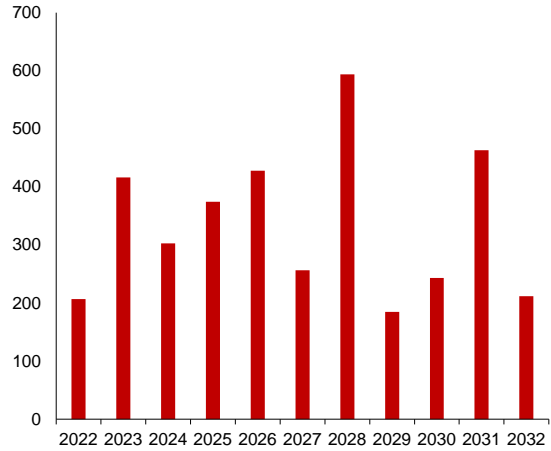
Philippines: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)

Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Philippines: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)

Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Philippines: Weekly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
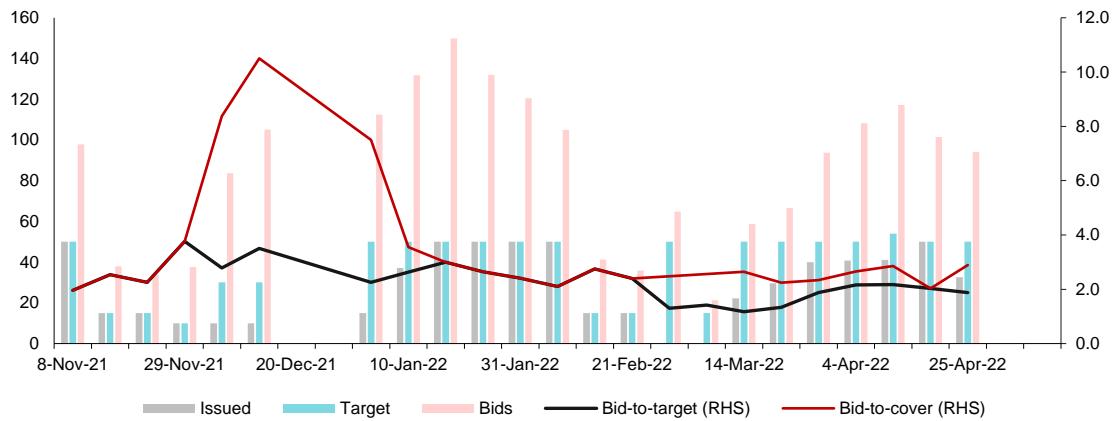
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippines, and Thailand, and only bonds for Vietnam.

Philippines: Monthly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
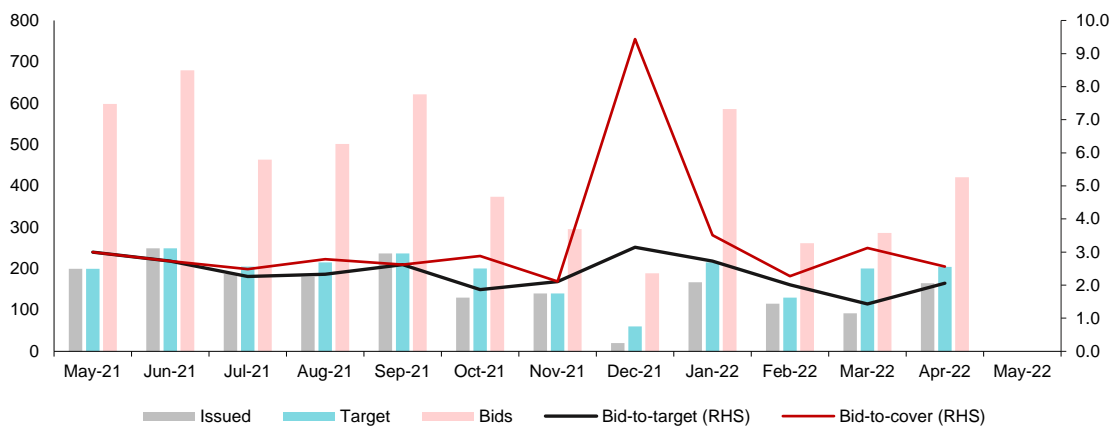
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippine, and Thailand, and only bonds for Vietnam.

Philippines: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor
(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
3m	*From: 28-Mar-22* *To: 25-Apr-22*			
6m	*From: 28-Mar-22* *To: 25-Apr-22*			
12m	*From: 28-Mar-22* *To: 25-Apr-22*			
3y	*From: 06-Oct-20* *To: 05-Apr-22*			
5y	*From: 03-Nov-21* *To: 12-Apr-22*			
7y	*From: 14-Dec-21* *To: 19-Apr-22*			
10y	*From: 07-Dec-21* *To: 26-Apr-22*			
20y	*From: 01-Jun-21* *To: 17-Aug-21*			

Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Philippines: Summary of Bids and Issuances of Sovereign Bonds by Tenor
(Billions of LCY)
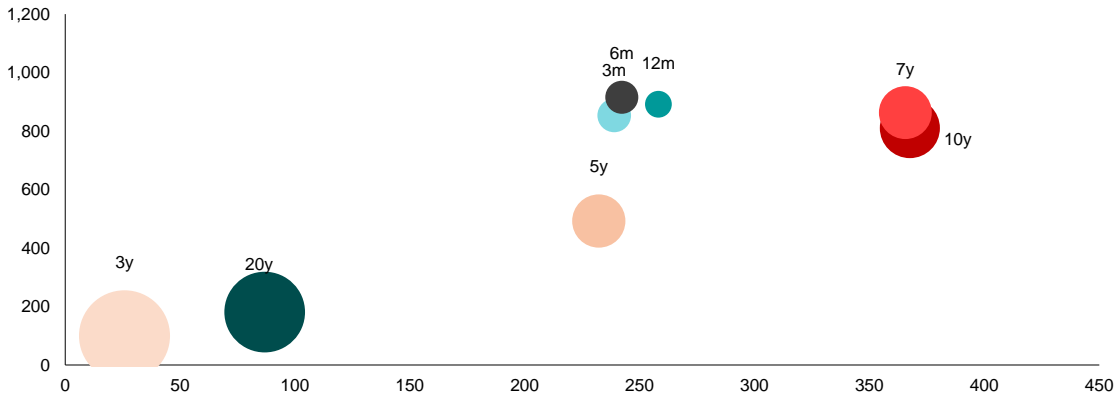
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is a weighted average (by issuance amount) of all auctions for a particular tenor.

Philippines: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022

● 3m ■ 6m ■ 12m ● 3y ● 5y ■ 7y ■ 10y ■ 20y

Sources: National authorities; and authors' calculations.

Philippines: Ownership Share of Outstanding Sovereign Bonds
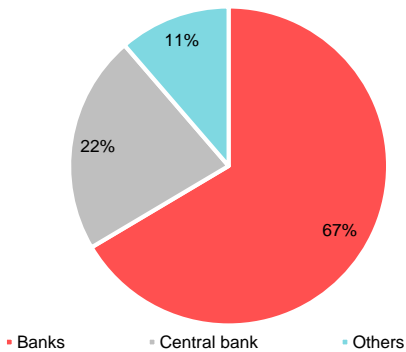
■ Banks ■ Central bank ■ Others

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The ownership pattern shows the local currency government bond holdings by investor type for Malaysia and Thailand, and all local currency tradable government securities for Indonesia. The estimates for Korea and the Philippines are based on published balance sheet statistics for selected major investors. There is no information available for Vietnam.

Philippines: Distribution of Outstanding Sovereign Bonds by Currency
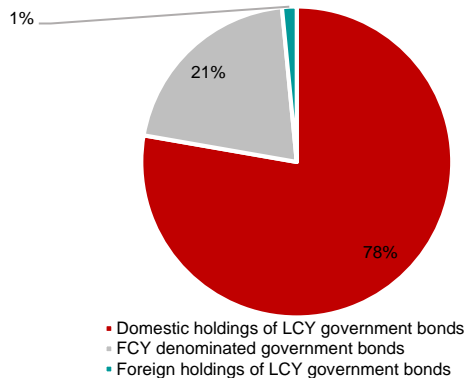
■ Domestic holdings of LCY government bonds
■ FCY denominated government bonds
■ Foreign holdings of LCY government bonds

Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.

Appendix Figure 5. Thailand

Thailand: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)
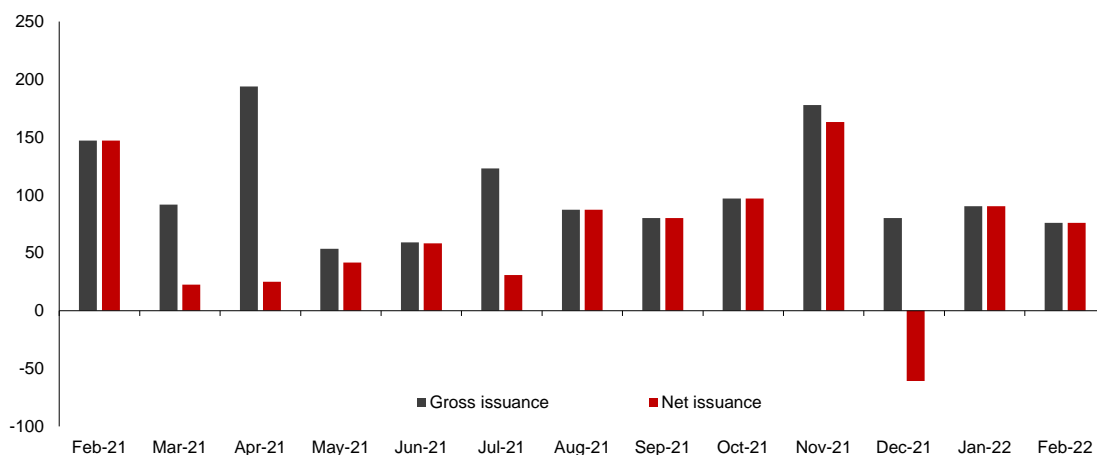
Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.
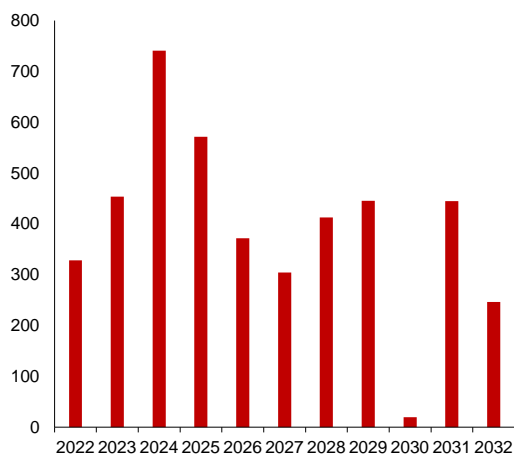
Thailand: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)
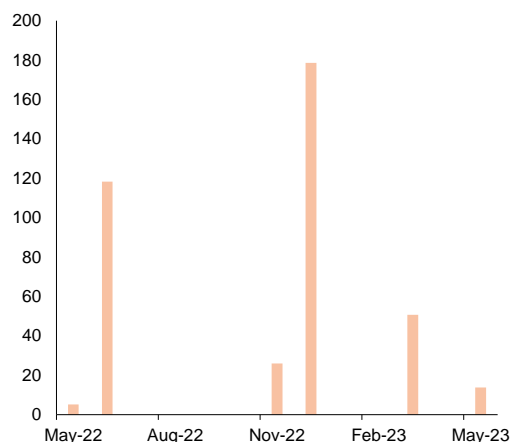
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Thailand: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)

Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Thailand: Weekly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
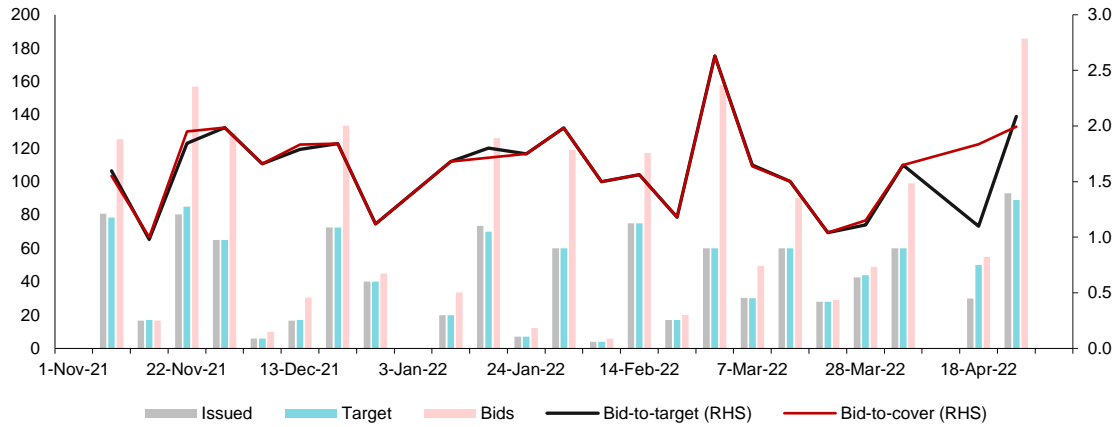
Thailand: Monthly Statistics of Recent Auctions of Sovereign Bonds
### (Ratio; billions of LCY)
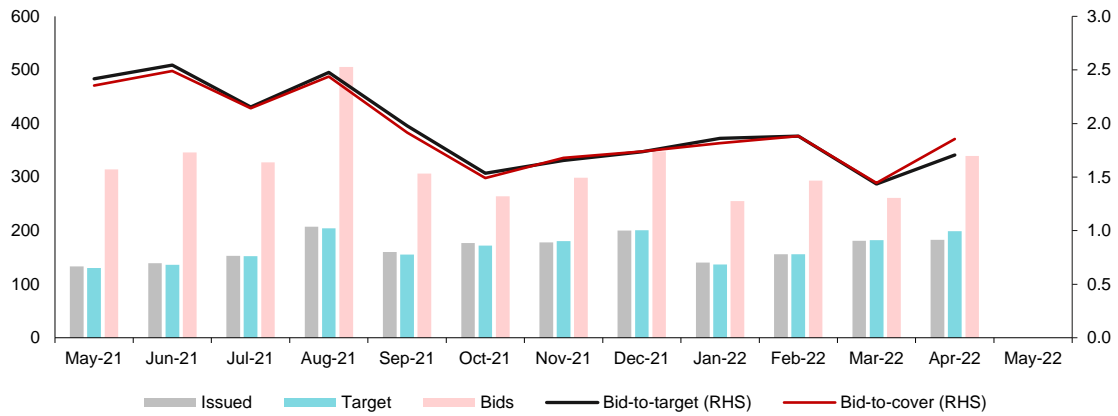
Thailand: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor
(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
6m	*From: 28-Feb-22 To: 25-Apr-22*			
12m	*From: 27-Apr-20 To: 25-Apr-22*			
3y	*From: 12-Oct-21 To: 20-Apr-22*			
5y	*From: 10-Nov-21 To: 27-Apr-22*			
10y	*From: 27-Oct-21 To: 05-Apr-22*			
15y	*From: 15-Sep-21 To: 16-Mar-22*			
20y	*From: 04-Aug-21 To: 20-Apr-22*			
30y	*From: 15-Sep-21 To: 30-Mar-22*			
50y	*From: 18-Aug-21 To: 27-Apr-22*			

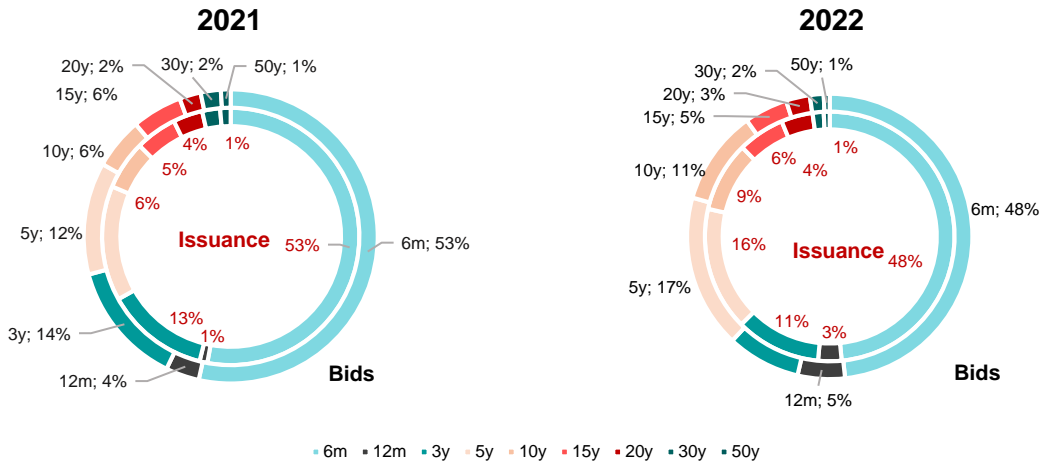Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Thailand: Summary of Bids and Issuances of Sovereign Bonds by Tenor
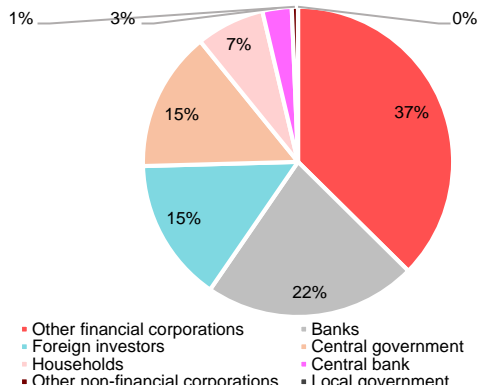### (Billions of LCY)
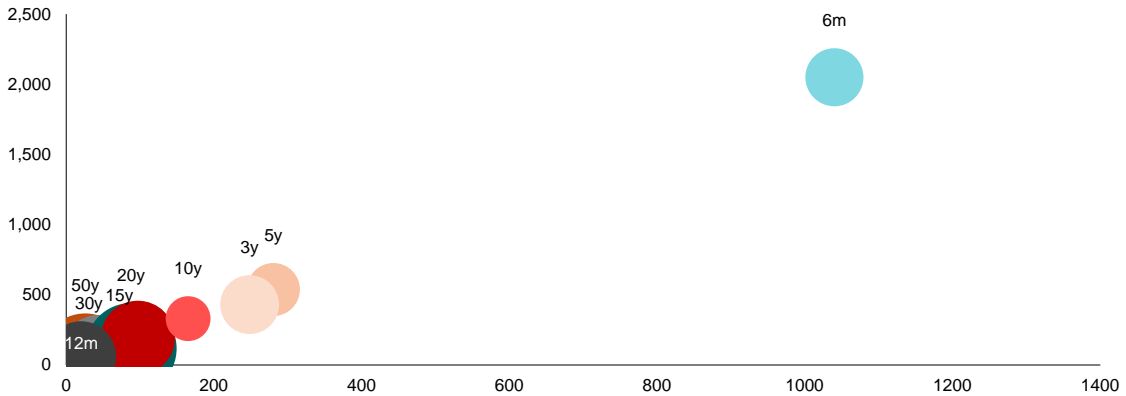
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is a weighted average (by issuance amount) of all auctions for a particular tenor.

## Thailand: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022

Legend: 6m • 12m • 3y • 5y • 10y • 15y • 20y • 30y • 50y

Sources: National authorities; and authors' calculations.

Thailand: Ownership Share of Outstanding Sovereign Bonds

- Other financial corporations
- Banks
- Foreign investors
- Central government
- Households
- Central bank
- Other non-financial corporations
- Local government

Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The ownership pattern shows the local currency government bond holdings by investor type for Malaysia and Thailand, and all local currency tradable government securities for Indonesia. The estimates for Korea and the Philippines are based on published balance sheet statistics for selected major investors. There is no information available for Vietnam.

Thailand: Distribution of Outstanding Sovereign Bonds by Currency
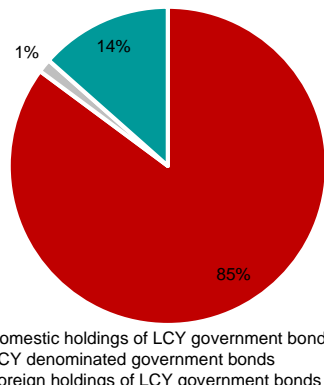
- Domestic holdings of LCY government bonds
- FCY denominated government bonds
- Foreign holdings of LCY government bonds

Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.

Appendix Figure 6. Vietnam

Vietnam: Gross and Net Monthly Issuances of Sovereign Bonds
(Billions of LCY)
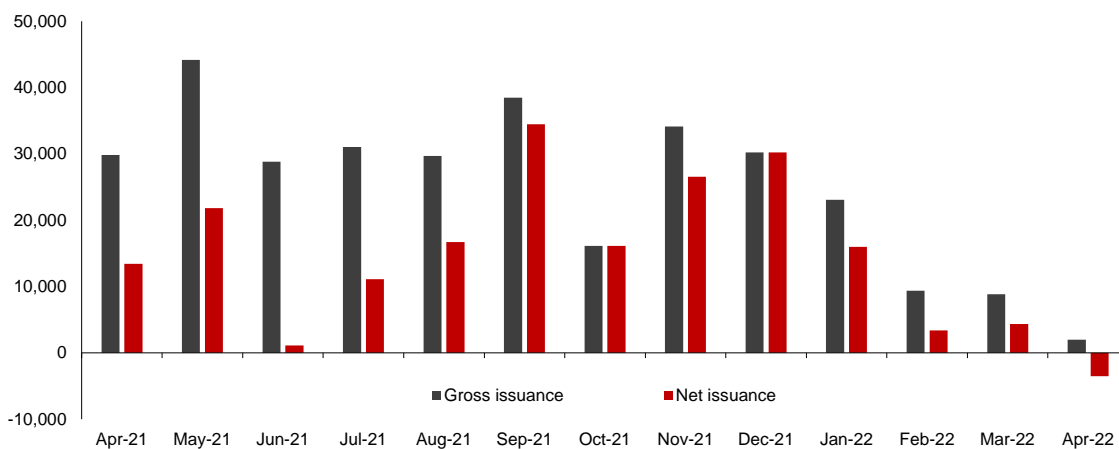
Sources: Haver Analytics; national authorities; and authors' calculations.
Note: The gross and net issuances (through competitive auctions and otherwise) are calculated for local currency government bonds for Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Vietnam: Monthly Redemption Profile of Sovereign Bonds
(Billions of LCY)
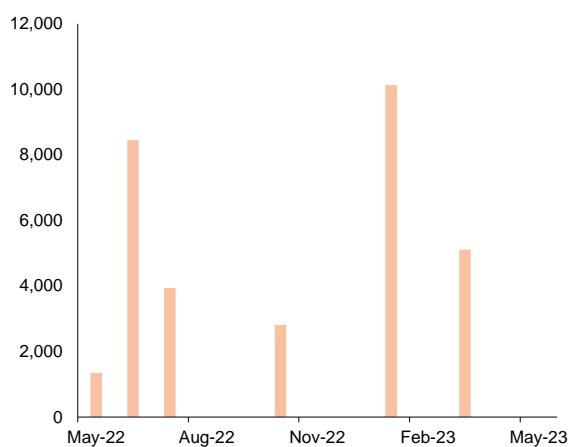
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Vietnam: Yearly Redemption Profile of Sovereign Bonds
(Billions of LCY)
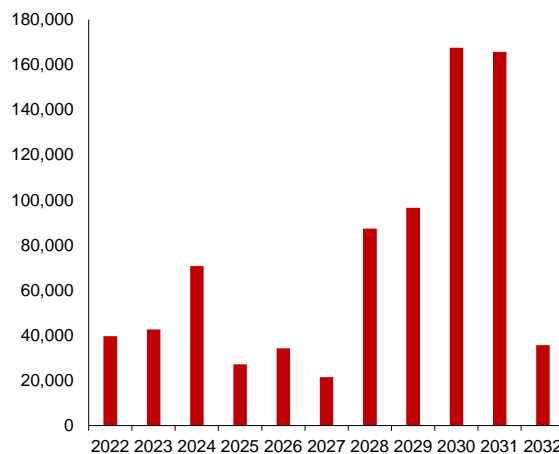
Sources: Cbonds; national authorities; and authors' calculations.
Note: The redemption profile shows the maturity breakdown for the local currency government bonds of Korea, Malaysia, the Philippines (excluding retail bonds), Thailand, and Vietnam. The data for Indonesia include all local currency tradable government securities.

Vietnam: Weekly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
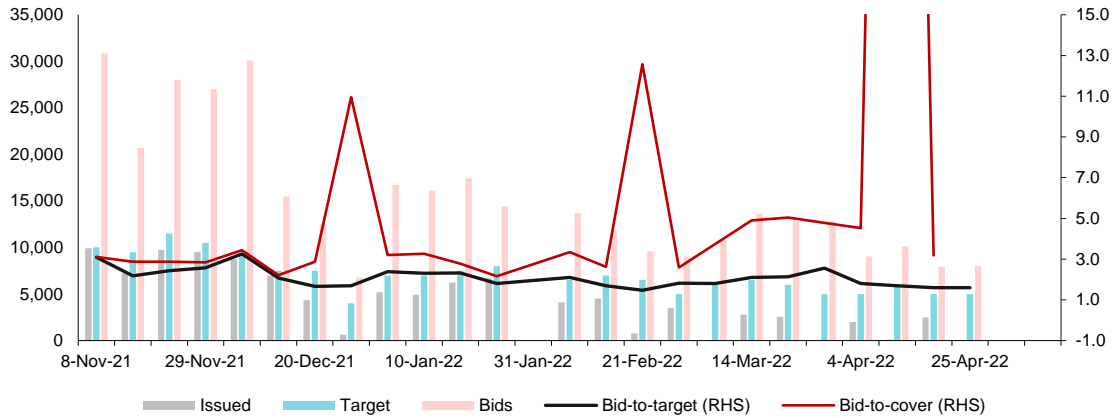
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippines, and Thailand, and only bonds for Vietnam.

Vietnam: Monthly Statistics of Recent Auctions of Sovereign Bonds
(Ratio; billions of LCY)
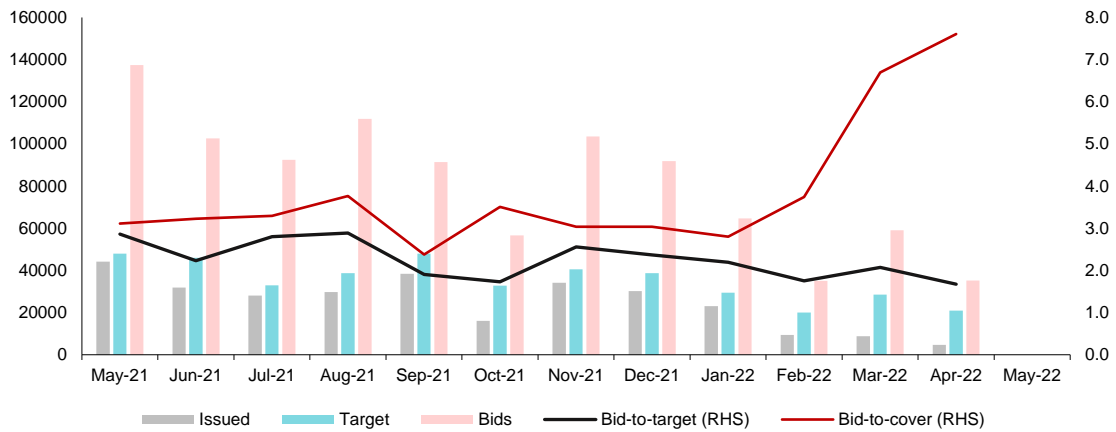
Sources: National authorities; and authors' calculations.
Note: The auction statistics include those of bonds and bills for Korea, Indonesia, Malaysia, the Philippine, and Thailand, and only bonds for Vietnam.

Vietnam: Issuance, Bid-to-Cover Ratio and Yield Trends of Sovereign Bonds by Tenor

(Billions of LCY; ratio; percent)

Tenor	Issuance		Bid-to-Cover	Weighted Average and Highest Yields
5y	*From: 29-Dec-21* *To: 27-Apr-22*			
7y	*From: 12-Jan-22* *To: 13-Apr-22*			
10y	*From: 30-Mar-22* *To: 27-Apr-22*			
15y	*From: 30-Mar-22* *To: 27-Apr-22*			
20y	*From: 23-Feb-22* *To: 20-Apr-22*			
30y	*From: 16-Mar-22* *To: 27-Apr-22*			

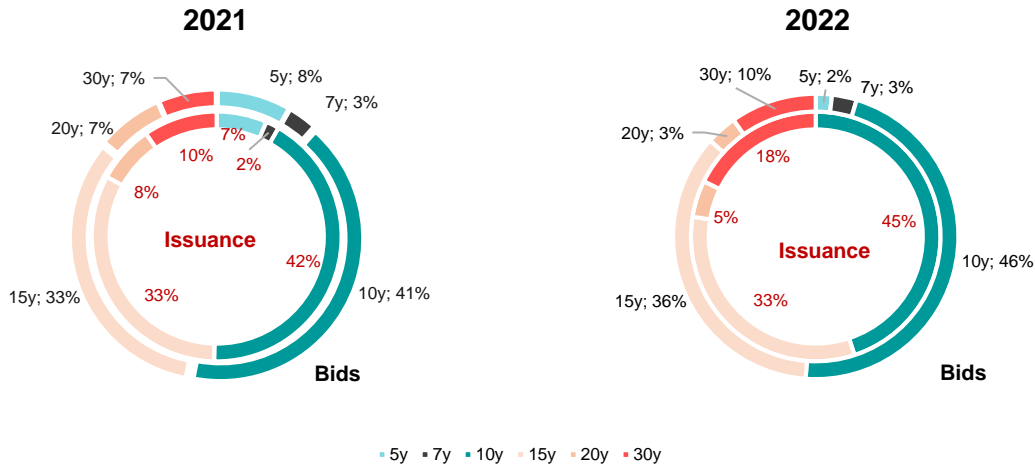Sources: National authorities; and authors' calculations.
Note: The trends show the past five auctions for each tenor, in chronological order from left to right. The weighted average yields for Indonesia sukuks, and Korea, and Vietnam bonds are back-calculated as the respective mid-points of the range of successful bids.

Vietnam: Summary of Bids and Issuances of Sovereign Bonds by Tenor
(Billions of LCY)
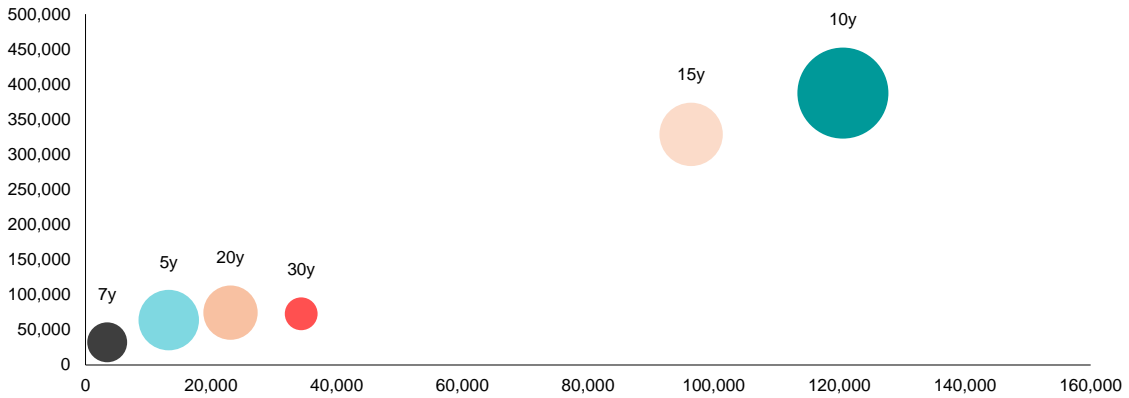
Sources: National authorities; and authors' calculations.
Note: The X-axis denotes the amount issued, Y-axis denotes the amount of bids received, and the size of the bubble represents the tail of the auction (the larger the bubble, the longer the tail). The tail is calculated as the half-the-range of successful bids in the auction for Indonesia sukuks, and Korea and Vietnam bonds; and as the difference between the highest successful yield and weighted average yield otherwise. The sample period is one year. The tail is an average, weighted by issuance amount, of all auctions for a particular tenor.

Vietnam: Demand and Supply Breakdown of Sovereign Bonds by Tenor

2021

2022

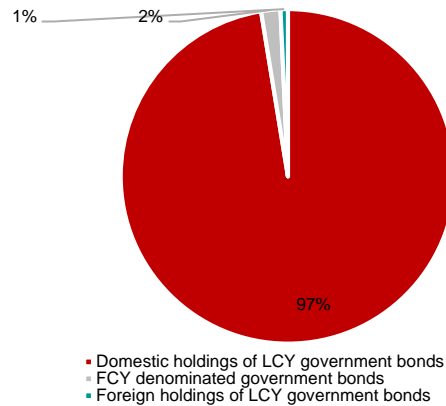■ 5y ■ 7y ■ 10y ■ 15y ■ 20y ■ 30y

Sources: National authorities; and authors' calculations.

Vietnam: Ownership Share of Outstanding Sovereign Bonds

Note: There is no corresponding information available for Vietnam

Vietnam: Distribution of Outstanding Sovereign Bonds by Currency

■ Domestic holdings of LCY government bonds
■ FCY denominated government bonds
■ Foreign holdings of LCY government bonds

Sources: Asia Bond Online; and authors' calculations.
Note: Local currency debt includes government bonds and bills for Indonesia, Malaysia, Thailand, government bonds for Korea, and Treasury instruments for Vietnam.