# Motivations for swap-covered foreign currency borrowing

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## 1. Introduction

Borrowing denominated in foreign currencies soared during the 2000s.[2] Gross issuance of foreign currency bonds tripled between 2002 and 2007 to $2.4 trillion, and even in 2008, during the international financial crisis, foreign currency borrowing remained relatively high (Figure 1). Issuance in some previously non-internationalised currencies, including a number of Asia-Pacific currencies, increased particularly fast (Figure 2). Indeed, for many currencies, issuance by non-residents outstripped the growth in issuance by residents, thereby expanding the presence of foreign issuers in the market (Figure 3).

A puzzling aspect of this large volume of foreign currency bonds is that many issuers immediately swap the funds raised into another currency, typically their own local currency. In other words, issuers raise foreign currency funding and simultaneously enter a currency swap to pay interest in local currency and receive interest in foreign currency, thereby replicating the cash flows associated with a local currency bond. What motivates borrowers seeking local currency financing to issue swap-covered foreign currency bonds rather than tap the local currency market directly?

The finance literature focuses on operational incentives as the main explanation for why borrowers tap foreign currency markets. Allayannis and Ofek (2001) examine a sample of S&P 500 non-financial firms and find evidence that firms issue foreign currency-denominated debt to hedge currency exposures arising from foreign operations or foreign currency income. Kedia and Mozumdar (2003) obtain similar results for foreign currency debt issued in 10 major currencies by large US firms. Geczy et al (1997) and Graham and Harvey (2001) find that firms with greater growth opportunities and tighter financing constraints are more likely to use currency derivatives, as well as those with foreign exchange exposure and economies of scale in hedging.

Rising trade and investment flows undoubtedly contributed to the increase in foreign currency bond issuance during the 2000s. However, issuance rose faster than can be explained by such flows alone. For example, foreign currency issuance rose from about 10% of world exports in the late 1990s to over 14% in 2006–07 (Figure 1). Moreover, non-financial corporations, which are the focus of most of the above-mentioned empirical studies, are minor participants in foreign currency bond markets. Non-financial corporations accounted for less than 10% of foreign currency bond issuance during the 2000s. Financial institutions are the largest borrowers in foreign currency bond markets, followed by governments, and

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[2] Bonds are categorised as "foreign currency bonds" when denominated in a currency different from that of the territory where the issuer principally resides and as "local currency bonds" when denominated in the same currency as that of the territory where the issuer principally resides. In this paper, no distinction is made between onshore and offshore issuance.

both are less likely than non-financial corporations to have an operational reason to borrow in foreign currency. Financial institutions and governments with no foreign operations or sales regularly seek to lower their financing costs by engaging in "opportunistic" swap-covered borrowing (McBrady and Schill (2007)).

Furthermore, in the few countries with comprehensive national data on derivative positions, a substantial proportion of foreign currency borrowing is evidently swapped into local currency. In Australia, close to 85% of external debt liabilities denominated in foreign currencies are hedged with financial derivatives into Australian dollars (Becker et al (2005)). In New Zealand, about 81% of foreign currency liabilities are hedged into New Zealand dollars (Statistics New Zealand (2008)).

The literature on swap-covered interest parity indicates that price differences across markets are actively arbitraged. In the most liquid markets, prices can adjust to new information without any trading taking place and so are unlikely to deviate significantly from their no-arbitrage levels. In less liquid markets, prices are slower to adjust and, therefore, temporary arbitrage opportunities may explain some swap-covered borrowing. However, if temporary, then opportunities for arbitrage should decline over time. The growing participation of non-residents in local currency markets, shown in Figure 3, and the large volume of swap-covered borrowing in some well developed markets indicate that the factors that give rise to swap-covered borrowing may be persistent.

Drawing on the literature on debt issuance, we consider a range of market imperfections and frictions that may result in persistent gains from raising local currency financing indirectly, on a swap-covered basis, rather than directly. Transactions costs, market size, market incompleteness, information asymmetries and regulatory frictions all potentially contribute to the attractiveness of swap-covered borrowing. We take these propositions to a large database on debt issuance, examining the characteristics of bonds issued by residents in foreign currency and by non-residents in local currency, natural swap counterparties with potentially comparative cost advantages. We find that the relative characteristics of resident and non-resident counterparties' issuance, in terms of credit quality, maturity and coupon structure, are consistent with the implications of many of the motivations considered. The counterparties' characteristics are significantly different in several respects, consistent with some of the hypotheses put forward.

While this paper has a finance focus, it is also relevant to the macroeconomic literature on financial crises. Many past crises were exacerbated by currency and maturity mismatches on firms' or banks' balance sheets. Countries' vulnerability to such mismatches is sometimes attributed to residents' inability to borrow abroad in their own currency ("international original sin", which leads to currency mismatch) or to borrow long-term in the domestic market ("domestic original sin", which leads to maturity mismatch).[3] Credible macroeconomic policies that protect the value of debts denominated in local currency, such as a commitment to low inflation, fiscal prudence and a transparent exchange rate policy, are necessary if non-residents are to buy local currency debt. But sound macroeconomic policy does not appear to be sufficient in some emerging markets. This paper looks in more detail at the microeconomic level. Swap-covered borrowing may offer a way to overcome currency or maturity mismatches, through the use of foreign debt markets. However, it is not a panacea. Against any benefits must be weighed the risks and regulatory demands associated with a more complex form of financing, as well as the consequences for the development of local capital markets. Moreover, if there are benefits to be exploited from swap-covered borrowing, they can only be realised if regulations, particularly exchange controls, allow. Residents must

[3] The term "original sin" was first used by Eichengreen and Hausmann (1999).

be able to borrow in foreign currency and non-residents in local currency, and both must be permitted to engage in currency swaps.

The rest of the paper proceeds as follows. Section 2 provides an overview of the size and structure of cross-currency swap markets. Section 3 explores potential motivations for swap-covered foreign currency borrowing, and Section 4 takes the implications of these motivations to the data on foreign currency bond issuance. Section 5 discusses the risks of swap-covered borrowing. The final section concludes with policy lessons and areas for future research.

## 2. Currency swap markets and international bond markets

Swap-covered foreign currency borrowing presumes the existence of a currency swap market. Currency swaps are over-the-counter derivatives. They can be characterised as an exchange of a loan in one currency for a loan in another currency. The principal amount is usually exchanged at both the initiation and termination of the swap, and interest payments are exchanged during its life. Interest can be paid at either a fixed or a floating rate. While plain vanilla currency swaps take the form of fixed-for-floating rates, there are a bewildering variety of ways in which currency swaps can be structured. Currency swaps can be negotiated for any maturity, but they are typically used for medium- and long-term transactions, out to several decades for some currencies.[4]

Currency swaps were introduced in the 1970s, and their use has expanded enormously since then. According to the BIS Triennial Central Bank Survey, the average daily turnover of currency swaps rose from $3.8 billion in April 1995 to $31.5 billion in April 2007 (Table 1). The nominal value of outstanding swaps rose from $2.0 trillion to $14.1 trillion over the same period.

An important innovation in currency swap markets was the shift in the 1990s towards the trading of currency basis swaps, in which floating rate payments in one currency are exchanged for floating rate payments in a different currency. A currency swap can thus be decomposed into a combination of a cross-currency basis swap and single-currency interest rate swaps. Currency basis swaps are typically quoted against US dollar Libor. A basis swap spread of *x* basis points indicates that a counterparty wanting to swap US dollars for a foreign currency loan must pay *x* basis points above the benchmark floating rate on foreign currency funds in return for US dollar Libor. As shown in Figure 4, currency basis swap spreads for many currencies were positive over the 2005–07 period and then turned negative in 2008.[5]

In the 2000s, the trading of currency swaps increased noticeably for many currencies. Whereas in April 2004 there were only seven currencies in which turnover exceeded $400 million a day, in April 2007 there were 15 currencies with turnover above $400 million, including KRW, ZAR and HKD.

The development of currency swap markets is closely related to the participation of non-residents in local currency markets and, equally as important, the participation of residents in

[4] For short-term transactions, up to one year, foreign exchange (FX) swaps are more widely used. Unlike currency swaps, FX swaps do not involve an exchange of payment streams; only the principal amount is exchanged.

[5] The downward move in spreads in 2008 likely reflected a combination of supply pressures and changes in the risk characteristics of the underlying money market instruments. See Baba and Packer (2008) for a discussion.

foreign currency markets. By definition, the currency exposures and preferences of non-residents differ from those of residents. Residents of one territory do not generally have a need for funding in the currency of another territory. Therefore, there is a natural symbiosis between resident and non-resident market participants. In currency swap markets as in other segments of foreign exchange markets, controls that restrict transactions between residents and non-residents tend to depress trading activity (Tsuyuguchi and Wooldridge (2008)).

While investors can participate in currency swap markets, the participation of issuers appears to be especially important for the development of these markets. Issuance by non-residents of bonds denominated in a given currency has significant explanatory power for the turnover of currency swaps in that currency (Figure 5a). In other words, countries with large non-resident participation in their bond markets relative to GDP tend to have large currency swap markets. New Zealand and Switzerland are at one extreme and many emerging market currencies are at the other. The relationship between issuance by residents of bonds in foreign currencies and local currency swap activity is weaker but still positive (Figure 5b).

It is unclear whether foreign currency issuance is a pre-condition for the development of a currency swap market. For example, Korea has a large currency swap market even though few non-residents borrow in KRW. What is clear is that activity in one market supports activity in the other. This self-reinforcing relationship is consistent with the contention, put forth by McBrady and Schill (2007) among others, that internationally active bond issuers are the arbitrageurs who effectively link global bond markets.

## 3. Motivations for swap-covered foreign currency borrowing

There are two commonly cited explanations for the use of swaps: risk management and comparative advantage (Kolb (2000)). Risk management is undeniably an important motivation for the general use of currency swaps. When either the operations or desired financial structure of a firm change, currency swaps are a cost-effective way to transform risk exposures and alter future cash flows. However, changes in operations and financial structures cannot explain swap-covered borrowing; by definition, such borrowing is intended to replicate risks, not transform them. Bond issuers raising funds in one currency with the express intention of swapping the funds for another currency are choosing to replicate cash flows that could also be achieved by borrowing directly in the desired currency.

Comparative advantage is a more convincing motivation for swap-covered foreign currency borrowing. Indeed, central banks in countries with large volumes of swap-covered borrowing frequently cite comparative advantage as the key motivation for such borrowing (see eg Eckhold (1998), Drage et al (2005), Ólafsson (2005), Ryan (2007)). In financial markets, comparative advantage exists when the same risk is priced differently in different markets. If borrowing costs differ across markets, then issuers can reduce their overall financing costs by raising funds in the market in which each has a comparative cost advantage and swapping the proceeds.

### Covered interest parity

The existence of comparative advantage creates opportunities for arbitrage. As arbitrage takes place, costs should converge consistent with covered interest rate parity. Empirical support for long-term swap-covered interest parity is weak relative to short-term covered interest parity using forward contracts.[6] Most studies find that deviations from long-term

[6] On short-term interest parity, see Taylor (1987) and Peel and Taylor (2002).

interest parity are small on average but can be large and persistent. Popper (1993) estimates mean absolute deviations of 15 to 50 basis points among major currencies for the period 1985–88. Fletcher and Taylor (1996) adjust for transactions costs and estimate deviations of 12 to 33 basis points for the period 1985–89.

The persistence of deviations from covered interest parity does not necessarily prove the availability of arbitrage opportunities. Measured deviations may reflect underlying risks. In other words, estimated differences in borrowing costs across markets may compensate for risks and so, on a risk-adjusted basis, may not indicate a comparative cost advantage. Turnbull (1987) suggests that spread differences for seemingly identical risks reflect compensation for credit risk taken on by the higher-quality counterparty in a swap agreement. Counterparty credit risk can be important for currency swaps because they involve an exchange of both principal and interest payments, in contrast to interest rate swaps, where only interest payments are exchanged (Duffie and Huang (1996)). Similarly, currency basis swap spreads incorporate differences between the credit risk embedded in the money market rates of one currency and that in the other currency (Tuckman and Porfirio (2003)). For example, if the non-dollar leg of a currency basis swap is based on a collateralised rate, such as a rate for bankers' acceptances, and the US dollar leg is based on Libor, an unsecured bank lending rate, then the swap spread is fairly priced only when positive.

Nevertheless, several studies find that issuers systematically respond to estimated deviations from interest parity. Cohen (2005) finds that the choice of currency in international bond issuance is influenced by currency strength and interest rate differentials, suggesting a role for expected, uncovered interest returns. McBrady and Schill (2007) examine "opportunistic" foreign currency issuance by firms with no foreign currency revenues over the period 1993–97. They find that uncovered interest "bargains" of 10 to 20 basis points are common and persistent and that the choice of issuing currency is influenced by differences between local and foreign funding costs.

Even if there is no observed deviation from covered interest parity, if market imperfections and frictions give rise to asymmetries between markets that can be arbitraged through swap-covered borrowing large volumes of swap-covered foreign currency borrowing may persist in order to maintain swap-covered interest parity. Imperfections vary significantly among markets. In general, large financial markets, particularly US dollar and euro markets, more closely meet the ideal of a complete market than small markets, such as Philippine peso or Indian rupee markets.[7] Differences among markets potentially give issuers more favourable access to one market than to another, thereby raising the possibility that issuers can gain by exploiting their comparative advantage and engaging in swap-covered borrowing.

The remainder of this section focuses on four types of market imperfections that potentially give rise to cross-border arbitrage opportunities: transactions costs, non-traded assets, agency and information problems, and regulations. The importance of each of these as a motivation for swap-covered foreign currency borrowing is likely to differ across markets and change over time. In liquid, complete markets, prices can adjust to new information without any trading taking place and so arbitrage is unlikely to explain why issuers engage in swap-covered borrowing. In less liquid markets, prices are slower to adjust and thus arbitrage opportunities may exist, but probably only temporarily. In illiquid, incomplete markets, arbitrage opportunities may be substantial and persistent.

[7] There are exceptions. For example, yen financial markets are the third largest in the world, but sterling markets are widely perceived to be more developed. For a ranking of financial sector development, see eg World Economic Forum (2008).

**Transactions costs**

At the most simple level, the existence of transactions costs would tend to favour borrowing directly rather than through a more complex route involving multiple transactions. Transactions costs, however, differ substantially among markets. In financial markets, some types of transactions costs are a decreasing, non-linear function of volumes. For example, the maintenance of trading systems involves fixed costs and, therefore, total trading costs decline as volumes increase. In addition, the heterogeneity of market participants is often greater in large markets, thereby reducing search costs. The self-reinforcing nature of market liquidity strengthens the link between transactions costs and volumes: the willingness of a market participant to transact in a given market depends on the willingness of other participants to do likewise (CGFS (1999a)). As a result, transactions costs can differ significantly for nearly identical instruments.[8]

In a small market, the volume of transactions in any given instrument will naturally be smaller than in a large market, and transactions costs will be correspondingly higher. If the relationship between volumes and transactions costs is convex, then the cost difference of issuing a large bond in a small market compared to a large market may be less than the difference to issuing a small bond. Owing to differences in *relative* transactions costs, issuers from small markets, especially issuers of small bonds, may be able to lower their borrowing costs by tapping more liquid markets.

In addition to varying with volumes, transactions costs often vary with the riskiness of the traded instrument. Chakravarty and Sarkar (1999) find that both trading volumes and risk are equally important determinants of bid-ask spreads in US fixed income markets: spreads decline with trading volume and increase with the bond yield and residual maturity. Consequently, relative transactions costs for risky bonds, including low-grade bonds and long-duration bonds, may be lower in large markets.

Transactions costs can be broadly defined to include enforcement and bankruptcy costs. Enforcement procedures are simpler in certain jurisdictions. In the international bond market, contracts are predominantly governed by English law, regardless of the residency of the issuer or the currency in which the bond is denominated. The probability of a creditor needing to take enforcement action varies according to the credit quality of the borrower and, therefore, low-grade borrowers from markets where enforcement costs are high may be able to lower their financing costs by committing to contracts settled in more creditor-friendly jurisdictions, and swapping the proceeds with a non-resident borrower that can signal high credit quality and issues debt in the market with weak enforcement. While this is primarily a motivation for offshore borrowing (the borrower from the weak-enforcement market could issue in the desired currency in the euromarket), if offshore use of a currency is restricted then differences in the legal and information environments can also motivate an exchange of borrowings between low-grade and high-grade borrowers.

Transactions costs may also help to explain why issuers, rather than investors, appear to be the main arbitrageurs in international bond markets. Investors typically trade in smaller volumes than issuers: one bond issue is typically bought by many investors. If investors are willing to assume credit risk but not currency risk, then it is likely to be cheaper for the issuer to bundle a currency swap together with a foreign currency bond than for multiple investors to buy a foreign currency bond and swap out the currency risk.

[8] For example, in government securities markets, bid-ask spreads are usually much narrower for recently issued ("on-the-run") bonds than for off-the-run issues (see eg CGFS (1999a), Fleming (2002)).

**Non-traded assets**

The literature on non-traded assets[9] identified a variety of reasons why markets may be segmented and incomplete and, in turn, diversification in international financial markets may be difficult.[10] The range of assets traded differs substantially among markets. The absence of a particular type of asset may arise from either a lack of supply or a lack of demand. The structure of an investor's liabilities may create demand for particular types of assets; conversely, the structure of a borrower's assets may create demand for a particular form of funding. This can make it difficult for investors to optimise their portfolios to meet their investment objectives, and make it difficult for borrowers to raise funding without one or the other taking on additional risk. Consequently, investors may end up shunning certain risks altogether. Generally, smaller markets tend to have more non-traded assets than larger markets. The juxtaposition of assets that are traded in one market but not in another can create opportunities for arbitrage.

An important asset missing in some markets is bonds with minimal default risk, ie bonds with the highest, AAA credit ratings. National governments are typically the most creditworthy borrowers in their own currency. In countries where the government is not very creditworthy (for example, because it has a history of poor macroeconomic management), there are unlikely to be other resident issuers with (international) AAA credit ratings. There is usually a "sovereign ceiling", which caps the perceived creditworthiness of borrowers in a country. Even in countries where the government is very creditworthy, there may be a scarcity of highly rated debt because fiscal prudence restricts the supply of government debt. Swap-covered borrowing involving a highly rated non-resident issuer allows issuers to fill the void, benefiting from the tighter credit spread on top-rated bonds relative to lower-rated bonds.

Another important asset missing in some markets is long-term, fixed rate bonds, ie bonds with maturities beyond five years paying a fixed (as opposed to a floating) coupon. In countries with a history of poor macroeconomic management, a high degree of economic uncertainty can cause investors to avoid such investments. Even in countries with a stable policy environment, investors may be constrained (by regulation or by liability structure) from buying long-term, fixed rate bonds, or may prefer not to because of risk preferences. As a result, the cost of issuing a long-term, fixed rate bond can vary significantly among markets.

Other important assets missing in some markets are foreign exchange, interest rate and credit derivatives. Derivatives facilitate the unbundling of risks.[11] Local currency bonds are typically exposed to exchange rate, interest rate and credit risks, which investors may be willing to bear individually but not in combination, particularly if these risks are correlated (for example, domestic credit risk may be correlated with currency risk).[12] If instruments are

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[9] See Cuthbertson (1957) for a discussion of heterogeneous clienteles as an explanation for the term structure of interest rates; and Modigliani and Sutch (1966) on preferred habitat (bond investors prefer one maturity over another, for example to match their liabilities, and are only willing to buy bonds outside their maturity preference if a risk premium is paid). Svensson and Werner (1993) examine portfolio choice and asset pricing when some assets are non-traded, for example when a country cannot trade claims to its output on world capital markets. Vayanos and Vila (2007) present a model in which arbitrageurs integrate markets.

[10] See French and Poterba (1991); Baxter and Jermann (1997) on the extent of the lack of diversification; and Obstfeld and Rogoff (2000) in the context of a broader discussion.

[11] Burger and Warnock (2007) find that high variance and negative skewness deter US investors from investing in foreign bond markets. To the extent that these risks can be hedged or unbundled (eg they are credit or market risk), there may be gains to swap-covered borrowing; to the extent that they are the result of poor macroeconomic management, swap-covered borrowing may not overcome them.

[12] For example, if, in times of stress, the credit quality spread rises (the price of the bond falls) at the same time as the minor currency depreciates (flight to quality to the US dollar), then a highly rated non-resident will be in a position to unbundle those risks relative to a lower-rated domestic bond.

available in one market to unbundle risks but not in another, then this can create opportunities for arbitrage. Investors seeking exposure to credit risk may be willing to buy bonds issued by low-grade foreign borrowers, which potentially reduce the idiosyncratic risk in their portfolios, but in the absence of a liquid currency swap market only in a given currency. For investors seeking exposure to exchange rate or interest rate risk, local currency bonds issued by high-grade non-residents may be in greater demand than bonds issued by lower-grade residents in the absence of a liquid credit derivatives market. Herrera-Pol (2004) suggests that strong demand for the World Bank's issues of international bonds in minor currencies is explained in part by investors' preference to take on minor currency risk separate from credit risk. If issuers can unbundle risks for investors, then they may achieve lower borrowing costs. Common themes in discussions with market participants are segmentation of markets for currency risk and credit risk, and difficulty among domestic issuers in placing domestic currency debt directly.

### Agency and information problems

Agency and information problems are omnipresent in financial markets but are more acute in some markets than others. In particular, the effectiveness of mechanisms to mitigate agency and information problems varies considerably. Some countries have weak disclosure requirements, poor accounting practices, opaque corporate governance rules, and concentrated ownership structures. Such information asymmetries contribute to home bias, whereby investors hold a larger share of local assets in their portfolios than would be optimal in a well diversified portfolio. Stulz (1981) constructs a simple model of international asset pricing in which there is a cost associated with holding risky foreign assets and shows that investors will not hold some foreign assets, even if the return is increased slightly.[13] Furthermore, local investors tend to be better informed than foreign (distant) investors. For example, for a sample of 32 countries, Bae et al (2008) find that local analysts' earnings forecasts are more precise than those of analysts based in countries far from the company being analysed.

Moreover, borrowers from countries where mechanisms to mitigate agency and information problems are weak may be able to expand their investor base, thereby lowering their financing costs, by committing to contracts that require them to adhere to higher standards. Foreign bond markets potentially serve this purpose.[14,15] This is primarily a motivation for offshore borrowing, but if offshore use of a currency is restricted then it may be mutually advantageous for borrowers from markets with weak standards to issue abroad in foreign currency and swap with borrowers that are able to signal higher standards.

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[13] See also Stulz (2005), which discusses agency problems in the context of foreign investment, and Alfaro et al (2005), which examines explanations for the Lucas paradox (the lack of capital flows from rich to poor countries) and finds institutional quality to be the most important.

[14] Banks play an important role in overcoming agency and information problems. For example, Hale and Santos (2008) find that firms with a record of high creditworthiness and low creditworthiness enter the public bond market (investment grade market and high-yield markets, respectively) before firms with intermediate reputation. Moreover, a firm's relationships with investment banks in connection with private bond issues and syndicated loans may speed entry into the public bond market by allowing the firm to signal higher credit quality.

[15] The literature on equity cross-listings finds some evidence of higher valuations for firms listed in the United States due to greater disclosure (Doige et al (2004)). This argument is weaker for bonds, however, as disclosure requirements tend to be weaker.

### Regulations

Regulatory barriers, such as taxes, reporting requirements and exchange controls, can create significant differences in financing costs between markets. Moreover, these differences can persist until there are changes to the regulatory wedge (Smith et al (1988)). Regulatory barriers are commonly imposed by governments or government agencies. Market participants themselves may also create regulatory barriers, for example through investment mandates that restrict the range of investible assets.

The list of potential regulatory barriers is long and may create cost differences between onshore and offshore borrowing. Regulatory barriers were pivotal factors in the growth of offshore markets for US dollars. To the extent that regulatory barriers restrict the offshore use of a currency, they may also motivate swap-covered borrowing. Indeed, currency swaps evolved out of instruments structured to circumvent exchange controls. In the 1970s, the United Kingdom restricted capital outflows. Firms planning foreign investments circumvented the restrictions through a parallel loan, in which a UK company made a sterling loan to the UK subsidiary of a foreign company and the foreign company lent the equivalent amount in foreign currency to the foreign subsidiary of the UK firm (Clark (2004)).

Even in the absence of exchange controls, there are other regulatory barriers that can give different advantages to resident and non-resident borrowers. Restrictions that effectively segment low-grade and high-grade markets are one potentially important source of comparative advantage. For example, assets eligible for use as collateral in central banks' lending operations often trade at a premium because the available supply is limited. High-grade bonds issued by non-residents are sometimes eligible, potentially creating an opportunity for such borrowers to lower their financing costs by engaging in swap-covered borrowing. Furthermore, many institutional investors are restricted by mandate from investing in low-grade bonds. These restrictions are less distortionary in markets with heterogeneous investor bases, such as large markets, and so low-grade borrowers may gain from issuing in larger markets and swapping the proceeds. Mandates that restrict the range of investible assets or the use of derivatives may also be a factor in explaining why arbitrage opportunities in international bond markets are exploited more actively by issuers rather than investors.

The market imperfections and frictions discussed above have a number of implications for the characteristics of swap-covered foreign currency bond issuance if such issuance is used to overcome those market rigidities. In the next section, we draw out those implications and compare them to the characteristics of bonds and issuers.

## 4. Data and empirical results

From the discussion in Section 3 it follows that if market imperfections and frictions are key motivations for swap-covered borrowing, then there should be clear differences in the characteristics of foreign currency bonds issued by those engaged in such borrowing and on opposite sides of the currency swap. In particular, for any country or currency bloc, there should be clear differences between foreign currency bonds issued by residents and local currency bonds issued by non-residents. We examine these differences for 13 Asia-Pacific economies and find that bond characteristics are generally consistent with issuers seeking to arbitrage cost differentials.

### Data sources

Data on individual bond issues are obtained from the international debt securities database compiled by the BIS. This database combines information from several commercial data providers, namely Dealogic, Euroclear and Thomson Financial. The BIS seeks to capture all foreign currency bonds (foreign bonds and eurobonds) as well as local currency bonds

marketed to foreign investors, such as the international tranches of global bonds. The coverage of foreign currency bonds is close to complete.

Characteristics recorded for every bond in the database include: date of issue, original term to maturity, issue size, coupon structure (fixed or floating), currency and market of issue, type of issue (bond or medium-term note), and residency and industry sector of the issuer. The credit rating of the bond at the time of issue is also captured, but not for all bonds. Our sample covers the 1990–2008 period. We exclude bonds with an original maturity of less than one year because coverage is incomplete for short-term funding instruments. The BIS database includes neither US commercial paper nor interbank placements, which are close substitutes for money market instruments. We also exclude convertible (equity-linked) bonds because the funds raised are typically not swapped by the issuer.

From the BIS database, we extract all foreign currency bonds issued by residents of 13 Asia-Pacific economies: Australia, China, Chinese Taipei, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore and Thailand. We also extract all bonds denominated in the currencies of these same 13 economies and issued by non-residents. This results in 26 sub-samples. Bonds issued by residents of offshore financial centres and not denominated in the local currency of the centre are classified as foreign currency bonds regardless of the nationality of the issuer. For example, a Hong Kong dollar bond issued by the Cayman Islands-based subsidiary of a Hong Kong firm is classified as a Hong Kong dollar issue by a non-resident.

The number of observations in the 26 sub-samples varies enormously. The number of foreign currency bonds issued by Asia-Pacific residents ranges from 10,016 by Australian residents to 22 by Taiwanese residents. The number of bonds denominated in Asia-Pacific currencies issued by non-residents ranges from 79,220 in Japanese yen to 4 in Chinese renminbi.

For each of the 13 economies and every bond characteristic of interest, we test for differences between the distribution of foreign currency bonds issued by residents and the distribution of local currency bonds issued by non-residents. The distributions are typically severely skewed, and so we use a non-parametric test: the Wilcoxon-Mann-Whitney test, corrected for tied ranks (see eg Siegel and Castellan (1988)). The null hypothesis tests whether the two sets of observations do not differ systematically from each other. The alternative states that they do differ systematically, implying that they are not samples from the same population. We calculate size-weighted means, to account for skewness in issue sizes, as well as equally weighted means.

One important piece of information missing in our sample is whether the issuer swapped the funds raised into another currency. As a result, our sample is biased against finding patterns consistent with arbitrage by issuers. Swap-covered borrowing is surely not the sole motivation behind all foreign currency bonds in our sample, and so using the sample to test whether market imperfections can explain issuer behaviour minimises the probability of a type II error but heightens the probability of a type I error.

## Results

There are several potential ways to compare the characteristics of the bond data with the implications from the previous section. Here we present a univariate analysis contrasting characteristics of bond issues in foreign currencies by residents of a given market with the characteristics of issues in the local currency of the same market by non-residents. Summary statistics are presented in Tables 2 to 9. Histograms are plotted in Figures 6 to 9.

### *Currency of issuance*

Table 2 compares the currency composition of foreign currency bonds issued by Asia-Pacific residents with the residency composition of local currency bonds issued by non-residents. Foreign currency issuance is highly concentrated in the USD market. Concentration is lowest among Australian and New Zealand issuers, who borrow large amounts of EUR and minor currencies in addition to USD, and highest among Indian issuers (a small sample). The US domestic market accounts for about 40% of global domestic debt markets, as reported in BIS statistics. In contrast, the share of USD issuance among residents of these Asia-Pacific economies is typically much higher.[16] For local currency bonds issued by non-residents, the distribution of issuance across currencies is less concentrated, consistent with the notion that differences across markets may create opportunities for gains from trade.

The concentration in USD borrowing could relate to a several characteristics of the US market, including a large low-grade market (lower costs or stronger risk assessment infrastructure), size of the term market (lower costs), and flexibility from a (usually) liquid short-term commercial paper market. If transactions costs are a convex, decreasing function of volumes, and different market segments (in the domestic or foreign market) have different volumes, there may be gains from swap-covered borrowing with a non-resident with different characteristics. Foreign currency bonds issued by residents of a smaller or more segmented markets will tend to be denominated in currencies of larger markets, where the difference in costs between market segments is smaller. Conversely, bonds issued by non-residents in the smaller or more segmented market will tend to be issued by residents of large markets (to provide a swap counterparty). Credit quality and maturity are discussed in more detail below.

### *Issue size*

Table 3 and Figure 6 summarise distributions by issue size. For 10 of the 13 comparisons, the mean size of foreign currency bonds issued by residents is larger than that of local currency bonds issued by non-residents. This result does not support the hypothesis that convex and decreasing transactions costs play a role (which would suggest that foreign currency bonds issued by residents of small markets would tend to be smaller in size). Instead it supports the idea that residents issue in a foreign currency to access a larger or more liquid market, while non-residents issuing in local currency are limited by market size or market liquidity.

### *Credit quality*

Table 4 summarises the distribution of credit ratings for foreign currency bonds issued by residents and local currency bonds issued by non-residents. Lower numbers correspond to higher credit ratings, eg 1 = AAA. For all cases except Japan, the credit ratings of bonds issued by non-residents are significantly higher than those of bonds issued by residents. Differences in the distribution of credit ratings are consistent with low-grade and high-grade borrowers exploiting a comparative advantage to lower their borrowing costs. Such advantage could arise from differences in transactions costs, enforcement costs, non-traded assets or regulations.

As shown in Figure 7, this result is mainly due to the fact that non-resident issuance is concentrated in the AAA segment of the market. If there are few domestic high-grade issuers (eg because of a low sovereign ceiling, or because of fiscal prudence) leading to a scarce or

[16] Only in New Zealand is it lower, but that may be because New Zealand banks borrow through their Australian parents.

non-traded high-grade asset in that currency, then non-residents issuing bonds in that currency will tend to be highly rated (eg greater than or equal to the sovereign ceiling). Regulations may reinforce this from the demand side, if certain classes of investors (eg pension funds or assets accepted as collateral) are restricted to high-grade debt.

Enforcement mechanisms may also play a role. If there are differences across markets in enforcement mechanisms to mitigate agency and information problems, then residents of weaker enforcement areas will tend to issue foreign currency bonds in markets that adhere to higher standards, and local currency bonds issued by non-residents will be issued by residents of areas that adhere to higher standards or borrowers who can otherwise signal credit quality such as international organisations.

### *Industry sector*

As a cross-check on the distribution of credit ratings, we also compare the distribution of issuers by industry sector. Whereas data on credit ratings are incomplete, data on industry sectors are available for the issuer of each bond. Credit ratings and industry sectors are loosely correlated. Supranational institutions and national governments from high-income countries tend to be the highest-rated issuers, with AAA or AA ratings. Financial institutions are typically rated AA or A, and non-financial corporations A or lower. However, bond issues may be rated either higher or lower than the issuer, depending on credit enhancements, subordination and other contractual clauses.

In nine of the 13 comparisons, resident issuers of foreign currency bonds came from sectors that tended to be rated lower than the sectors from which non-resident issuers of local currency bonds came (Table 5). Among both resident and non-resident issuers, banks and non-bank financial institutions were the dominant issuers (Figure 8). However, there were important differences in the industry sector of the next largest group of issuers. Among non-resident issuers supranational institutions and governments were active, whereas among resident issuers non-financial corporations were more active.

### *Maturity*

If differences across markets in the demand for and supply of funding lead to relatively small or illiquid long-term bond markets, then foreign currency bonds issued by residents of the smaller market will tend to have a longer term to maturity relative to local currency bonds issued by non-residents. There is weak support for the notion that residents tap foreign currency markets for longer-term funding. The maturity of foreign currency bonds issued by residents is often, but not always, longer than that of local currency bonds issued by non-residents (Table 6 and Figure 9). In eight of the 13 comparisons, the maturity of foreign currency bonds is longer. In four comparisons, the maturity of local currency bonds is longer. In one case, the Philippines, there is no significant difference, although the issue weighted-mean maturity is longer for foreign currency bonds.

### *Coupon structure*

If differences across markets in the demand for and supply of funding lead to a relatively small or illiquid fixed-coupon bond markets, then foreign currency bonds issued by residents of the smaller market will tend to have a greater proportion of fixed rate structures relative to local currency bonds issued by non-residents. The data do not support that hypothesis. Fixed rate bond issues account for a smaller share of foreign currency bond issues by residents than they do for local currency bond issues by non-residents (Table 7). In eight of the 13 comparisons, this is the case. In four comparisons, there is no significant difference in interest rate structures. Only in one case, Indonesia, do residents appear to tap foreign currency markets for fixed rate funding.

### *Foreign bond or eurobond*

Foreign currency bonds can be issued as either "foreign" bonds or "euro" bonds. Foreign bonds are issued onshore, in the currency of the market where the bond is registered, whereas eurobonds are issued offshore, in a currency different from that of the market where the bond is arranged. Reporting requirements are typically more extensive for foreign bonds than eurobonds. However, issuers do not appear to use foreign currency bonds as a device to commit to higher reporting standards. The eurobond market is clearly the market of choice for foreign currency issues (Table 8). In only four cases – residents of China, Chinese Taipei, Malaysia and Thailand – are issuers more likely to issue foreign bonds than eurobonds. In all four economies, there are exchange controls that deter offshore use of the currency. Among the five substantial markets in terms of size (Australia, Hong Kong, Japan, New Zealand and Singapore), issuance is very skewed towards eurobonds. Peristiani and Santos (2008) report that, 10 years ago, it was cheaper to issue a bond in the US market, and that underwriting costs have declined over the decade. Eurobond costs, however, have fallen faster, eliminating the cost differential.

### *Single or multiple issue*

We also considered whether a bond was issued as a single issue or part of a medium-term note (MTN) programme. A single bond issue often requires extensive documentation, whereas under an MTN programme the same documentation can be used for multiple securities.[17] Therefore, MTNs are less effective devices for committing to higher reporting standards. Local currency bonds issued by non-residents are overwhelmingly MTNs (Table 9). For residents of Australia, Hong Kong, New Zealand and Singapore (the more developed international bond markets and higher-rated economies), foreign currency bonds issued by residents are also almost all MTNs. In most other Asia-Pacific economies, residents' issues are usually single issues. These patterns provide some support for differences in reporting standards as a motivation for swap-covered borrowing. Alternatively, they may simply reflect the role of large, regular borrowers as the arbitrageurs in international bond markets.

## 5. The risks of swap-covered funding

The use of foreign currency bonds to raise local currency debt indirectly can pose risks to the financial stability of both the borrower and the borrowing economy. Swap-covered debt is a more complex product than direct borrowing, so places greater demands on the risk management capacity of the borrower and the regulator in terms of currency risk, counterparty risk, rollover risk and interest rate risk. Of these the most important is probably rollover risk, particularly where there are large net or gross external debt positions. In this section, these risks are discussed in turn, followed by a brief overview of how they played out in Australia and New Zealand in 2007–08, two countries with substantial net external debts funded in part through swap-covered borrowing. The discussion reinforces the importance of strong risk management, a sound banking system, the ability and willingness of governments to provide temporary support, and the benefits of domestic savings and more stable forms of external funding such as foreign direct investment.

[17] Each new MTN requires only a pricing supplement setting out the terms of the issue. MTNs are typically issued by large borrowers, who regularly disclose information, and are frequently tailored to satisfy specific investor preferences.

**External debt and rollover risk**

An important concern associated with synthetic local currency borrowing is a rapid increase in external indebtedness. Where it has been widely used, there are typically large gross or net external debt positions. Many of the potential motivations discussed in Section 3 suggest that borrowers previously restricted to borrowing local currency directly may be able to access cheaper funding or a wider pool of funding by overcoming market rigidities. Greater access to external funding may in turn lead borrowers to increase financial leverage, while increasing exposure to external wholesale funding. The risks, of course, need to be weighed against the benefits of financial integration and the extent to which they can be mitigated through prudential supervision.

The bulk of swap-covered financing involves financial intermediaries, and so maturity mismatch is a potential concern. Maturity mismatch may lead to rollover risk on two levels: during the tenor of the swap and at maturity of the swap. If the swap does not match the foreign currency debt and local currency assets in terms of tenor and coupon structure, as well as currency, then the borrower may face currency risk, rollover risk and interest rate risk.

Even if the swap matches assets and liabilities, rollover risk will re-emerge at maturity of the swap if the debt needs to be rolled over (for example, if net external debt is large). The rollover risks may be large for swap-covered borrowing which relies on wholesale funding sources. The same is true for wholesale funding in local currency. Both tend to be less stable than the domestic deposit base, which typically benefits from deposit insurance. Wholesale borrowing is normally not covered by government deposit insurance, and is likely to be less stable during a crisis.

Non-resident investors may be a particularly unstable funding source, providing funding during expansions when the local currency is expected to appreciate, and withdrawing funding during times of stress if the local currency is expected to depreciate. The ability to substitute domestic funding for large volumes of external funding (direct or swap-covered) may be very limited. Large net debt suggests weak domestic savings performance. The private saving rate may increase by a few percent relative to GDP, but the increase in savings may be small relative to gross external financing requirements in the event of severe external funding stress. Moreover, with integrated markets, external funding pressures are likely to spread quickly to domestic markets. In the event of severe stress, public savings will almost certainly be called upon, where feasible, to fill the funding gap if the net debt is large.

Swap-covered borrowing requires rollover in both funding and hedging markets. This added complexity may increase risk relative to external local currency funding. Allayannis et al (2003) look at a sample of East Asian non-financial borrowers and find that, during the Asian crisis, the financial performance of firms which used synthetic local currency debt was worse than that of those which relied on direct local or foreign currency borrowing. They attribute this result to the illiquidity of swap markets, which made it expensive for firms to roll over short-term derivative positions used to hedge long-term debt.

Swap-covered borrowing may allow a borrower to diversify funding sources. Among integrated financial systems, however, market liquidity is likely to be highly correlated, so that diversification of the funding base may offer little scope for reducing rollover risk. Diversifying the funding base from the domestic market (in the periphery) to the US markets (the centre) may normally be considered a good approach to reducing liquidity risk, as US markets are normally very liquid and may be resilient to stress in the periphery. Stress in the centre, however, is likely to spread to smaller markets in the absence of exchange controls (see Baba and Packer (2008) for a discussion on foreign exchange forward and swap market dislocations in 2007–08). A sharp rise in the cost of foreign currency funding may translate rapidly to a rise in the cost of local currency funding. With some degree of segmentation among markets, however, there may be some scope to reduce market risk. This appears to have been the case to some degree in 2008, with a number of new issuers entering the samurai market (Japanese yen bonds issued in Japan by non-residents).

### Currency risk

The ability to hedge currency risk is a major potential benefit of swap-covered borrowing for an emerging economy that has difficulty borrowing in its own currency. It can potentially benefit from access to international financial markets without currency mismatch if a non-resident can successfully issue local currency debt to provide a swap counterparty (if exchange controls do not prohibit).

### Interest rate risk

Even if borrowings are structured so that currency and tenor are hedged, interest rate risk could still be a problem if local currency income and local currency payments under the cross currency swap are not matched. For example, if a domestic bank swaps foreign currency payments for fixed-term local currency payments but has floating rate local currency income (or vice versa), it may face difficulty if monetary policy is adjusted rapidly. Liquid local currency interest rate swap markets help manage interest rate risk.

### Replacement risk

Swaps are generally traded in over-the-counter markets. While this allows customisation of products, without central clearing the two borrowers assume each other's credit risk. Various hedged risks, including currency risk, can re-emerge if one counterparty to the swap defaults. As recent developments have shown, assessing counterparty risk is complicated by the opacity of firms' financial positions. When one counterparty fails, the other may be left with a mismatched position due to interest rate or currency fluctuations. For example, suppose the minor currency resident holds minor currency principal as collateral but has US dollar liabilities at maturity. If the minor currency depreciates sharply, losses could be substantial. Bilateral netting and collateral arrangements are widely used to reduce the risks associated with a counterparty default. Central clearing may reduce risks further by providing a highly rated central counterparty, requiring positions to be marked to market daily, and making use of multilateral netting through offsetting long and short positions. Potential barriers are low liquidity in minor currency markets, which may delay or prevent market-making and, high margins for those providing swaps in a less transparent environment.

### Domestic market liquidity

A potential concern regarding synthetic debt is that offshore issuance may take liquidity from the domestic market. Swap-covered borrowing itself does not necessarily reduce the size of the local currency market. Rather, it changes the composition of issuers in the market from domestic borrowers to non-resident borrowers. However, if non-resident borrowers prefer to issue in the offshore markets, there may be a loss of liquidity in the domestic market. This need not be the case, though. Offshore issuance may complement domestic market development through competition that motivates efficiency or by establishing a minor currency asset class (widening the pool of potential investors).

### How did the risks play out in 2007–08?

In the Asia-Pacific region, Australia and New Zealand stand out as countries with large outstanding amounts of swap-covered borrowing and large net external debts. Non-resident local currency bond issuance at end-2007 was 44% of GDP in New Zealand and 27% of GDP in Australia. In this section, we briefly discuss recent developments in those two markets.

Most previous crises had been concentrated in the periphery, and the US markets were thought to be deep and liquid so that additional funding could be found without large adverse price movements. This turned out not to be the case. With the drying-up of the US commercial paper market, an important source of temporary liquidity, and dislocation in currency swap markets associated with dollar funding pressure and counterparty concerns, borrowing costs rose sharply. The US dollar shortage spread quickly to domestic markets, where funding costs rose as borrowers turned to domestic markets for funding. The rise in US dollar costs was moderated a little as demand for dollars drove down the cost of swapping US dollar funding into other currencies where liquidity pressure was less severe. With increased risk aversion, placing minor currency debt directly became more difficult.

Australian banks and their New Zealand subsidiaries appear to be managing these risks successfully. The banks entered the crisis well capitalised and profitable. Hedging appears to have largely matched external borrowings and local currency assets. Asset quality has deteriorated somewhat, but not sharply, and gross positions are modest.

Rollover risk, or the degree to which it translates into higher funding costs, has been very important because of the large net external debt. While private savings have risen and deposits have increased, this has been far from the scale required to fund current the account deficits and roll over external debt. Several other factors have helped to fill the potential funding gap. First, liquidity provision by the two central banks was scaled up rapidly. The ability to rapidly scale up liquidity has, in turn, been facilitated by effective control of the overnight interest rate, which has meant that an increase in liquidity need not undermine monetary policy, and strong fiscal positions (fiscal surpluses and near-zero public sector debt) that have allowed greater public borrowing without adverse effects on public sector credit quality.

Second, in early 2008, the banks prefunded a substantial amount of maturing debt (despite high perceived costs at the time) as a cushion against continued market dislocations, which left them in a stronger position when rollover costs increased later in the year.

Third, government guarantees have helped the banks increase both domestic and foreign currency funding by upgrading the credit quality of bank debt to AAA in the case of Australia and to AA+ in the case of New Zealand. In both cases, the guarantees are intended to be temporary.

Fourth, Federal Reserve initiatives to provide US dollar liquidity increased credibility. These initiatives included provision of US dollar swap lines to several countries, including Australia and New Zealand, and direct purchases of commercial paper (for which the AA banks were rated highly enough to be eligible),

Fifth, flexible exchange rates have aided adjustment. Currency depreciation of about 40% relative to the US dollar has both increased competitiveness (and so helped to reduce funding requirements) and lowered the US dollar value of the funding required. The latter has been valuable in the face of US dollar market illiquidity, as funding costs have tended to rise sharply with issuance volume. At the same time, currency depreciation has not had adverse valuation effects, as debts are effectively denominated in local currency. Overall, valuation effects are positive, as foreign currency assets have increased in local currency.

The resilience of Australia and New Zealand in the face of a US dollar crisis, despite large net external debts funded largely through US dollar markets, suggests that widespread use of swap-covered borrowing can be managed. That resilience has, however, been supported by a variety of mitigating factors, including a well capitalised banking system with good risk management, a strong fiscal position, scalable domestic currency liquidity provision, government guarantees, investment grade sovereign ratings, and floating exchange rates. Whether a country with a sub-investment grade rating or weaker institutions would be able to weather the same storm with substantial net debt is open to debate.

## 6. Conclusions

Still few countries consistently access external financing in their own currencies. Sound macroeconomic policies are recognised as a necessary condition for countries to borrow in their own currency. But sound macroeconomic policy – price stability, fiscal prudence and a transparent exchange rate regime – does not appear to be sufficient for some countries, suggesting that microeconomic constraints may also be important.

One suspect is domestic capital market development. The many initiatives to develop domestic bond markets in Asia in the past decade have facilitated local currency funding by extending domestic market liquidity and maturity, improving credit assessment, reducing market frictions and domestic market risk, and increasing non-resident access, especially for investors. Fiscal prudence and foreign reserve accumulation have contributed to rising sovereign rating ceilings, supporting extension of the domestic bond market to higher-grade debt. Some aspects of bond market development, such as developing an internationally rated AAA market and liquid low-grade market, may take decades. Swap-covered foreign currency borrowing may help domestic borrowers to efficiently access local currency funding in the meantime.

This paper aims to contribute to a gap in the literature in understanding the motivations for swap-covered borrowing. In this paper, we considered aspects of bond market incompleteness, and market frictions that may be overcome to some extent by swap-covered foreign currency borrowing and therefore motivate that form of borrowing. Empirical assessment established several stylised facts. The characteristics of bond issuance by residents in foreign currency and by non-residents in local currency (swap counterparties) are significantly different in several respects. Foreign currency issuance by residents is, on average, significantly lower-rated, longer-term and larger in size than non-resident issuance in the domestic market, consistent with the notion that swap-covered borrowing may provide resident issuers with access to larger, more liquid low-grade and long-term markets. Non-resident issuance in Asia-Pacific currencies is highly skewed towards AAA issuers, suggesting that a credit quality gap is important. This is consistent with several motivations, including a scarcity of high-grade minor currency debt, for example due to a low sovereign ceiling or fiscal prudence, regulations that limit certain investor classes to high-grade debt and risk unbundling.

In practice, many of the motivations for swap-covered foreign currency borrowing discussed may be valid in different countries at different times. In less complete and liquid markets, arbitrage of price gaps is likely to predominate. Most countries' low-grade debt markets are relatively undeveloped compared to the US market, and most countries' sovereign ratings are below AAA, so swap-covered borrowing provides a potential means of arbitraging non-traded assets and unbundling risk. Even in countries rated AAA such as Australia and Singapore, non-resident issuance is a growing share of total issuance in domestic currency, suggesting more persistent motivations such as market completeness through diversification or unbundling of risk. In recent years, bond markets in most currencies have become more international and cross-currency swap markets have grown rapidly where not restricted. The events of 2007–08 may reverse these trends in some markets for a while, and have helped our understanding of the risks. Looking forward, more globally integrated markets, including significant volumes of this pattern of borrowing, appear increasingly to be the norm.

The questions raised are important ones for policymakers in terms of understanding current market developments, promoting domestic bond market development and financial stability or understanding potential effects of easing exchange controls. Continued development of domestic bond markets remains an important focus to reduce information asymmetries, develop more liquid low-grade and term markets, reduce market frictions and support other domestic financial markets. Swap-covered borrowing provides a potential means to overcome market frictions, enabling domestic firms to raise financing more efficiently, and to

diversify and deepen domestic currency debt markets. Many unanswered questions provide fertile ground for further research.

# Tables

Table 1

**Average daily turnover of currency swaps**[a]

| | April 1995 | April 1998 | April 2001 | April 2004 | April 2007 |
|---|---|---|---|---|---|
| All currencies[b] | 3,772 | 9,902 | 7,190 | 21,116 | 31,497 |
| USD | 3,126 | 8,628 | 5,944 | 17,605 | 27,333 |
| EUR | | | 2,190 | 9,732 | 11,240 |
| GBP | 165 | 937 | 1,207 | 4,835 | 5,052 |
| JPY | 1,147 | 2,865 | 1,969 | 3,354 | 3,495 |
| CAD | 64 | 308 | 361 | 521 | 2,388 |
| CHF | 125 | 352 | 152 | 1,118 | 1,924 |
| AUD | 150 | 381 | 510 | 1,573 | 1,824 |
| KRW | n/a | 7 | 46 | 342 | 1,303 |
| SEK | 7 | 26 | 145 | 119 | 1,070 |
| ZAR | 0 | 20 | 50 | 62 | 538 |
| NZD | 9 | 11 | 101 | 80 | 474 |
| HKD | 18 | 231 | 285 | 293 | 420 |
| INR | n/a | 0 | 1 | 97 | 411 |
| TRL | n/a | n/a | 1 | 1 | 336 |
| BRL | n/a | n/a | 403 | 381 | 307 |
| NOK | 6 | 5 | 42 | 98 | 207 |
| PLN | n/a | n/a | 4 | 6 | 185 |
| DKK | 150 | 41 | 103 | 87 | 182 |
| MXN | n/a | 0 | 34 | 384 | 161 |
| SGD | 2 | 73 | 18 | 54 | 154 |
| IDR | n/a | 30 | 13 | 24 | 148 |
| CNY | n/a | n/a | n/a | 4 | 133 |
| TWD | n/a | 6 | 22 | 102 | 99 |
| THB | n/a | 4 | 11 | 246 | 59 |
| CZK | n/a | n/a | 5 | 8 | 40 |
| MYR | n/a | n/a | n/a | 11 | 37 |

n/a = not available

[a] Turnover in over-the-counter markets of the specified currency against all other currencies, in millions of US dollars. Data are adjusted for local and cross-border inter-dealer double-counting but are not adjusted for gaps in reporting.

[b] The sum of transactions in individual currencies equals twice the total turnover because two currencies are involved in each transaction.

Source: BIS Triennial Central Bank Surveys.

Table 2

**Share of issuance by currency of issue and residency of issuer**[a]

| | Foreign currency bonds issued by residents: currency of issue | | | | | Local currency bonds issued by non-residents: residency of issuer | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | USD | EUR | JPY | Other | HH[b] | US | EU[c] | Supra[d] | Other | Memo: nation[e] | HH[b] |
| AU | 48 | 28 | 6 | 19 | 0.34 | 18 | 32 | 27 | 23 | <1 | 0.26 |
| CN | 75 | 22 | 2 | . . . | 0.62 | . . . | . . . | 61 | 39 | 39 | 0.52 |
| HK | 88 | 2 | 2 | 8 | 0.78 | 5 | 19 | 6 | 70 | 14 | 0.54 |
| ID | 83 | 1 | 12 | 3 | 0.71 | 22 | 2 | 45 | 30 | . . . | 0.35 |
| IN | 99 | . . . | . . . | 1 | 0.97 | 18 | 6 | 18 | 57 | . . . | 0.40 |
| JP | 56 | 34 | . . . | 11 | 0.44 | 20 | 25 | 5 | 50 | 52 | 0.36 |
| KR | 69 | 10 | 13 | 8 | 0.51 | 63 | . . . | . . . | 37 | 35 | 0.53 |
| MY | 91 | 7 | . . . | 1 | 0.84 | 10 | 8 | 20 | 61 | . . . | 0.43 |
| NZ | 28 | 31 | 9 | 31 | 0.28 | 11 | 28 | 33 | 28 | . . . | 0.28 |
| PH | 88 | 6 | 5 | 1 | 0.77 | 23 | . . . | 61 | 17 | . . . | 0.45 |
| SG | 73 | 13 | 5 | 8 | 0.57 | 25 | 22 | 2 | 51 | . . . | 037 |
| TH | 78 | . . . | 22 | . . . | 0.66 | 29 | 15 | 19 | 37 | . . . | 0.28 |
| TW | 67 | . . . | . . . | 33 | 0.56 | . . . | 6 | 92 | 2 | . . . | 0.85 |

AU = Australia; CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; JP = Japan; KR = Korea; MY = Malaysia; NZ = New Zealand; PH = Philippines; SG = Singapore; TH = Thailand; TW = Chinese Taipei; . . . = 0.

[a] Percentage share of total issuance over the 2000–08 period, calculated in current USD.

[b] Hirschman-Herfindahl index of concentration.

[c] Euro area.

[d] Supranational institutions.

[e] Non-resident issuers who are nationals of the specified country. Some nationals are included in the shares of US and EU residents, but most reside in “Other” countries, mainly offshore financial centres.

Sources: BIS; authors’ calculations.

Table 3

**Distribution by size of issue**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 620.4 | 251.0 | 64.3 | 25.7 | 189.1 | 76.1 | 7.0 | 5.9 | 10,016 | 9,976 | 51.17** |
| CN | 490.0 | 169.8 | 200.0 | 153.1 | 245.6 | 58.3 | 2.2 | 1.8 | 128 | 4 | 0.15 |
| HK | 388.0 | 60.4 | 33.0 | 17.4 | 100.3 | 27.4 | 7.6 | 3.9 | 1,732 | 8,632 | 5.88** |
| ID | 587.0 | 50.0 | 108.2 | 12.3 | 228.2 | 21.6 | 3.6 | 4.1 | 205 | 237 | 7.67** |
| IN | 527.9 | 58.1 | 186.9 | 29.6 | 254.2 | 29.8 | 5.5 | 1.8 | 72 | 20 | 5.84** |
| JP | 540.1 | 253.2 | 145.9 | 20.2 | 239.9 | 68.6 | 2.9 | 13.4 | 1,120 | 79,220 | 35.25** |
| KR | 406.8 | 65.2 | 154.1 | 38.2 | 197.4 | 32.5 | 4.4 | 0.9 | 1,151 | 41 | 7.67** |
| MY | 545.8 | 144.0 | 285.3 | 73.1 | 274.0 | 72.7 | 1.2 | 1.0 | 99 | 55 | 5.46** |
| NZ | 386.0 | 224.2 | 102.9 | 52.8 | 171.0 | 95.2 | 4.6 | 5.0 | 306 | 1,829 | 9.83** |
| PH | 573.2 | 93.5 | 280.2 | 45.1 | 287.4 | 48.8 | 2.4 | 1.1 | 175 | 12 | 4.57** |
| SG | 460.2 | 90.0 | 28.5 | 17.5 | 110.9 | 35.7 | 8.2 | 4.6 | 1,830 | 1,498 | 0.96 |
| TH | 280.7 | 65.6 | 149.1 | 17.3 | 140.7 | 29.0 | 2.5 | 2.6 | 113 | 114 | 10.85** |
| TW | 257.7 | 102.1 | 93.1 | 45.8 | 126.7 | 51.0 | 2.1 | 1.8 | 22 | 137 | 1.04 |

[a] In years.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 4

**Distribution by credit rating**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 2.7 | 1.9 | 3.3 | 1.8 | 2.4 | 1.5 | 1.6 | 1.9 | 686 | 482 | 13.54** |
| CN | 7.3 | . | 7.9 | . | 1.2 | . | 0.5 | . | 46 | 0 | . |
| HK | 7.7 | 2.8 | 6.5 | 3.1 | 3.4 | 1.8 | 0.7 | 0.6 | 52 | 284 | 7.36** |
| ID | 13.6 | 2.1 | 13.4 | 3.2 | 0.7 | 2.9 | –0.6 | 1.9 | 21 | 11 | 7.73** |
| IN | 9.4 | . | 9.7 | . | 0.6 | . | 0.0 | . | 18 | 0 | . |
| JP | 2.3 | | 2.4 | 3.7 | 2.3 | 2.9 | 1.9 | 1.1 | 268 | 1,989 | 8.87** |
| KR | 6.8 | 1.0 | 6.4 | 1.0 | 2.7 | 0 | 0.5 | . | 251 | 3 | 2.90** |
| MY | 7.6 | 2.7 | 7.5 | 2.7 | 2.4 | 2.9 | –0.1 | 2.1 | 41 | 7 | 3.18* |
| NZ | 4.4 | 1.5 | 4.8 | 1.6 | 2.1 | 1.3 | 1.1 | 2.1 | 36 | 160 | 8.87** |
| PH | 12.4 | 1.0 | 12.1 | 1.0 | 2.1 | 0.0 | –3.8 | . | 40 | 2 | 2.38* |
| SG | 5.2 | 2.7 | 6.1 | 3.3 | 4.6 | 1.8 | 0.5 | 0.0 | 55 | 41 | 2.58** |
| TH | 8.2 | 3.2 | 8.5 | 3.9 | 3.0 | 2.4 | 0.5 | –0.3 | 35 | 17 | 4.90** |
| TW | 6.8 | 1.5 | 4.7 | 1.3 | 3.1 | 1.2 | 0.9 | 4.1 | 3 | 17 | 3.48** |

[a] 1 = AAA/Aaa; 2 = AA+/Aa1; 3 = AA/Aa2; 4 = AA–/Aa3; 5 = A+/A1; 6 = A/A2; 7 = A–/A3; 8 = BBB+/Baa1; 9 = BBB/Baa2; 10 = BBB–/Baa3; 11 = BB+/Ba1; 12 = BB/Ba2; 13 = BB–/Ba3; 14 = lower than BB–/Ba3; . = no data.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 5

**Distribution by industry sector of issuer**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 2.4 | 2.0 | 2.1 | 2.3 | 0.5 | 0.7 | 1.5 | 0.9 | 10,016 | 9,976 | 16.9** |
| CN | 2.0 | 1.8 | 2.4 | 1.5 | 0.9 | 1.0 | –0.1 | 2.0 | 128 | 4 | 1.86* |
| HK | 2.6 | 2.1 | 2.2 | 2.1 | 0.5 | 0.5 | 2.4 | 0.9 | 1,732 | 8,632 | 3.19** |
| ID | 2.1 | 1.9 | 3.3 | 2.1 | 1.0 | 0.5 | –1.0 | 2.3 | 205 | 237 | 12.6** |
| IN | 2.7 | 1.6 | 3.0 | 1.7 | 0.9 | 0.6 | 0.0 | 0.0 | 72 | 20 | 5.24** |
| JP | 3.2 | | 3.4 | 2.3 | 0.9 | 0.6 | –1.2 | 0.4 | 1,120 | 79,220 | 42.8** |
| KR | 3.0 | 2.6 | 2.9 | 2.6 | 1.1 | 0.9 | –0.1 | 0.6 | 41 | 1,150 | 1.50 |
| MY | 3.0 | 2.1 | 3.1 | 2.1 | 0.8 | 0.6 | –0.9 | 0.0 | 99 | 55 | 7.14** |
| NZ | 2.1 | 1.9 | 2.1 | 2.1 | 1.1 | 0.7 | 0.6 | 0.3 | 306 | 1,829 | 2.81** |
| PH | 1.7 | 1.3 | 2.2 | 1.8 | 1.2 | 0.8 | 0.4 | 0.4 | 175 | 12 | 0.79 |
| SG | 2.7 | 2.4 | 2.3 | 2.2 | 0.6 | 0.5 | 1.6 | 1.6 | 1,830 | 1,498 | 5.50** |
| TH | 2.5 | 2.2 | 2.5 | 2.1 | 1.2 | 0.5 | –0.1 | 1.1 | 113 | 114 | 2.68** |
| TW | 2.1 | 1.1 | 2.1 | 1.2 | 0.5 | 0.6 | 2.3 | 3.0 | 22 | 137 | 7.54** |

[a] 1 = supranational institution, national government or sub-national government; 2 = bank; 3 = non-bank financial institution; 4 = non-financial corporation.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 6

**Distribution by maturity**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 10.3 | 5.1 | 8.8 | 3.5 | 8.1 | 3.3 | 1.7 | 6.2 | 10,016 | 9,976 | 61.21** |
| CN | 7.8 | 9.5 | 7.3 | 9.3 | 9.2 | 1.5 | 8.5 | –2.0 | 128 | 4 | 2.42* |
| HK | 7.1 | 4.4 | 5.5 | 4.2 | 4.2 | 3.5 | 3.3 | 3.6 | 1,732 | 8,632 | 17.61** |
| ID | 12.5 | 6.7 | 4.6 | 7.6 | 9.9 | 5.2 | 3.6 | 0.9 | 205 | 237 | 7.21** |
| IN | 8.9 | 5.0 | 9.9 | 4.3 | 12.9 | 3.1 | 5.4 | 1.2 | 72 | 20 | 4.14** |
| JP | 8.1 | 8.6 | 6.8 | 8.7 | 5.0 | 11.0 | 3.8 | 0.8 | 1,120 | 79,220 | 12.56** |
| KR | 6.8 | 3.5 | 5.2 | 3.5 | 5.4 | 3.0 | 7.0 | 4.1 | 1,151 | 41 | 4.43** |
| MY | 10.8 | 6.1 | 9.3 | 5.2 | 10.9 | 2.6 | 6.2 | 1.4 | 99 | 55 | 3.97** |
| NZ | 5.3 | 3.9 | 5.1 | 4.0 | 3.8 | 2.5 | 2.3 | 1.8 | 306 | 1,829 | 3.63** |
| PH | 12.5 | 5.7 | 9.4 | 6.3 | 9.6 | 4.1 | 5.2 | 1.9 | 175 | 12 | 1.35 |
| SG | 7.4 | 5.4 | 5.3 | 4.3 | 3.4 | 3.5 | 2.4 | 3.6 | 1,830 | 1,498 | 12.59** |
| TH | 8.0 | 4.4 | 7.0 | 3.0 | 4.4 | 2.4 | 3.1 | 2.2 | 113 | 114 | 9.96** |
| TW | 7.0 | 4.8 | 4.0 | 4.6 | 3.1 | 1.8 | 2.5 | 0.5 | 22 | 137 | 2.65** |

[a] In years.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 7

**Fixed versus floating rate structure**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 1.6 | 1.2 | 1.4 | 1.1 | 0.5 | 0.3 | 0.5 | 3.4 | 10,016 | 9,976 | 51.38** |
| CN | 1.3 | 1.0 | 1.4 | 1.0 | 0.5 | 0.0 | 0.3 | . | 128 | 4 | 1.70 |
| HK | 1.4 | 1.2 | 1.3 | 1.2 | 0.5 | 0.4 | 0.9 | 1.7 | 1,732 | 8,632 | 12.65** |
| ID | 1.1 | 1.4 | 1.2 | 1.5 | 0.4 | 0.5 | 2.0 | 0.0 | 205 | 237 | 7.59** |
| IN | 1.3 | 1.4 | 1.4 | 1.7 | 0.5 | 0.5 | 0.4 | –0.7 | 72 | 20 | 1.94 |
| JP | 1.1 | 1.2 | 1.4 | 1.2 | 0.5 | 0.4 | 0.5 | 1.5 | 1,120 | 79,220 | 14.57** |
| KR | 1.3 | 1.0 | 1.5 | 1.1 | 0.5 | 0.3 | –0.1 | 2.8 | 1,151 | 41 | 4.48** |
| MY | 1.1 | 1.1 | 1.3 | 1.2 | 0.5 | 0.4 | 0.9 | 1.9 | 99 | 55 | 1.77* |
| NZ | 1.5 | 1.1 | 1.5 | 1.1 | 0.5 | 0.3 | –0.1 | 2.9 | 306 | 1,829 | 19.40** |
| PH | 1.1 | 1.1 | 1.2 | 1.2 | 0.4 | 0.4 | 1.7 | 2.1 | 175 | 12 | 0.08 |
| SG | 1.3 | 1.2 | 1.2 | 1.2 | 0.4 | 0.4 | 1.7 | 1.5 | 1,830 | 1,498 | 1.18 |
| TH | 1.3 | 1.1 | 1.4 | 1.0 | 0.5 | 0.2 | 0.5 | 5.1 | 113 | 114 | 6.41** |
| TW | 1.7 | 1.1 | 1.8 | 1.2 | 0.4 | 0.4 | –1.4 | 1.3 | 22 | 137 | 5.16** |

[a] 1 = fixed rate bond; 2 = floating rate bond.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 8

**Eurobond versus foreign bond**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 1.1 | 1.3 | 1.0 | 1.0 | 0.2 | 0.2 | 5.2 | 4.5 | 10,016 | 9,976 | 3.38** |
| CN | 1.3 | 1.6 | 1.4 | 1.8 | 0.5 | 0.5 | 0.6 | –2.0 | 128 | 4 | 1.54 |
| HK | 1.1 | 1.1 | 1.0 | 1.1 | 0.1 | 0.2 | 7.7 | 4.1 | 1,732 | 8,632 | 6.32** |
| ID | 1.0 | 1.0 | 1.1 | 1.0 | 0.2 | 0.0 | 3.8 | . | 205 | 237 | 3.77** |
| IN | 1.2 | 1.2 | 1.2 | 1.1 | 0.4 | 0.3 | 1.5 | 2.9 | 72 | 20 | 1.09 |
| JP | 1.1 | 1.2 | 1.3 | 1.0 | 0.5 | 0.1 | 1.0 | 8.6 | 1,120 | 79,220 | 70.27** |
| KR | 1.2 | 1.5 | 1.2 | 1.5 | 0.4 | 0.5 | 1.7 | 0.2 | 1,150 | 41 | 1.13 |
| MY | 1.2 | 1.7 | 1.2 | 1.4 | 0.4 | 0.5 | 1.4 | 0.3 | 99 | 55 | 2.55* |
| NZ | 1.1 | 1.1 | 1.1 | 1.0 | 0.2 | 0.2 | 4.0 | 6.0 | 306 | 1,829 | 2.54* |
| PH | 1.1 | 1.3 | 1.1 | 1.2 | 0.3 | 0.4 | 2.9 | 2.1 | 175 | 12 | 0.84 |
| SG | 1.0 | 1.2 | 1.0 | 1.1 | 0.1 | 0.2 | 9.4 | 4.1 | 1,830 | 1,498 | 6.82** |
| TH | 1.4 | 1.7 | 1.3 | 1.2 | 0.4 | 0.4 | 1.1 | 1.5 | 113 | 114 | 1.13 |
| TW | 1.3 | 1.7 | 1.2 | 1.7 | 0.4 | 0.4 | 1.8 | –1.1 | 22 | 137 | 5.18** |

[a] 1 = eurobond; 2 = foreign or global bond.

[b] Foreign currency bonds issued by residents.

[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

Table 9

**Single bond versus medium-term note programme**[a]

| | Mean: size-weighted | | Mean: equal-weighted | | Standard deviation | | Skewness | | Number of observations | | *W* test stat[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | FC by res[b] | LC by non-res[c] | |
| AU | 1.5 | 1.5 | 1.9 | 1.9 | 0.3 | 0.3 | –2.6 | –3.2 | 10,016 | 9,976 | 6.44** |
| CN | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 | 0.0 | . | . | 128 | 4 | . |
| HK | 1.5 | 1.8 | 1.9 | 1.9 | 0.3 | 0.3 | –2.5 | –3.4 | 1,732 | 8,632 | 5.43** |
| ID | 1.2 | 1.9 | 1.6 | 1.9 | 0.4 | 0.2 | –0.5 | –3.9 | 205 | 237 | 8.43** |
| IN | 1.1 | 1.8 | 1.2 | 1.9 | 0.4 | 0.3 | 1.4 | –2.9 | 72 | 20 | 5.52** |
| JP | 1.1 | 4.7 | 1.2 | 2.0 | 0.4 | 0.2 | 1.9 | –4.4 | 1,120 | 79,920 | 115.02** |
| KR | 1.3 | 1.4 | 1.5 | 1.5 | 0.5 | 0.5 | 0.2 | 0.2 | 1,151 | 41 | 12.98** |
| MY | 1.0 | 1.2 | 1.1 | 1.5 | 0.3 | 0.5 | 3.1 | –0.1 | 99 | 55 | 6.19** |
| NZ | 1.6 | 1.7 | 1.8 | 1.9 | 0.4 | 0.3 | –1.9 | –2.4 | 306 | 1,829 | 2.00* |
| PH | 1.1 | 1.7 | 1.2 | 1.8 | 0.4 | 0.5 | 1.5 | –1.3 | 175 | 12 | 4.32** |
| SG | 1.4 | 1.7 | 1.9 | 1.9 | 0.3 | 0.3 | –3.3 | –3.4 | 1,830 | 1,498 | 0.15 |
| TH | 1.1 | 1.3 | 1.3 | 1.8 | 0.5 | 0.4 | 0.7 | –1.4 | 113 | 114 | 6.99** |
| TW | 1.1 | 1.0 | 1.4 | 1.1 | 0.5 | 0.3 | 0.4 | 2.3 | 22 | 137 | 3.34** |

[a] 1 = bond issued with its own documentation; 2 = bond issued as part of an MTN programme.

[b] Foreign currency bonds issued by residents.

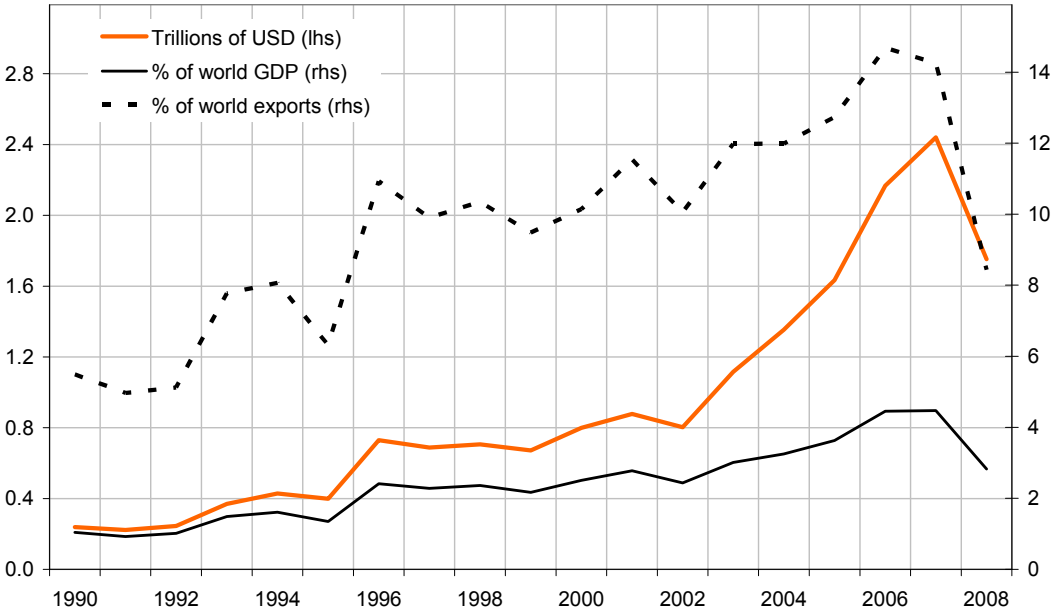
[c] Local currency bonds issued by non-residents, ie bonds denominated in the specified currency and issued by non-residents.

[d] Wilcoxon-Mann-Whitney test; ** and * indicate that the null hypothesis – ie that the two sets of observations do not differ systematically from each other – is rejected at the 99% and 95% confidence levels, respectively.

# Figures

Figure 1

**Gross issuance of foreign currency bonds**[a]

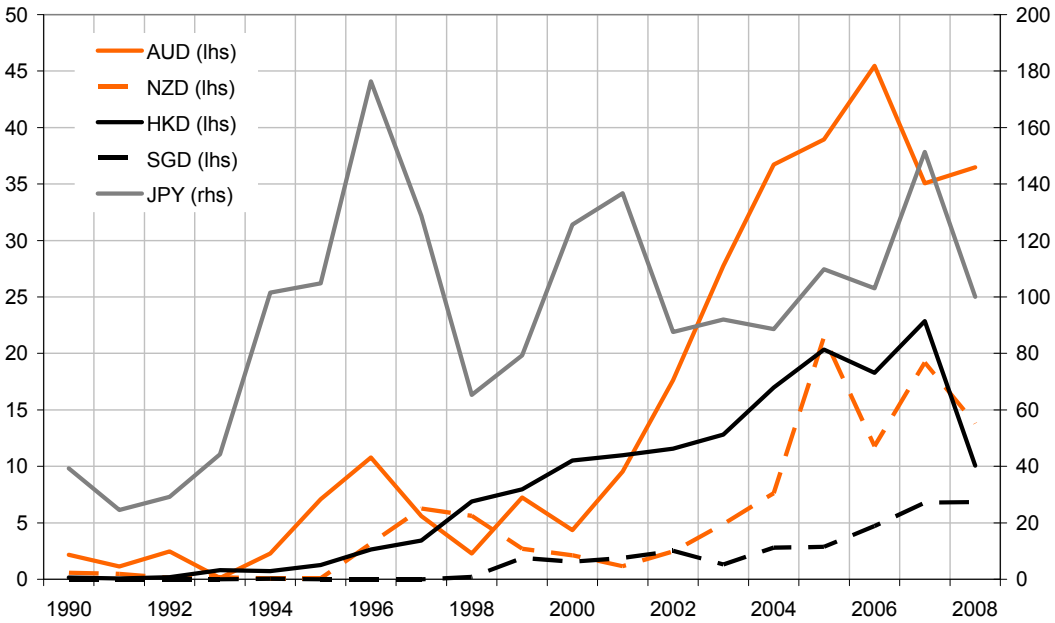



[a] Bonds and medium-term notes denominated in a currency different from that of the territory where the issuer principally resides.

Sources: IMF; Dealogic; Euroclear; ICMA; Thomson Financial; BIS; authors' calculations.

Figure 2a

**Gross issuance of foreign currency bonds denominated in Asia-Pacific currencies**[a]

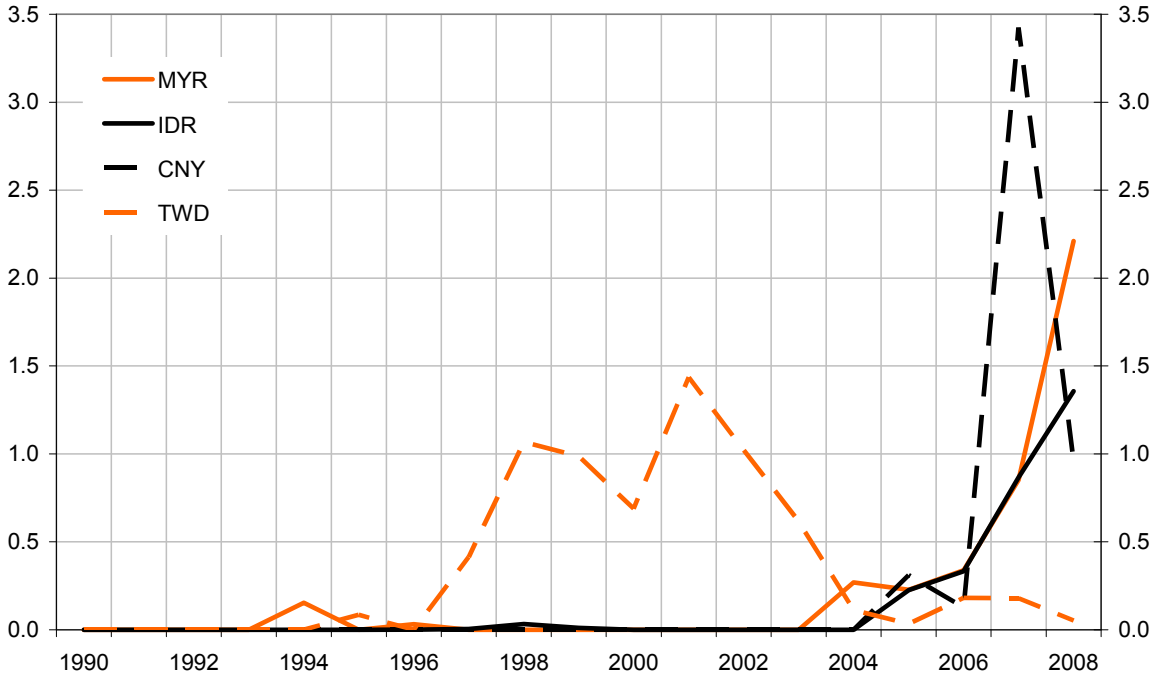



[a] In billions of constant 2008 US dollars.

Sources: IMF; Dealogic; Euroclear; ICMA; Thomson Financial; BIS; authors' calculations.

Figure 2b

**Gross issuance of foreign currency bonds denominated in Asia-Pacific currencies**[a]

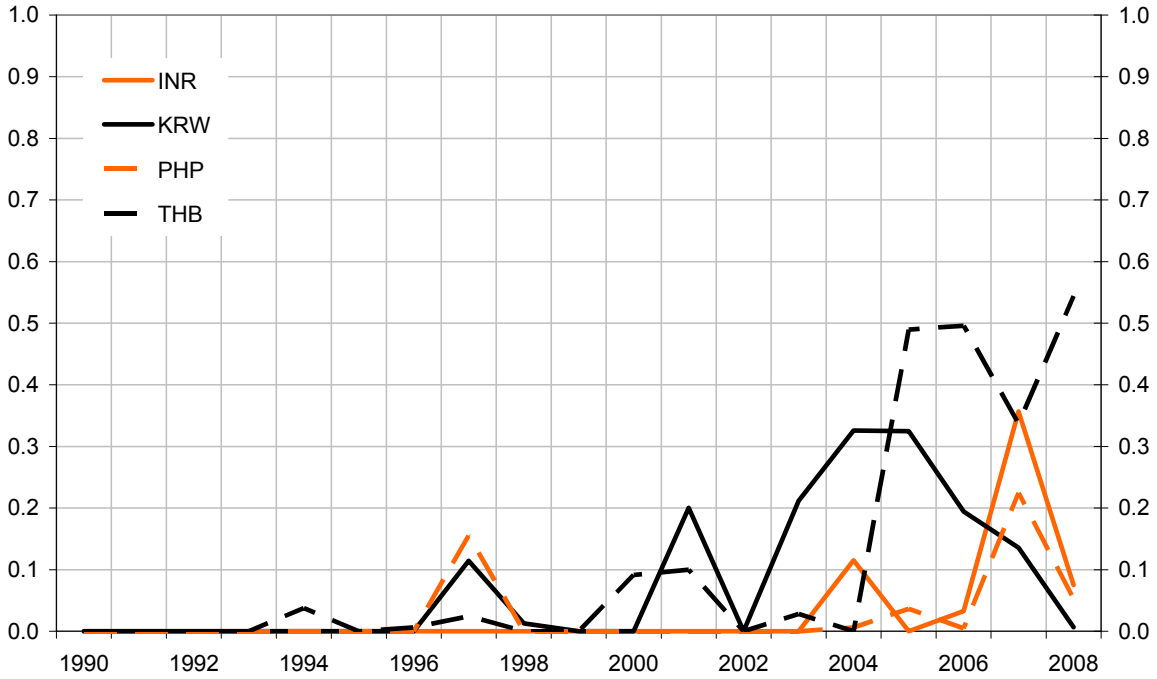



[a] In billions of constant 2008 US dollars.

Sources: IMF; Dealogic; Euroclear; ICMA; Thomson Financial; BIS; authors' calculations.

Figure 2c

**Gross issuance of foreign currency bonds denominated in Asia-Pacific currencies**[a]

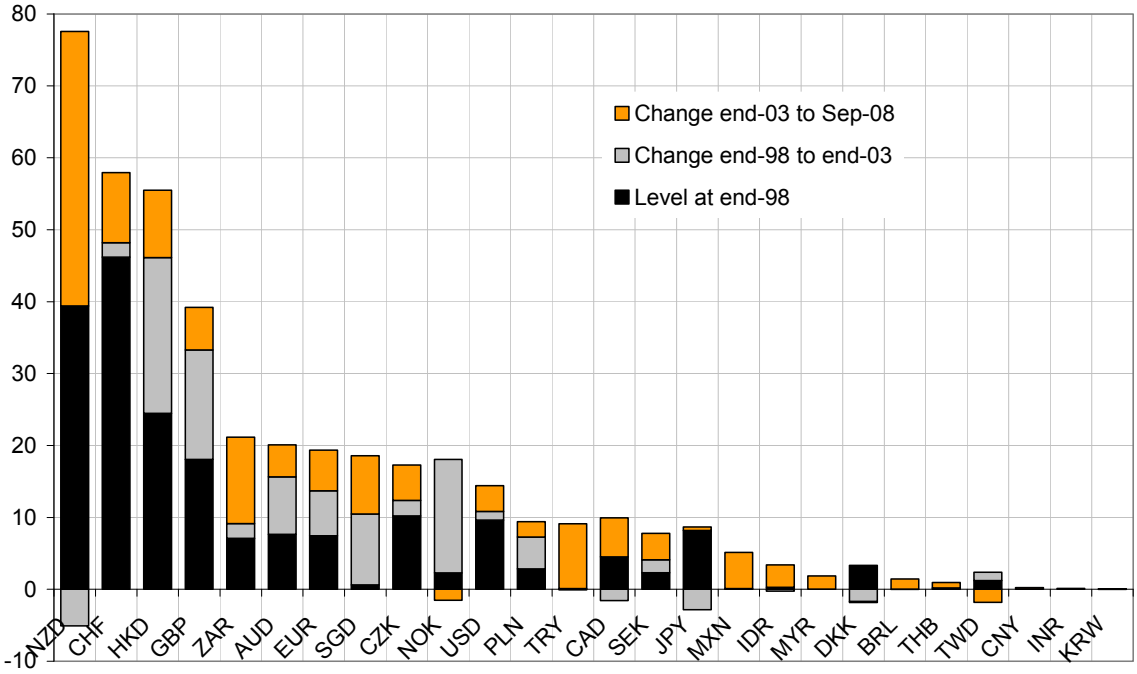



[a] In billions of constant 2008 US dollars.

Sources: IMF; Dealogic; Euroclear; ICMA; Thomson Financial; BIS; authors' calculations.

Figure 3

**Participation of non-resident issuers in local currency markets**[a]

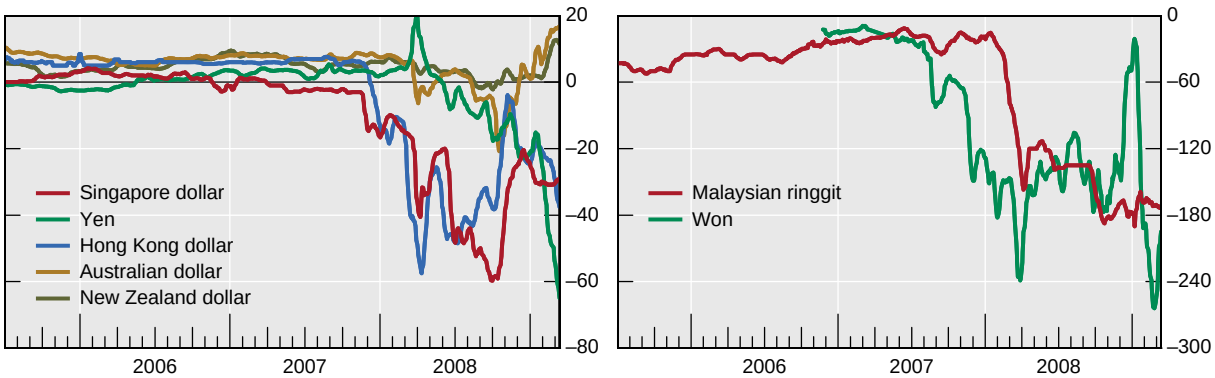



[a] Outstanding stock of debt securities issued by non-residents in the specified currency as a percentage of all debt securities issued in the specified currency. Data on residents' and non-residents' issues are from different sources and may be incomplete.

Sources: Dealogic; Euroclear; ICMA; national data; BIS; authors' calculations.

Figure 4

**Cross-currency basis swap spreads**[a]

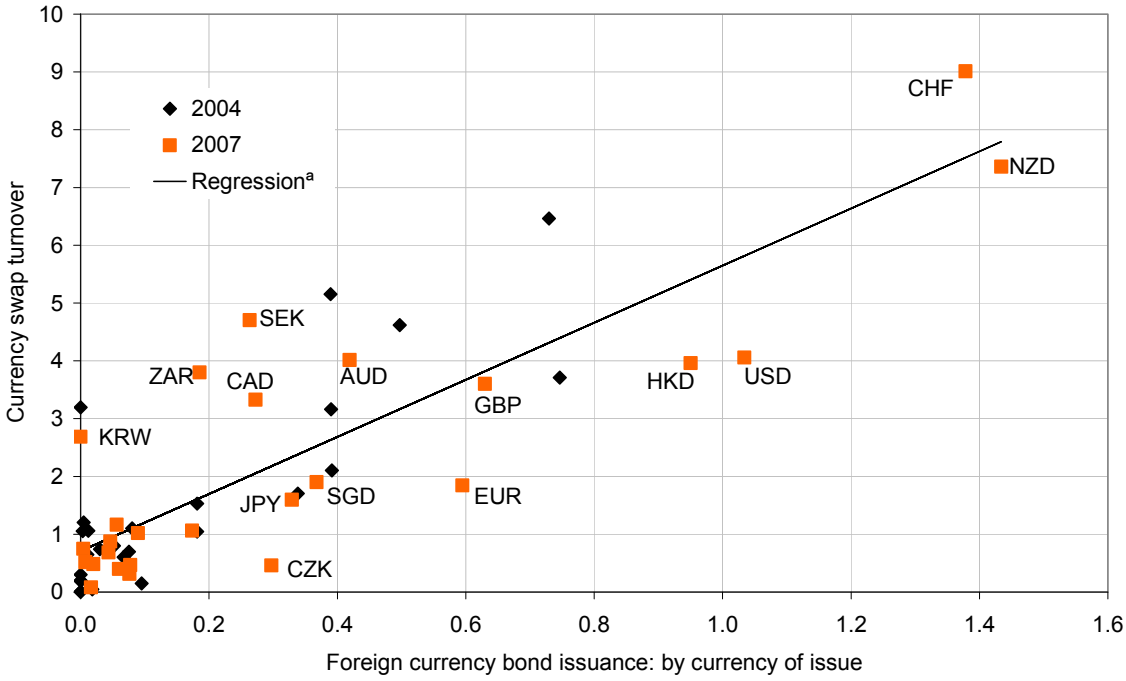



[a] Spread to borrow the specified currency in exchange for lending USD at Libor. Five-year indicative spreads, in basis points; 10-day moving average.

Source: Bloomberg.

Figure 5a

**Correlation between currency swap turnover and foreign currency bond issuance (by currency of issue)[b]**



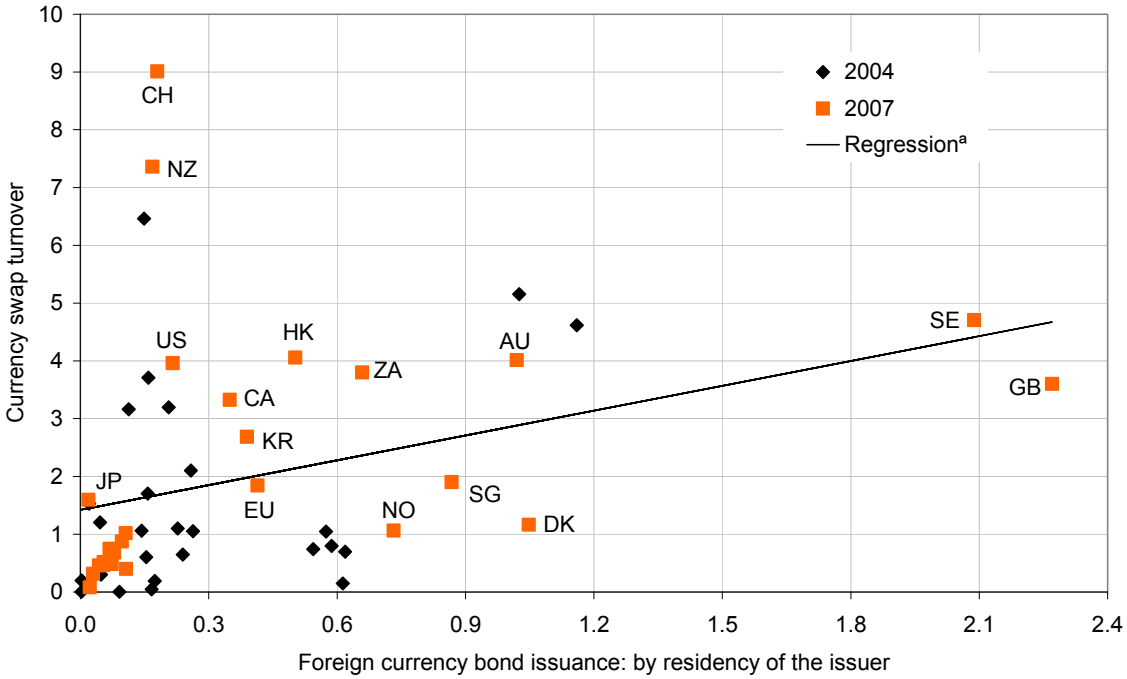

[a] Intercept = 0.7076 (*t*-statistic = 3.7085); slope coefficient = 4.9415 (*t*-statistic = 11.0291); *n* = 52; *r2* = 0.7087.

[b] Horizontal axis: monthly gross issuance (during the April–June period of the year specified) by non-residents of bonds and notes denominated in the specified currency, as a percentage of national annual GDP; vertical axis: monthly turnover (in April of the year specified) of currency swaps denominated in the specified currency, as a percentage of national annual GDP.

Sources: BIS Triennial Central Bank Survey; IMF; Dealogic; Euroclear; ICMA; authors' calculations.

Figure 5b

**Correlation between currency swap turnover and foreign currency bond issuance (by residency of the issuer)[b]**




[a] Intercept = 1.4200 (*t*-statistic = 4.1549); slope coefficient = 1.4320 (*t*-statistic = 2.5231); *n* = 52; *r2* = 0.1129.

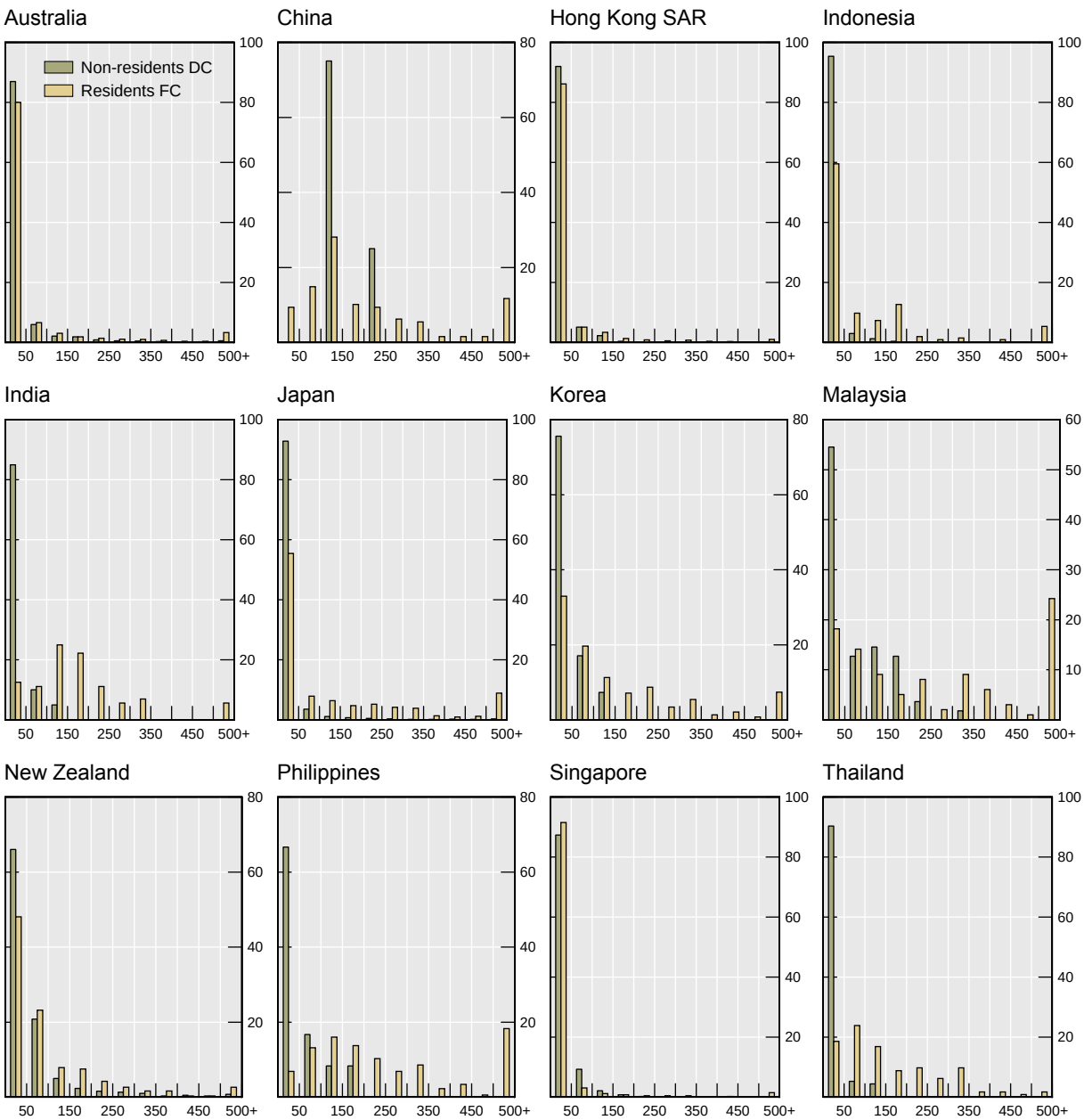
[b] Horizontal axis: monthly gross issuance (during the April–June period of the year specified) of bonds and notes denominated in foreign currencies by residents of the specified countries, as a percentage of national annual GDP; vertical axis: monthly turnover (in April of the year specified) of currency swaps denominated in the local currency of the specified country, as a percentage of national annual GDP.

Sources: BIS Triennial Central Bank Survey; IMF; Dealogic; Euroclear; ICMA; authors' calculations.

Figure 6

**Issue size**[a]

Foreign currency bonds issued by residents versus local currency bonds issued by non-residents



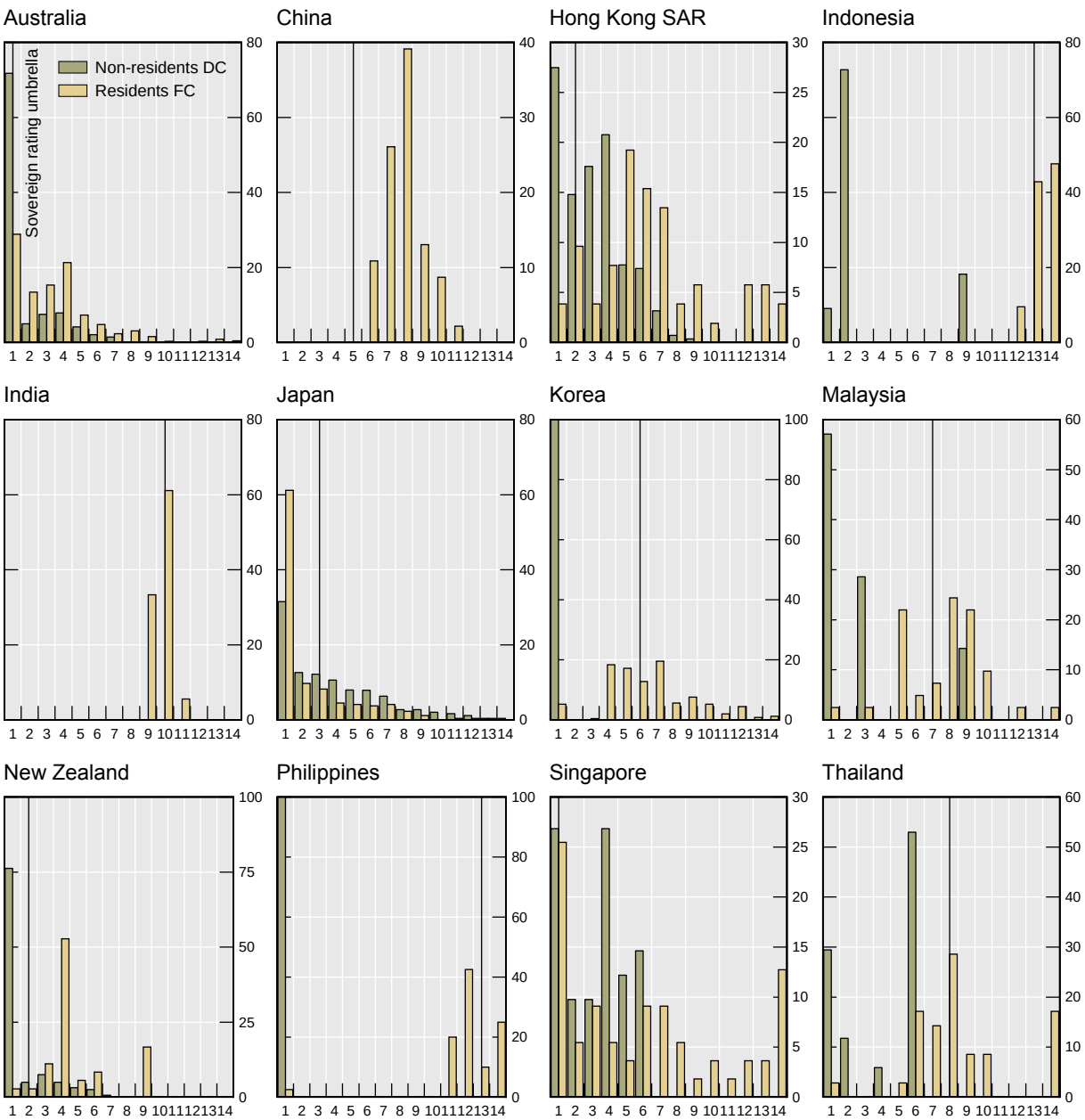

DC = local currency; FC = foreign currency.

[a] Horizontal axis = issue size, in millions of US dollars; vertical axis = percentage of bonds.

Figure 7

**Credit ratings**

Foreign currency bonds issued by residents versus local currency bonds issued by non-residents



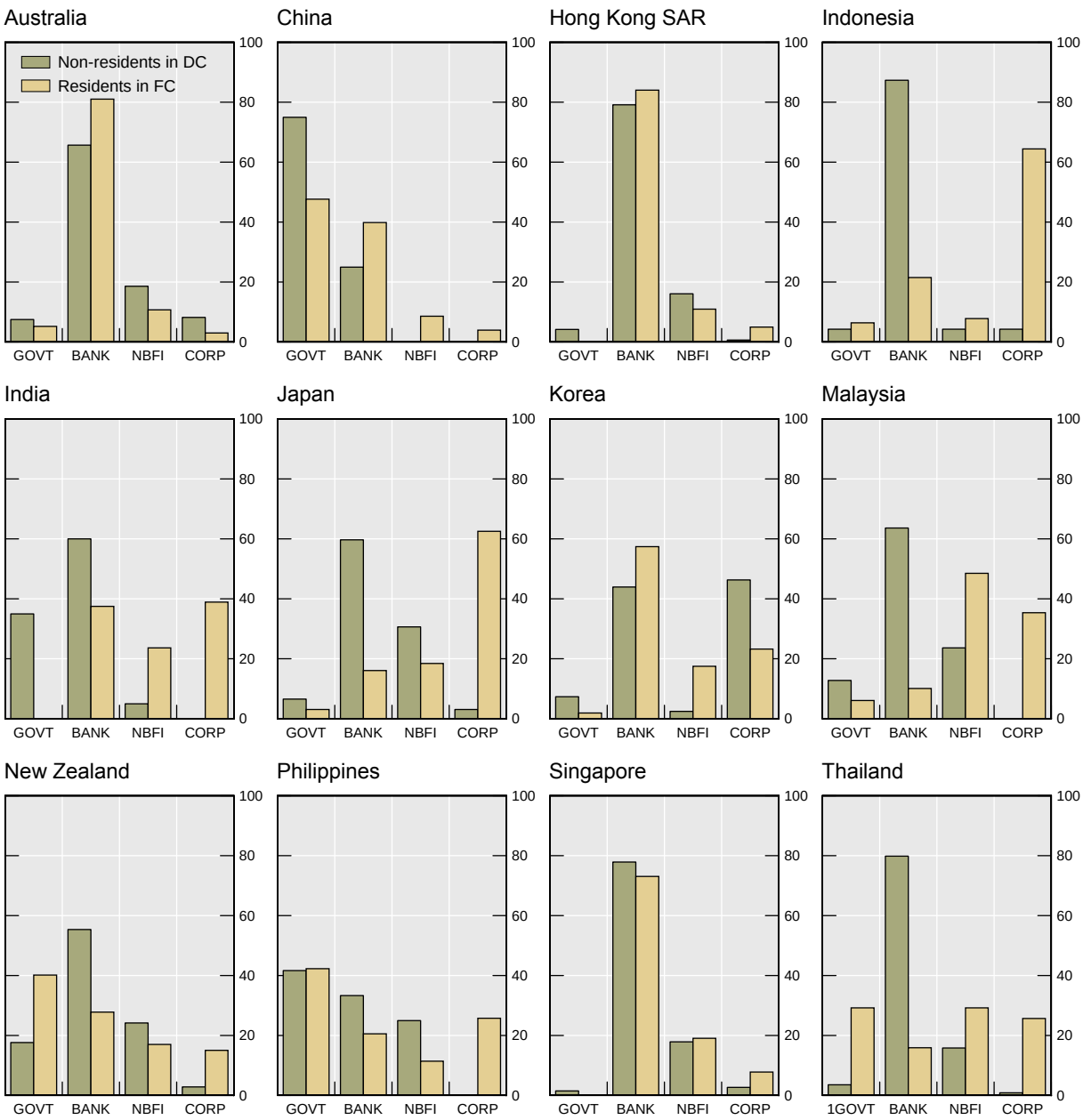

DC = local currency; FC = foreign currency.

[a] 1 = AAA/Aaa; 2 = AA+/Aa1; 3 = AA/Aa2; 4 = AA–/Aa3; 5 = A+/A1; 6 = A/A2; 7 = A–/A3; 8 = BBB+/Baa1; 9 = BBB/Baa2; 10 = BBB–/Baa3; 11 = BB+/Ba1; 12 = BB/Ba2; 13 = BB–/Ba3; 14 = lower than BB–/Ba3.

Figure 8

**Industry sector of issuer**[a]

Foreign currency bonds issued by residents versus local currency bonds issued by non-residents



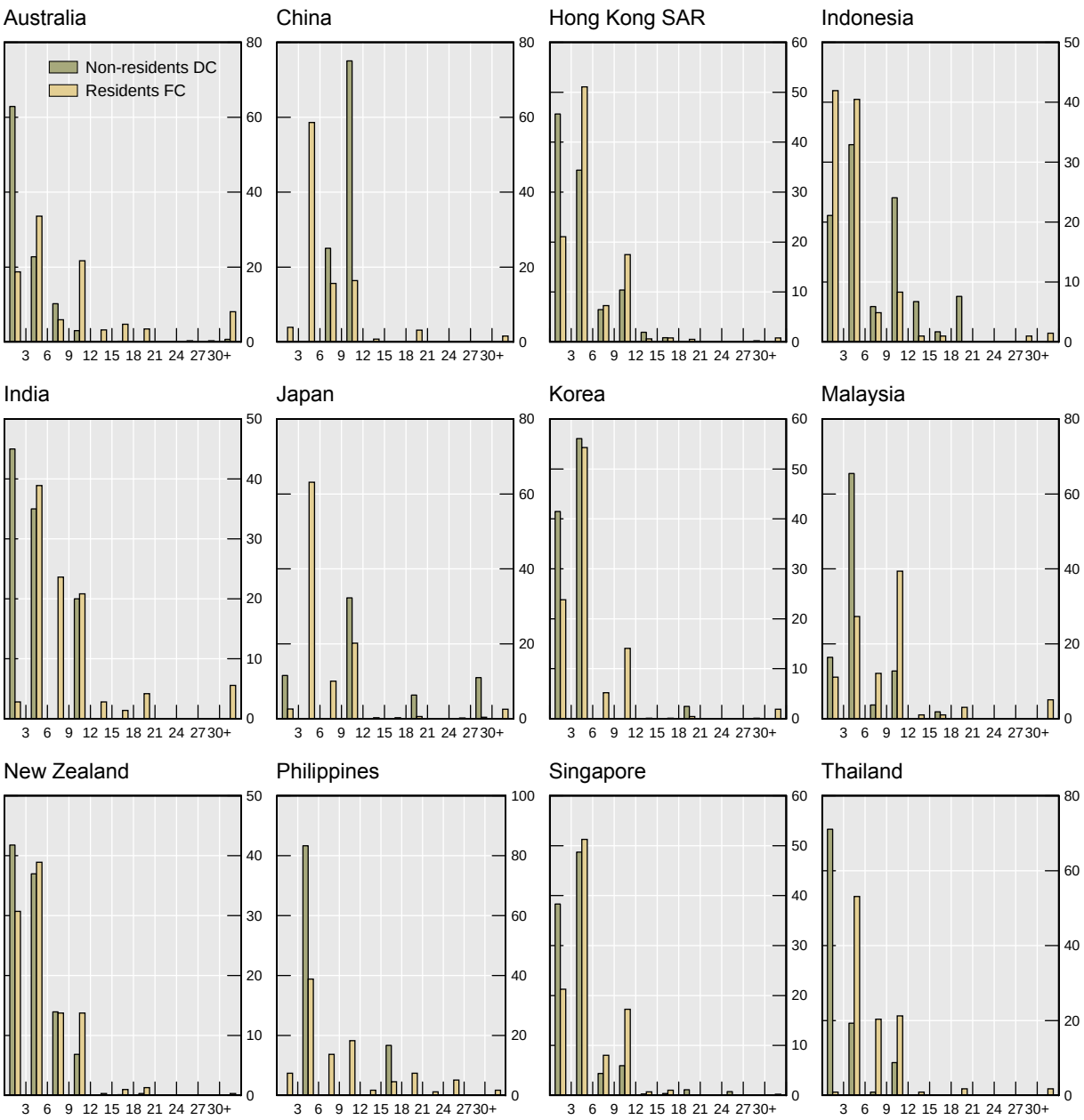

DC = local currency; FC = foreign currency.

[a] GOVT = supranational institutions, central governments and sub-national governments; BANK = banks; NBFI = non-bank financial institutions; CORP = non-financial corporations.

Figure 9

**Maturity**[a]

Foreign currency bonds issued by residents versus local currency bonds issued by non-residents




DC = local currency; FC = foreign currency.

[a] In years. "30+" refers to bonds of maturity equal to or greater than 30 years.

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