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## Asian local currency bond markets<sup>1</sup>

*The liquidity of Asian local currency bond markets varies with overall size, turnover, issue size and dispersion of holdings. Recently, returns on higher-yielding instruments have led local currency bonds to outperform US Treasuries in aggregate.*

*JEL classification: E440, G150, H630, O160.*

Through various initiatives, East Asian governments are focusing their financial cooperation on developing regional bond markets. In June 2003, 11 central banks announced that they were pooling about \$1 billion of their official reserves to invest in US dollar bonds issued by sovereigns and agencies of eight of the 11 economies. They also set to work on funds to be invested in bonds denominated in domestic currencies (EMEAP (2003), (2004)).

What characteristics make these local currency bonds so interesting as an asset class? This special feature addresses this question. It offers an introduction to Asian local currency bond markets, analysing their size and liquidity and describing their performance in recent years.

While the scale of Asian local currency bond markets makes them a potentially important asset class, several factors limit liquidity. Since the Asian crisis, these markets, and their most liquid subset, have grown to be substantially larger than the Asian US dollar bond market. Liquidity varies a great deal across Asian bond markets, and some have achieved considerable trading volume, especially in Northeast Asia. We find that size matters for liquidity: larger markets enjoy higher trading volume, which in turn underpins narrower bid-ask spreads. Markets with larger average issue size, moreover, are more liquid. Given size, holdings that are concentrated among buy-and-hold investors depress liquidity. A broader investor base, including foreign investors, could thus improve liquidity, perhaps particularly at times of stress.

Recent experience, at least, suggests that these less liquid markets have offered respectable returns. While yields on local currency bonds stand both higher and lower than those on US Treasuries, Asian local currency bonds on an unhedged basis returned more than US Treasury securities of similar duration from January 2001 to March 2004. This outcome resulted largely from

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<sup>1</sup> The views expressed in this article are those of the authors and do not necessarily reflect those of the BIS.

capital gains and higher yields for bonds that started out with higher yields. A question we leave for future analysis is how these bonds fit into global bond portfolios.

### Size of Asian local currency bond markets

Asian local currency bond markets have experienced rapid growth since the Asian crisis. They more than doubled in size between 1997 and 2002 (excluding Australia, Japan and New Zealand). The total outstanding amount reached \$1.2 trillion by end-2002, equivalent to about 50% of regional GDP (Table 1).<sup>2</sup> This impressive growth reflected official measures to develop alternative channels of financial intermediation, as well as the funding needs of bank restructuring and government deficits.

Outstandings of  
over \$1 trillion ...

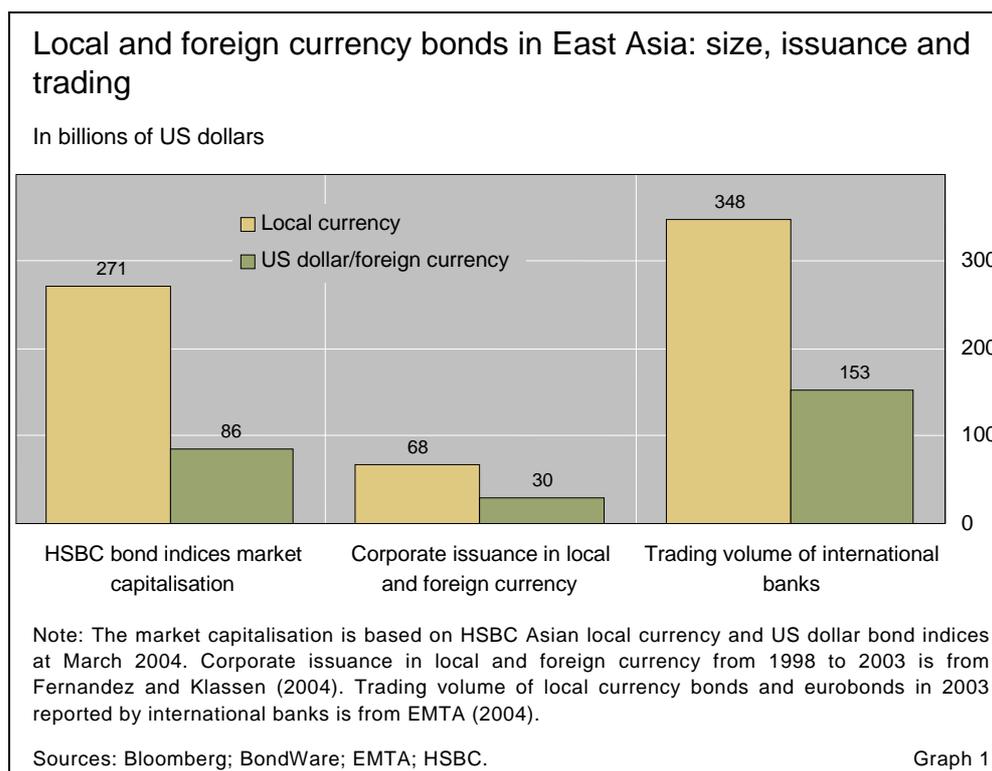
| Size of local bond markets in EMEAP economies in 2002 |             |          |                  |            |                 |            |
|---|-------------|----------|------------------|------------|-----------------|------------|
| Economy   | Bond market |          | Of which:        |            |                 |            |
|   |             |          | Government bonds |            | Corporate bonds |            |
|   | US\$ bn     | % of GDP | US\$ bn          | % of total | US\$ bn         | % of total |
| Australia   | 208         | 53       | 71               | 34         | 58              | 28         |
| China   | 465         | 38       | 243              | 52         | 10              | 2          |
| Hong Kong SAR   | 68          | 42       | 15               | 22         | 5               | 7          |
| Indonesia   | 56          | 31       | 54               | 96         | 2               | 4          |
| Japan   | 6,735       | 161      | 4,838            | 72         | 753             | 11         |
| Korea   | 381         | 76       | 96               | 25         | 151             | 40         |
| Malaysia  | 83          | 87       | 34               | 41         | 38              | 46         |
| New Zealand <sup>1</sup>                              | 18          | 29       | 18               | ..         | ..              | ..         |
| Philippines   | 26          | 34       | 25               | 97         | 1               | 3          |
| Singapore   | 53          | 60       | 33               | 62         | 3               | 5          |
| Thailand  | 47          | 38       | 29               | 61         | 7               | 14         |
| Total   | 8,140       | 115      | 5,456            | 67         | 1,027           | 13         |
| Total excluding Japan                                 | 1,405       | 48       | 618              | 44         | 274             | 19         |
| Total excluding Australia, Japan<br>and New Zealand   | 1,179       | 48       | 528              | 45         | 216             | 18         |
| <i>Memo:</i>  |             |          |                  |            |                 |            |
| <i>India</i>  | 156         | 34       | 154              | 99         | 2               | 1          |
| <i>Taiwan, China</i>                                  | 107         | 38       | 61               | 57         | 33              | 31         |
| <i>United States</i>                                  | 16,324      | 156      | 4,537            | 28         | 2,421           | 15         |

Note: Bonds issued by financial institutions are not included in corporate bonds.

<sup>1</sup> Private sector bond data are not available.

Sources: Deutsche Bank (2003); Hong Kong Monetary Authority; Reserve Bank of New Zealand; CEIC; IFS; BIS. Table 1

<sup>2</sup> The amounts in Table 1 for government bonds are understated by excluding central bank debt instruments. In a number of economies, the central bank issues its own liabilities to sterilise foreign exchange purchases (McCauley (2003)). In Korea, for instance, monetary stabilisation bonds, with original maturities up to two years, now top 100 trillion won, much the same size as the government bond total on Table 1. Similar central bank liabilities, albeit of generally shorter maturity, are found in China, Indonesia, Malaysia, Taiwan (China) and Thailand.



Despite rapid growth, Asian local currency bond markets remain to varying degrees underdeveloped. They are small relative to those in the United States or Japan, where outstanding domestic bonds account for over 150% of GDP. Moreover, government bonds make up half of the market. Corporate financing remains dominated by bank lending and equity financing.<sup>3</sup> In addition, the markets are to some extent segmented from each other and from global fixed income markets by, inter alia, withholding taxes, regulatory and legal factors, and deficiencies in infrastructure.

The “investible” portion of these markets is much smaller than the total outstanding amount, but not inconsequential. The investible universe of Asian local bonds, as defined by the HSBC local currency bond index, had a capitalisation of about \$270 billion in March 2004, less than a quarter of the outstanding \$1.2 trillion. HSBC has excluded Chinese bonds owing to capital controls. In addition, illiquid bank recapitalisation bonds in Indonesia and the retail bonds targeted at domestic individuals issued in 2002 to cover bank rescue costs in Thailand are excluded.

Nonetheless, compared to their foreign currency counterparts, the local currency bond markets bulk substantially larger, attract heavier issuance and show higher aggregate trading volumes. Even the investible portion of the local markets is larger than the Asian US dollar bond market (Graph 1), whether measured by the HSBC Asian US dollar bond index (with a capitalisation of about \$86 billion) or the similar JPMorgan Asia Credit index (about \$94 billion). In the primary market, domestic currency issuance has recently dominated that in foreign currency for both the government and corporate sectors (Reserve

... with a smaller portion readily accessible ...

... but still larger than Asian dollar bonds

<sup>3</sup> This pattern of corporate finance is observed widely in Europe as well.

Bank of Australia (2003), Fernandez and Klassen (2004)). In the secondary market, even the multinational financial firms that make up the Emerging Markets Traders Association (EMTA) alone report a trading volume of Asian local currency bonds more than double that of Asian international bonds in 2003. Only for bonds issued by borrowers in China, Indonesia and the Philippines are more transactions reported in international bonds.

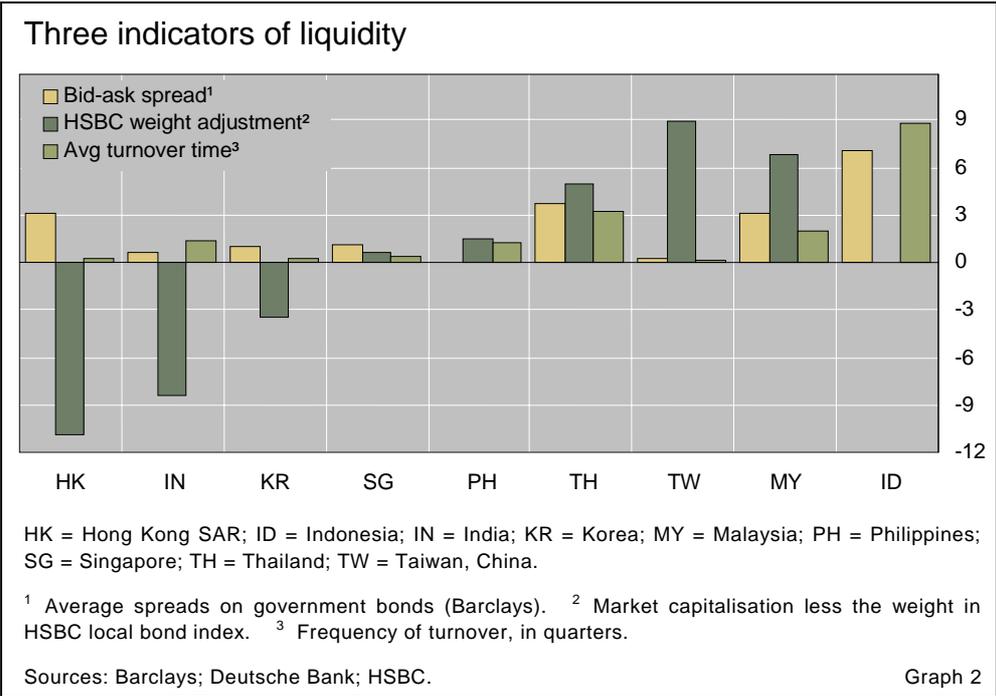
**Liquidity of Asian local currency bond markets**

In a liquid market, transactions can be carried out cheaply and rapidly without affecting the price. Liquidity has several dimensions – tightness, depth, immediacy and resilience (CGFS (2000)). Tightness refers to the difference between buy and sell prices, such as bid-ask spreads in a quote-driven market. Depth refers to the size of transactions that can be executed without moving the price. Immediacy refers to the speed at which orders can be executed, and resilience refers to the ease with which prices return to normal after temporary disturbances or imbalances in orders. There can be trade-offs between dimensions. For instance, competition between market-makers or regulation can narrow the bid-ask spread at the cost of less depth, as reduced profitability leads to less capital devoted to market-making. A liquid government bond market is important for cash or funding liquidity, as it improves the ability of financial institutions to realise value via sales of government securities.

*Measuring liquidity*

Since liquidity is a multidimensional concept, we examine several indicators: a market-maker’s assessment, turnover and the bid-ask spread. These indicators turn out to be broadly consistent (Graph 2).

Three measures



HSBC's assessment of liquidity, accessibility and infrastructure leads the bank to place a higher or lower weight on its local bond index than would be justified by market capitalisation alone. The overweighted markets of Hong Kong SAR, India and Korea are considered to have better liquidity and accessibility than the other markets.

Broadly paralleling this assessment is the indication offered by turnover and its relation to market capitalisation. Measured by the frequency of turnover, Hong Kong, Taiwan (China),<sup>4</sup> Korea and Singapore enjoy more liquid bond markets.

A similar indication is provided by reported average bid-ask spreads. These range from around 1 basis point in India, Korea, Singapore and Taiwan to 7 basis points in Indonesia. Reported spreads in general are narrow, even when compared to the liquid US Treasury markets, where bid-ask spreads range from 0.5 basis points for Treasury bills to 3 basis points for Treasury bonds. While Fleming (2003) finds that the bid-ask spread is the best indicator of liquidity, the narrowness of this spread in East Asia may in part reflect government or exchange rules that constrain the market-makers' bid-ask spreads. The apparent liquidity of the narrow spread may be offset by less market depth.

#### *Determinants of liquidity*

Turning from measuring to assessing the determinants of liquidity, several factors play a role (CGFS (2000)). On the supply side, the size of the bond markets in Asia, which Eichengreen and Luengnaruemitchai (2004) find to be empirically related to the size of the economy itself, could contribute to the lack of depth and liquidity. Further, small individual issue size, which could reflect the shallowness of markets, may also discourage trading and thereby contribute to the lack of liquidity. On the demand side, a narrow investor base, dominated by local commercial banks and/or a government provident fund, could result in a one-sided bond market, with participants all attempting to sell or buy at any given moment. Absent or high-cost hedging instruments and restrictions on short selling could accentuate momentum trading in bond markets, and discourage broad investor participation. Accounts based on historical rather than market value could encourage buy-and-hold strategies which reduce market liquidity (Mohanty (2002)).

Supply factors:  
overall size ...

We find that size matters for liquidity in Asia (Graph 3, upper panels). A larger market tends to be associated with higher trading volumes (both variables are in logs), which are in turn associated with tighter bid-ask spreads. This is similar to (although somewhat weaker than) the relationship between size, turnover and liquidity observed in G10 government bond markets and ascribed to economies of scale in market-making (McCauley and Remolona (2000)).

Using the existence of an active government bond futures markets as well as bid-ask spreads in G10 markets, McCauley and Remolona (2000) suggest

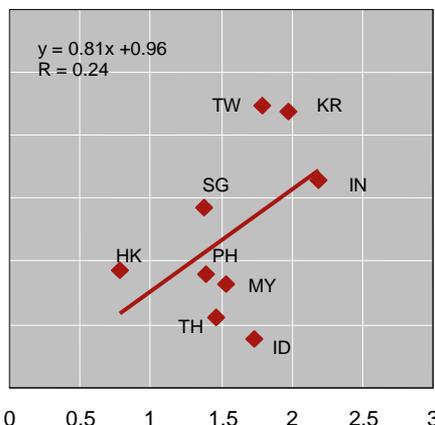
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<sup>4</sup> Hereinafter Taiwan.

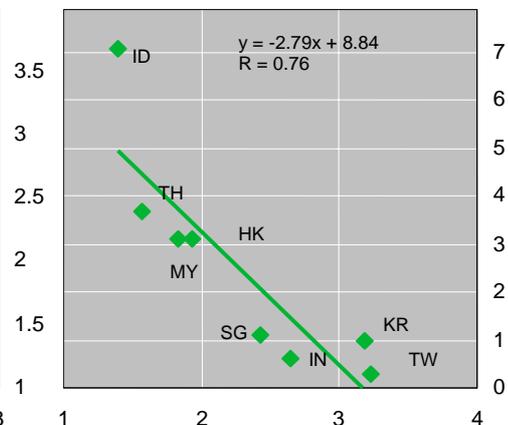
## Liquidity in East Asian bond markets

Size, trading, issue size and concentration

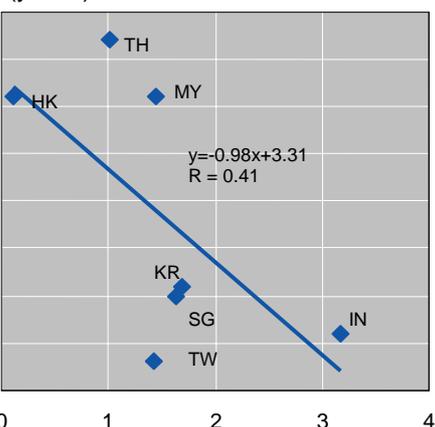
Size (x-axis) and trading volume (y-axis)<sup>1</sup>



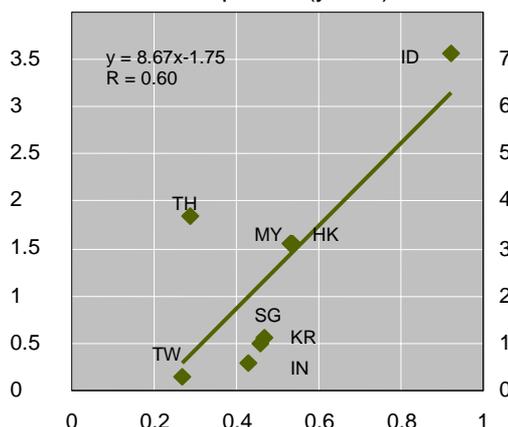
Trading volume (x-axis)<sup>1</sup> and bid-ask spread (y-axis)<sup>2</sup>



Issue size (x-axis)<sup>1</sup> and bid-ask spread (y-axis)<sup>2</sup>



Concentration of bond holdings (x-axis)<sup>3</sup> and bid-ask spreads (y-axis)<sup>2</sup>



<sup>1</sup> In billions of US dollars; in logs. <sup>2</sup> In basis points. <sup>3</sup> Herfindahl-Hirschman index.

Sources: Barclays Capital; Bloomberg; Deutsche Bank; HSBC; BIS calculations.

Graph 3

that the critical size for a liquid market is around \$100–200 billion. In Asia, China and India have crossed this threshold, and Korea and Taiwan are approaching it. Australia's experience, however, suggests that, under the right circumstances, liquid government bond cash and futures markets can both be sustained at a much smaller size (Australia (2003)). Equally, though, the \$100–200 billion threshold may be too low under less favourable circumstances.

Large individual issues in a market indicate market depth, itself a liquidity indicator, but can also promote liquidity by attracting more trading. In Asia, the average issue size is negatively associated with bid-ask spreads, implying that the bond markets with larger average issue sizes have better liquidity (Graph 3, lower left-hand panel). Again, China and India stand out with average issue sizes above \$3 billion. Thus, while fostering liquid bond markets is no doubt easier in larger economies than in smaller ones, careful debt management can lead to better liquidity than size alone would suggest.

... and individual issue size

One way of creating size is by lumping together different types of debt. This has two facets in Asian economies – few versus many maturities, and one versus many public sector obligors. With regard to maturity, the choice is between concentrating issuance into benchmarks on the one hand, and supplying a continuous yield curve while lengthening maturities on the other. Industrial countries faced with fiscal surpluses tend to concentrate issuance in a few large benchmark issues to maintain liquidity. There seems to be some room to increase the size of benchmark issues in India, Taiwan and Thailand, as they have relatively low ratios of maximum to minimum or average issue size (at least among the HSBC Asian local currency bond index constituents). At the same time, multiple obligors divide the market into relatively less liquid segments. Consideration might be given to the proposal to unify each government bond market in East Asia, by overfunding government fiscal needs and depositing the proceeds in the central bank, replacing its liabilities to market participants, as suggested in McCauley (2003).

Demand factors:  
broad investor  
base ...

A narrow investor base, dominated by banks, hinders the development of a liquid secondary bond market. On average, over half of Asian domestic debt securities are held by banks, a share significantly higher than in other emerging markets as well as in developed economies. We find that more concentrated bond holding is associated with larger bid-ask spreads, suggesting that the concentration of bond holdings in Asia impairs liquidity (Graph 3, lower right-hand panel). The concentration of bond holdings is measured by the standard Herfindahl-Hirschman (HH) index, which is defined as the sum of the squared market shares. The larger the HH index, the more concentrated the market. Increased participation by institutional investors and foreign investors, who are notable by their absence – in sharp contrast to equity markets in the region – could help to reduce market concentration and thereby improve liquidity.

Withholding taxes may limit foreign investors' interest in Asian local currency bonds (Takeuchi (2004)). In most cases other than Hong Kong, such taxes are an issue, though how far either the interest forgone or the time and trouble required for refunding such taxes goes in explaining low levels of foreign investment in local markets is not clear. In Korea, it appears that long positions in three-year government bond futures (rather than the cash market) are the main channel for foreign investor participation, which suggests that withholding taxes may be the binding constraint.

... and hedging  
markets

Gaps in the existence of hedging markets, such as those for interest rate swaps and government bond futures, and underdeveloped funding markets like repurchase markets may reduce liquidity in Asian local bond markets (Barclays (2003), Hohensee and Lee (2004)). Swap markets are either underdeveloped or inactive in many countries, except Hong Kong and Singapore, mainly reflecting regulatory restrictions and the lack of reliable reference rates. Exchange-traded futures have been tried in Hong Kong, Singapore, Korea, Taiwan, Malaysia and India but have achieved critical mass only in Korean three-year bond futures. Repo market development is uneven, hindered by regulatory and taxation issues. Most of the transactions involve central banks, with limited inter-dealer markets in Korea, Malaysia and Singapore. While forward hedging of most local currencies is restricted, the increasing liquidity of

non-deliverable forward contracts may facilitate foreign investment in local currency bond markets by providing hedging instruments (Ma et al (2004)).

### *Liquidity under stress*

Measures and determinants of liquidity in normal markets may not apply to liquidity under stress, which may be a particular challenge for Asian local markets. Even well developed bond markets can show strains in down markets, as in 1994 or mid-2003 (Borio and McCauley (1996)). East Asian markets, with small size, less liquidity and a less diversified investor base, can encounter even more difficulty in times of stress.

The Korean and Thai markets have provided instances in support of the view that markets, like financial institutions, can be subject to runs (Borio (2000)). While such runs can occur in the centre of a market, as when dealers become concerned about each other's solvency and liquidity (counterparty risks in an over-the-counter market), recent Asian cases show that the runs can start among ultimate investors: in response to adverse price movements arising from either generally higher interest rates or unexpected defaults by bond issuers, investors in non-bank financial institutions that held bonds sought to withdraw their funds. This forced the financial institutions in turn to liquidate their bond holdings, which led to a drying-up of bond market liquidity (see box on page 75).<sup>5</sup>

Runs in bond markets

### Yields and returns on Asian local currency bonds

Yields on local currency bonds show considerable dispersion, standing both higher and lower than US Treasury yields. Spreads of local bonds over US Treasuries range from -270 basis points to +1,350 basis points, while yields on Asian US dollar sovereign bonds are uniformly higher than those on equivalent US Treasury notes, with spreads ranging from 50 to 800 basis points (Table 2). Local currency bonds of Singapore, Taiwan and, more recently, Hong Kong SAR trade with yields lower than the comparable US Treasury notes. In Singapore and Taiwan, low policy rates and the expected strengthening of the domestic currencies against the US dollar account for lower interest rates. While Hong Kong bonds have usually offered a premium over their US Treasury counterparts, reflecting the risk of currency unpegging, since September 2003 expectations of renminbi appreciation have carried Hong Kong bond yields below US yields. In China and Malaysia, capital controls allow yields that are lower than US yields, despite the fixed exchange rate against the dollar and the absence, until 2003, of expectations of appreciation. In Thailand, low policy rates and expected currency appreciation accounted for lower interest rates in much of last year, but more rapid growth and a much reduced threat of deflation have put pressure on local yields more recently.

Asian local currency bonds yield both more and less than US Treasury securities

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<sup>5</sup> It is not clear whether the clearing and settlement infrastructure in Asia, which is regarded as not sufficiently mitigating risks in the settlement process in all cases (Braechevelt (2004)), contributes to any loss of liquidity during market stress.

## Volatility and liquidity in Asia

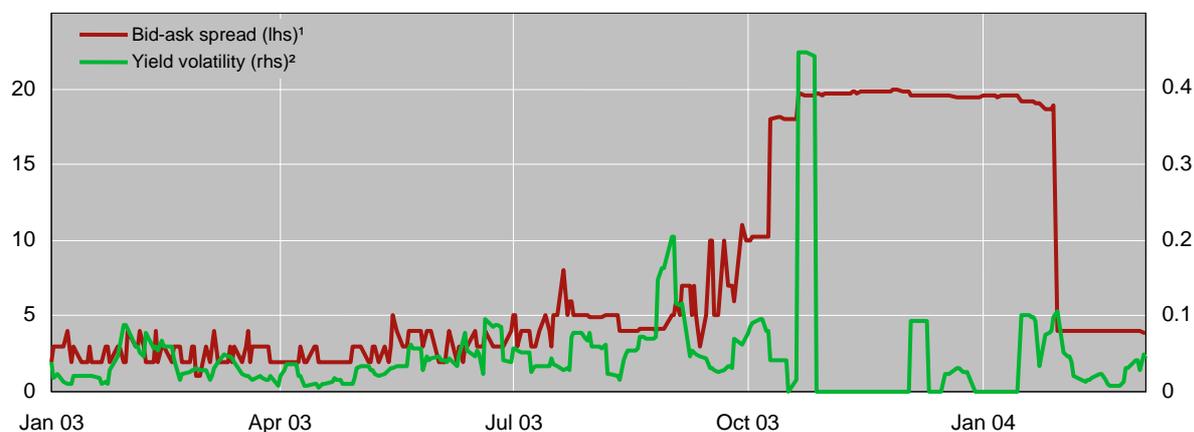
In early 2003, the Korean bond market went through its third crisis since the 1997–98 Asian crisis. Common elements in the three crises were a shock to the assessment of a private firm (Daewoo, Hyundai or SK Group/LG Card), a run on bondholding investment trust companies by households and firms, distress sales of bonds – especially government bonds, illiquidity and eventually government intervention.

More recently, the sell-off in the US Treasury markets during the summer of 2003 as well as domestic developments led to bouts of volatility in Asian local currency bond markets and adversely affected market liquidity. In the latter half of 2003, 10-year bond yields in China, Singapore, Taiwan and Thailand all underperformed the comparable US Treasury notes.

In China, the increase in the reserve requirement in September, the rise in inflation and expectations of a large supply of Treasury bonds led to a major sell-off in a bond market dominated by commercial banks. Ten-year bond yields rose from 2.9% in September to 3.9% in November. This run-up resulted in liquidity vanishing in the primary market, with undersubscription and cancellation of new issues of Treasury bonds.

The sell-off in the Thai baht bond market was triggered by the volatility in the US Treasury markets. However, domestic factors – relaxed restrictions on capital outflows, uncertainty about the timing of government bond issuance and strong performance of the stock market – pushed baht yields up even after the US markets had stabilised. The decline in the net asset value of fixed income mutual funds was sharp owing to the lack of hedging instruments. This led to withdrawals by investors. Mutual funds had to sell bonds to meet redemption requests, further depressing bond prices. As price volatility increased from June, bid-ask spreads widened substantially from about 3 basis points to 10 basis points, and further to almost 20 basis points (see graph below). Though bid-ask spreads also rose in the US Treasury markets amid volatile conditions, the movement in the Thai market was much larger and lasted longer (Kos (2003)). Trading volume fell to less than 1 billion baht a day from about 10 billion baht a day.

### Yield volatility and bid-ask spread for Thai government bond maturing in 2012



<sup>1</sup> In basis points. <sup>2</sup> Standard deviations of daily yield changes in the preceding week.

Sources: Bloomberg; HSBC; BIS calculations.

Over the past three years, investing in those instruments with relatively high yields would have tended to produce higher returns in local currency terms (Table 2). The higher-yielding bonds of India and the Philippines performed better both because of capital gains as yields declined and because of the higher yields themselves. Bonds yielding less than comparable US Treasury bonds tended to produce lower local currency returns.

Since exchange rates against the dollar were on average relatively stable during the period, the mix of local currency returns translated into respectable US dollar returns. This conclusion emerges from a juxtaposition of the total returns on Asian local currency bonds in local and US dollar terms (on an unhedged basis), as compiled by HSBC, with those on US Treasuries as compiled by the European Federation of Financial Analysts Societies (EFFAS). Since these sets of returns are available only for indices, we choose the appropriate EFFAS index to match each Asian index's duration.

Based on these indices, the total returns from Asian local bonds exceeded those on comparable US Treasury bonds from January 2001 to March 2004 (Graph 4). In particular, the total return in US dollars from the HSBC local bond market index during the period is higher than the comparable US Treasury return by about 24 percentage points.<sup>6</sup> Except in China, Malaysia and Singapore (where yields were generally low and currencies stable), Asian local bonds in each economy posted returns in US dollar terms in excess of those on US Treasuries over the 39 months. Exchange rate appreciation did contribute significantly to higher returns in Korea and Thailand, with dollar returns exceeding local currency returns by 10 to 13 percentage points. While exchange rate weakness reduced local currency returns by 17 percentage points in the Philippines, this exchange loss was more than offset by higher yields and capital appreciation. As noted, these factors accounted for higher returns in India, and to a much lesser extent, Hong Kong, over the 39 months.<sup>7</sup>

Outperformance  
against US  
Treasury  
securities ...

| Yield spreads and returns on Asian local currency bonds |  |   |                           |
|---|--|---|---------------------------|
| In per cent   |  |   |                           |
|   | Yield spread <sup>1</sup><br>31 Jan 2001 | Yield spread <sup>1</sup><br>1 Mar 2004 | Index return <sup>2</sup> |
| China 11-year   | -1.64 <sup>3</sup>                       | 0.44                                    | 10.94                     |
| Hong Kong SAR 5-year                                    | 0.61                                     | -0.33                                   | 25.42                     |
| India 10-year   | 5.45                                     | 1.29                                    | 81.65                     |
| Korea 3-year  | 0.93                                     | 2.64 <sup>4</sup>                       | 25.99                     |
| Malaysia 10-year  | -0.01                                    | 0.69                                    | 14.30                     |
| Philippines 3-year                                      | 11.94 <sup>5</sup>                       | 9.60                                    | 54.88                     |
| Singapore 10-year                                       | -1.42                                    | -0.71                                   | 16.16                     |
| Taiwan, China 10-year                                   | -0.04                                    | -1.44                                   | 35.65                     |
| Thailand 10-year  | -0.27                                    | 0.42                                    | 23.20                     |

<sup>1</sup> Spread over US Treasury of corresponding maturity. <sup>2</sup> Between January 2001 and March 2004; index return in local currency terms, as compiled by HSBC. <sup>3</sup> 11 October 2001. <sup>4</sup> 27 February 2004. <sup>5</sup> 19 October 2001.

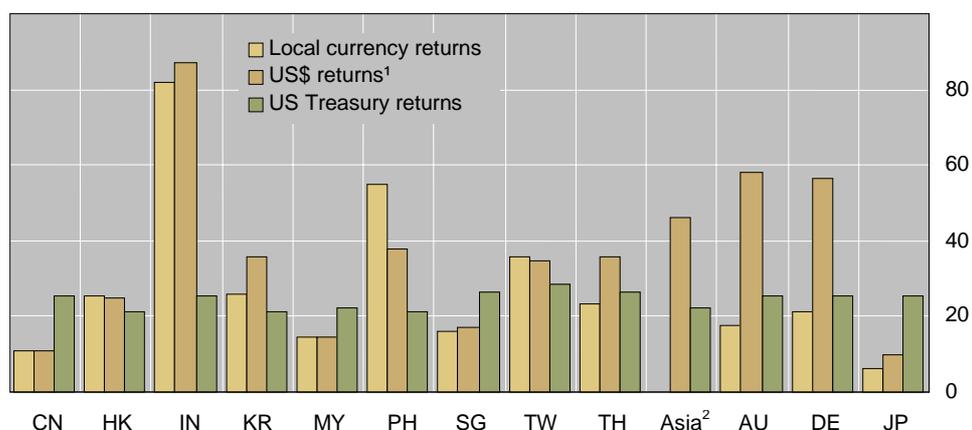
Sources: Bloomberg; HSBC; BIS calculations. Table 2

<sup>6</sup> The HSBC overall Asian local bond total return index covers Hong Kong SAR, India, Korea, Malaysia, the Philippines, Singapore, Taiwan and Thailand, and is calculated in US dollar terms. The index excludes China since its bond market has not been opened to foreign investment.

<sup>7</sup> See Remolona and Schrijvers (2003) on higher-yielding bonds and returns.

## Returns from Asian local currency bonds and US Treasuries

January 2001–March 2004



AU = Australia; CN = China; DE = Germany; HK = Hong Kong SAR; IN = India; JP = Japan; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan, China.

<sup>1</sup> Unhedged basis. <sup>2</sup> Asian countries shown, except Japan.

Sources: Bloomberg; HSBC; BIS calculations.

Graph 4

... but not against euro or Australian dollar bonds

These returns from Asian local currency bonds can be compared to the returns from Australia dollar, euro and Japanese yen bonds. Total US dollar returns from Asian bonds fell short of those from Australian dollar or euro bonds during the 39 months, by about 10 percentage points, owing entirely to the strength of the Australian dollar and the euro against the US dollar.<sup>8</sup> Asian bond dollar returns were higher than those on Japanese bonds.

Lower credit quality

With higher credit risks in Asian bonds, these realised returns alone would not necessarily make such bonds attractive to investors. The credit ratings assigned to Asian local currency sovereign bonds are generally higher than those assigned to their dollar bonds (Kisselev and Packer (2004)). Still, these bonds averaged a credit rating of about A/A2 during the sample period, as compared to the higher ratings assigned to the US Treasury, top-rated European governments and the Australian government. Furthermore, there was a trend towards higher ratings in Asia in the sample period, which would tend to increase realised returns.

## Conclusions

Asian local currency bond markets have achieved substantial size since the Asian crisis. Liquidity conditions vary substantially across Asian economies, with market size and larger individual issues working for liquidity and concentration of bond holdings among buy-and-hold investors working against

<sup>8</sup> This discussion of returns is from the perspective of a dollar-based investor, which is appropriate for many portfolios managed in Asia. For a euro-based investor, the ranking would be the same: investing on an unhedged basis in euro or Australian dollar bonds would have led to the highest returns, followed by investing in Asian bonds and then investing in US Treasuries.

it. This implies that measures to consolidate different segments of the markets, such as fewer but larger issues and the unifying of government and central bank debts, would be helpful in improving liquidity. Efforts to develop hedging markets and to build up a broad investor base could help improve liquidity. Such measures might make it less likely that local currency bond markets seize up when hit with a change in liquidity preference or when otherwise stressed.

In most East Asian economies, investing in Asian local currency bonds on an unhedged basis would recently have produced returns in US dollar terms that were higher than similar investments in US Treasury securities, but lower than those in Australian dollar or euro bonds. Higher-yielding local bond markets, which enjoyed capital gains, contributed most to this outcome. To some extent as well, these returns reflect higher credit risk.

## References

Australia, Commonwealth of (2003): "Statement 7: budget funding", Budget for 2003-03, Canberra, May.

Barclays (2003): "The Asian bond market: from fragmentation to aggregation", Asian Rates and Credit Research, Barclays Research, Singapore, September.

Borio, C (2000): "Market liquidity and stress: selected issues and policy implications", *BIS Quarterly Review*, November.

Borio, C and R McCauley (1996): "The economics of recent bond market volatility", *BIS Economic Papers*, no 45, July.

Braeckvelt, F (2004): "Clearing, settlement and depository issues in Asia", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

Committee on the Global Financial System (2000): *Market liquidity: research findings and selected policy implications*, BIS, March.

Deutsche Bank (2003): "Asian local bond markets", Emerging Markets – Global Markets Research, Singapore, June.

Eichengreen, B and P Luengnaruemitchai (2004): "Why doesn't Asia have bigger bond markets?", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

EMEAP (2003): "EMEAP central banks to launch Asian Bond Fund", 2 June.

——— (2004): "EMEAP central banks announce the initial structure of the Asian Bond Fund 2", 15 April.

Emerging Markets Traders Association (2004): *2003 Annual Debt Trading Volume Survey*, 19 February.

Fernandez, D G and S Klassen (2004): "Choice of currency by East Asia bond issuers", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

Fleming, M J (2003): "Measuring treasury market liquidity", Federal Reserve Bank of New York, *Economic Policy Review*, September.

Hohensee M and K Lee (2004): "A survey of hedging markets in Asia – a description of Asian derivative markets from a practical perspective", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

Kisselev, K and F Packer (2004): "Minding the gap in Asia: foreign and local currency ratings", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

Kos, D (2003): "Recent trends in US government debt markets", EMEAP Forum, Hong Kong SAR, 15 December.

Ma, G, C Ho and R McCauley (2004): "The markets for non-deliverable forwards in Asian currencies", in this *Quarterly Review*, June.

McCauley, R (2003): "Unifying the government bond markets of East Asia," *BIS Quarterly Review*, December.

McCauley, R and E Remolona (2000): "Size and liquidity of government bond markets", *BIS Quarterly Review*, November.

Mohanty, M S (2002): "Improving liquidity in government bond markets: what can be done?", *BIS Papers*, no 11, June.

Remolona, E and M Schrijvers (2003): "Reaching for yield: selected issues for reserve managers", *BIS Quarterly Review*, September.

Reserve Bank of Australia (2003): "Bond market development in East Asia", *Reserve Bank of Australia Bulletin*, December, pp 1–8.

Takeuchi, A (2004): "Identifying impediments to cross-border bond investment and issuance in Asian countries", paper presented at the Korea University/BIS conference *Asian bond markets: issues and prospects*, Seoul, March.

