

## Diversifying with Asian local currency bonds<sup>1</sup>

*Asian local currency bonds offer diversification potential in global bond portfolios.*

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

A special feature in the *BIS Quarterly Review* of June 2004 profiled the Asian local currency bond markets as a potential asset class, contrasting their considerable capitalisation with their mixed liquidity. The article found that larger markets with larger issues saw more trading at narrower bid-ask spreads. For a market of a given size, concentration of holdings among investors depresses liquidity. A broader investor base might thus be expected to improve liquidity, particularly at times of stress (Jiang and McCauley (2004)).

Foreign investors might find these markets' recent performance attractive. Half of them returned more than US Treasury securities of similar duration on an unhedged basis from January 2001 to March 2004. This special feature addresses the question of how such bonds might fit into a global bond portfolio.

Asian local currency government bonds offer scope for diversification since their returns co-move only moderately with their US Treasury counterparts. In particular, their correlations with US Treasury bonds mostly lie below those of euro area or Australian government bonds. If Asian bonds' risk is measured by just the volatility of returns, then only by being combined in a portfolio would they offer a favourable risk-return trade-off relative to US Treasury bonds. If risk is measured by co-movement with the US bond market, almost every Asian bond market shows a very favourable risk-return trade-off.

The scope for diversification is greater for bonds of lower credit standing and for less globalised domestic bond markets. In particular, non-investment grade local currency bonds show lower correlations. These also tend to be lower in markets with a more limited presence of international banks.

Diversification sometimes fails when it is most needed during a bear market. Sell-offs in mid-2003 and the second quarter of 2004 tested the diversification possibilities suggested by our short-sample analysis. We find that Asian local bonds offered less refuge from the global sell-off than might have been expected.

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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.

## Co-movement of returns and yields

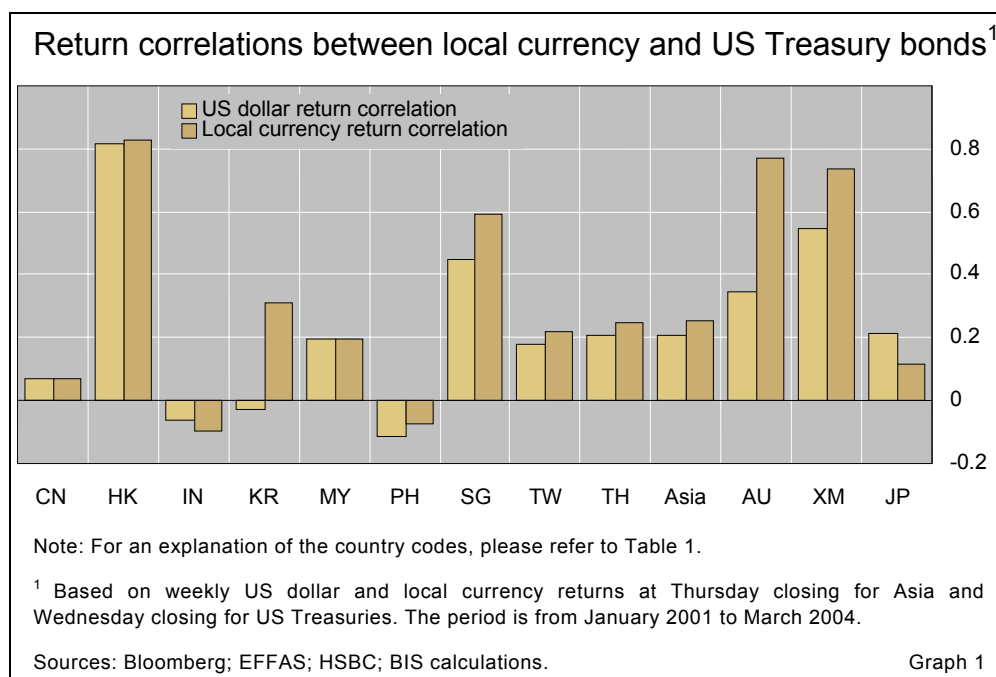
How do returns on Asian local currency bonds relate to those on global bonds? To address this question, we focus on the co-movement of local and US Treasury returns, in terms of US dollar returns on unhedged investments and own currency returns (Table 1). The correlation and variability of returns on an unhedged or hedged basis is most relevant from the perspective of a manager of a portfolio with US dollar bonds as its most important single constituent. We analyse unhedged returns directly and give some attention to own currency returns as a proxy for hedged returns, given generally narrow interest rate differentials.<sup>2</sup> To help understand the relationship of returns, we also analyse the co-movement of yields, specifically the extent to which US Treasury yield changes pass through to the yields on local currency bond benchmarks.<sup>3</sup> The pass-through analysis provides rules of thumb like: “A 10 basis point rise in US Treasury yields is associated with a 5 basis point rise in Singapore government yields.”

We measure co-movement ...

Benchmark government bonds and return indices				
	Benchmark bond analysis	Dollar return analysis		
		Duration of HSBC local bond index (years)	Matching US Treasury index	Duration of US Treasury index (years)
China (CN)	2011	5.6	USGATR (all > 1 year)	6.1
Hong Kong SAR (HK)	5-year	2.7	US17TR (1–7 years)	2.7
India (IN)	10-year	5.4	USGATR (all > 1 year)	6.1
Indonesia (ID)	7-year	...	.	.
Korea (KR)	3-year	2.4	US17TR (1–7 years)	2.7
Malaysia (MY)	10-year	3.4	US10TR (1–10 years)	3.7
Philippines (PH)	3-year	2.8	US17TR (1–7 years)	2.7
Singapore (SG)	10-year	4.6	US30TR (3–10 years)	4.6
Taiwan, China (TW)	10-year	8.9	US3OVERTR (3+ years)	7.9
Thailand (TH)	10-year	4.6	US30TR (3–10 years)	4.6
Asia local bond index	.	3.7	US10TR (1–10 years)	3.7
<i>Memo:</i>				
<i>Australia (AU)</i>	<i>10-year</i>	<i>4.4 (all &gt; 1 year)</i>	<i>US30TR (3–10 years)</i>	<i>4.6</i>
<i>Euro area (XM)</i>	<i>10-year</i>	<i>5.5 (all &gt; 1 year)</i>	<i>USGATR (all &gt; 1 year)</i>	<i>6.1</i>
<i>Japan (JP)</i>	<i>10-year</i>	<i>5.5 (all &gt; 1 year)</i>	<i>USGATR (all &gt; 1 year)</i>	<i>6.1</i>
<p>Note: US, Australian, German and Japanese indices are constructed by the European Federation of Financial Analysts Societies (EFFAS). The analysis is based on Wednesday closing data for US Treasuries and Thursday closing data for Asia from 1 January 2001 to 5 March 2004, except the benchmark analysis for China and the Philippines, which starts in October 2001, and Indonesia, which starts in January 2003.</p>				
Sources: Bloomberg; CEIC; HSBC; BIS calculations.				Table 1

<sup>2</sup> Hedging costs are higher the higher are local currency short-term interest rates relative to the base currency and the wider are bid-ask spreads on forward contracts. Thus, local currency returns differ most from hedged returns for the higher-yielding currencies like the Indonesian rupiah or the Philippine peso.

<sup>3</sup> Granger causality tests generally show that movements in US Treasury yields precede changes in Asian bond yields and not vice versa. A Granger causality test assesses how



... taking account of differences in time zones ...

*Timing* must be handled with care. Closing prices on US Treasury securities precede or follow those on Asian bonds by about 12 hours. As a result, an analysis of daily data would inevitably introduce the variance resulting from half a day's news and positioning into just one or the other market's daily movements. The effect of such non-simultaneous observation is to bias downwards estimated correlations and betas. We mitigate this daily effect, and also the effect of differences in liquidity, by using weekly data.

... and duration ...

*Duration* must also be treated cautiously. In Korea and the Philippines, three-year government bonds serve as the benchmark; in Hong Kong SAR, the five-year bond serves this purpose; in China and Indonesia, seven-year bonds seem most representative. In other Asian markets the international standard of 10-year bonds provides a reasonable benchmark. The market aggregates assembled by HSBC similarly vary in duration, and so we compare them to US Treasury indices of different duration.

... to assess the balance of global and domestic influences

The covariance of local currency and dollar bond returns reflects the balance between global and purely domestic influences. Deeper economic and financial integration tends to produce higher correlations, which can go even higher during periods of market stress. However, prices of local bonds are also affected by purely domestic macroeconomic conditions, such as those that affect domestic demand. Local financial market conditions, for instance households' reallocation of funds between financial institutions with different propensities to hold bonds, and official debt management policies can also move bond prices. The greater the influence of purely domestic factors on local bond prices, the lower will be international correlations and the greater the potential benefits from diversification.

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much of the current  $y$  is explained by past values of  $y$  and whether adding lagged values of  $x$  explains more.  $Y$  is said to be Granger-caused by  $x$  if  $x$  helps in the prediction of  $y$ .

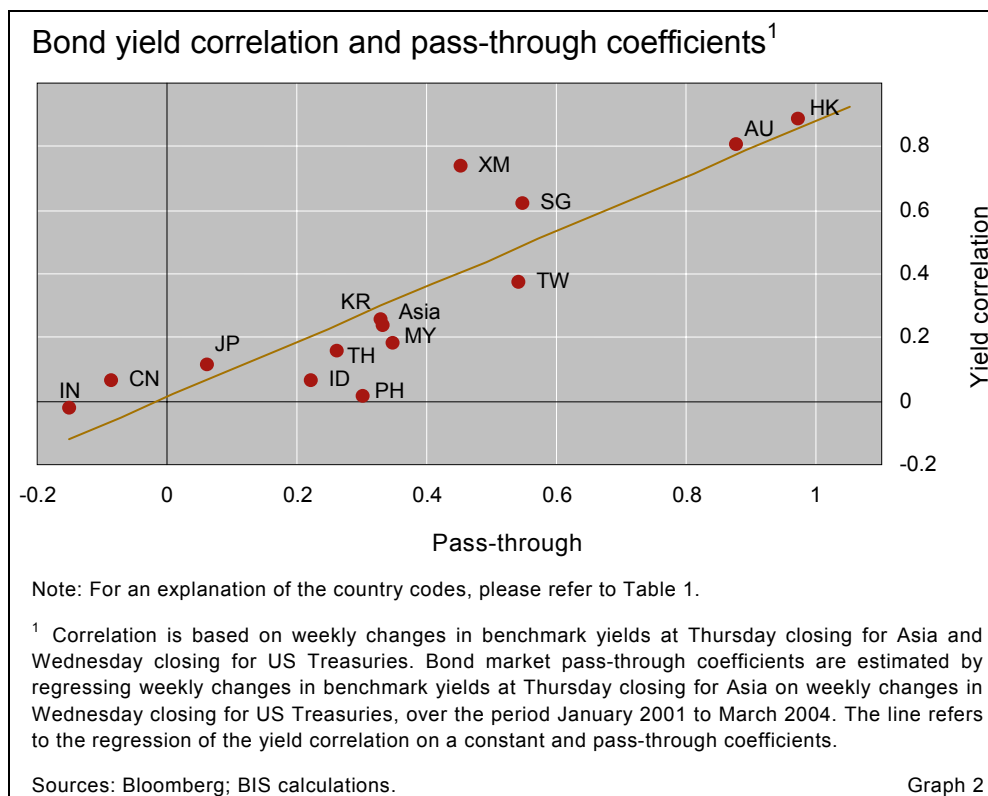
Dollar returns on Asian local currency bonds bear little relation to returns on their US Treasury counterparts (Graph 1). On average, Asian returns show a low correlation of about 0.2, like that on Japanese government bonds. This contrasts with a measured correlation of over 0.5 on euro area government bonds. Only for Hong Kong, and to a lesser extent Singapore, could the correlation of dollar returns with US Treasury returns be described as high. Indeed, for three economies, India, Korea and the Philippines, the sample correlation of returns was actually negative.

Asian bond returns show limited co-movement with US Treasuries

Correlations of local currency returns with US Treasury returns are generally higher, especially in Korea. This suggests that exchange rate changes tend to add noise. However, the contrast between the lower correlation of returns on Asian bonds and that on euro area government bonds is even sharper for local currency than for dollar returns. These observations suggest the possibility that Asian local currency bonds offer substantial scope for diversification,<sup>4</sup> perhaps especially in the context of currency-hedged investment.

Underlying these return relationships are varying degrees of pass-through from changes in US Treasury benchmark yields to local benchmark yields (Graph 2). Higher pass-through of yield changes or yield correlations makes for higher return correlations. Only in Hong Kong does the Exchange Fund paper move one for one with US Treasury yields. In Singapore and Taiwan, China<sup>5</sup>

Return relationship reflects pass-through of yield changes



<sup>4</sup> From a European investor's perspective, the high correlation between US and euro area bonds and the low correlation between Asian and US bonds imply that the correlation between Asian bonds and euro area bonds is low. That correlation measured in euros will be even lower as exchange rate movements add noise to the relationship.

about half of US Treasury yield changes pass through. In Indonesia, Korea, Malaysia, the Philippines and Thailand, and for Asia on average, 20–35% of US Treasury yield changes pass through. In the two largest and most financially closed economies, China and India, there was no pass-through on average during the sample period.<sup>6</sup>

## Risk and return in Asian local currency bonds

We assess performance with two measures ...

This section compares the risk and returns on the HSBC aggregates of Asian local currency bonds to those on US Treasury baskets of comparable duration using two approaches. The Sharpe ratio measures risk as the overall volatility of returns. It turns out that, in our sample period at least, most Asian local currency bonds did not offer a higher ratio of returns in relation to their overall volatility than their US counterparts. However, a second approach considers only the systematic risk of returns; that is, in this context, the extent to which returns co-vary with global bond returns. The Treynor ratio indicates that Asian local currency bonds offered relatively high returns in relation to their systematic risk.

Each approach has its strengths and weaknesses. For a diversified portfolio, focusing on systematic risk has considerable appeal. For instance, Sharpe penalises Korean bonds for the pronounced movement in government bond prices connected with a corporate accounting scandal and the difficulties of credit card companies in early 2003. Treynor ignores such idiosyncratic bond market events and instead rewards Korean bonds for having performed well when major markets sold off. Operationally, overall volatility may be a more stable, less sample period dependent measure of risk. The latter consideration suggests that the favourable finding under the second approach depends on the stability of the covariance of returns between Asian local currency bonds and US Treasury returns. This special feature's last section takes up this question.

### *Sharpe ratios*

... one capturing the overall volatility of returns ...

Sharpe (1966) compared the returns of portfolios in relation to their risk by dividing their returns in excess of the riskless rate of return by the volatility of their returns. A portfolio with a higher Sharpe ratio is preferred in that it offers a higher return per unit of risk, as measured by return volatility.

The Sharpe ratio is computed by taking dollar returns and subtracting the US Treasury bill return and then dividing by the volatility of returns (see last four columns of Table 2). Sharpe would rank Chinese, Malaysian, Singaporean and Taiwanese bonds below their US Treasury counterparts because the volatility of the Asian bond returns was not low enough to offset their low excess returns (Table 3). While the dollar returns on Hong Kong and Thai

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<sup>5</sup> Hereinafter referred to as Taiwan

<sup>6</sup> These relationships are not very stable: rolling correlations show large fluctuations, with many episodes of a *negative* relation in the past three years.

Yields, returns and volatility of Asian local currency bonds										
Economy	Benchmark bond analysis				Local currency and dollar return analysis					
	Asia		US		HSBC local bond index		HSBC local bond index (in USD)		Matching US Treasury index	
	Yield	Vol <sup>1</sup>	Yield	Vol <sup>1</sup>	Return	Vol <sup>2</sup>	Return	Vol <sup>2</sup>	Return	Vol <sup>2</sup>
China	2.97	51	4.18	111	3.41	3.24	3.41	3.24	7.24	5.63
Hong Kong SAR	4.09	128	3.71	116	6.33	3.37	6.39	3.44	6.04	2.89
India	7.37	122	4.51	107	17.63	5.14	18.41	5.65	7.24	5.63
Indonesia	12.27	178	4.18	111	25.68	10.10	30.52	18.63	...	...
Korea	5.34	152	3.02	111	6.81	3.08	8.07	8.57	6.04	2.89
Malaysia	4.10	95	4.51	107	3.84	3.67	3.82	3.69	6.37	3.46
Philippines	10.59	270	3.02	111	13.94	5.52	10.95	12.31	6.04	2.89
Singapore	3.36	94	4.51	107	4.09	3.77	3.97	6.39	7.51	5.06
Taiwan, China	3.22	100	4.51	107	8.92	5.55	7.63	6.10	8.11	7.41
Thailand	4.57	171	4.51	107	5.16	5.92	7.36	7.73	7.51	5.06
Asia	...	...	3.71	116	...	...	10.52	4.07	6.37	3.46
<i>Memo:</i>										
<i>Australia</i>	5.62	117	4.51	107	5.15	5.07	14.67	11.61	7.51	5.06
<i>Euro area</i>	4.55	65	4.51	107	5.93	3.60	14.09	11.83	7.24	5.63
<i>Japan</i>	1.21	59	4.51	107	1.81	2.44	3.27	9.56	7.24	5.63

Note: US, Australian, German and Japanese government bond indices are constructed by EFFAS. The analysis is based on Wednesday closing yields on US Treasuries and Thursday closing yields in Asia from 1 January 2001 to 5 March 2004 for all economies, except the benchmark analysis for China and the Philippines, which starts in October 2001, and Indonesia, which starts in January 2003.

<sup>1</sup> In basis points. <sup>2</sup> In per cent.

Sources: Bloomberg; CEIC; HSBC; BIS calculations.

Table 2

bonds were similar to those of US Treasuries, these Asian bonds' higher return volatility also ranks them below US Treasuries. Finally, the higher returns on Indian, Indonesian, Korean and Philippine bonds were more than offset by their higher volatilities in all but the case of the best-performing Indian bonds. On this showing, most of the Asian local currency markets offered inferior returns in relation to risk as compared with US Treasury bonds.

In contrast, the Sharpe measure for the overall index of Asian local currency bonds compiled by HSBC (which overweights liquid markets and excludes China and Indonesia altogether) tells a different story. This index outperformed its US Treasury counterpart, owing largely to India (weighted almost a quarter). More importantly, it showed less volatility of returns. This shows the potential volatility reduction arising from a combination of bonds with imperfectly correlated returns. In particular, the index's volatility is lower than all but two of its constituent portfolios from dollar-linked economies (Hong Kong SAR, weighted about 15%, and Malaysia, weighted about 4%).

#### Treynor ratios

An alternative way of looking at risk and return casts a more flattering light on the performance of Asian bonds. The Treynor ratio suggests that all but one market (as well as the aggregate) had a favourable relation of risk to return in the sample period (Table 3). This measure divides excess returns on a portfolio

... the other focusing on shared volatility

Portfolio performance of Asian local currency bonds				
Economy	Sharpe measure		Treynor measure	
	Asia	US	Asia	US
China	0.45	0.94	83.86	7.24
Hong Kong SAR	1.29	1.41	6.66	6.04
India	2.91	0.94	-277.57	7.24
Indonesia	1.53	...	...	...
Korea	0.71	1.41	-104.37	6.04
Malaysia	0.50	1.27	18.33	6.37
Philippines	0.73	1.41	-23.49	6.04
Singapore	0.31	1.09	6.95	7.51
Taiwan, China	0.93	0.83	53.48	8.11
Thailand	0.70	1.09	23.11	7.51
Asia	2.10	1.27	53.31	6.37
<i>Memo:</i>				
<i>Australia</i>	<i>1.09</i>	<i>1.09</i>	<i>18.35</i>	<i>7.51</i>
<i>Euro area</i>	<i>1.02</i>	<i>0.94</i>	<i>13.60</i>	<i>7.24</i>
<i>Japan</i>	<i>0.14</i>	<i>0.94</i>	<i>9.12</i>	<i>7.24</i>
Note: See Table 2.				
Sources: Bloomberg; CEIC; HSBC; BIS calculations.				
				Table 3

by the beta relating returns on it to the global portfolio. Here, we take the global portfolio to be the US Treasury matched duration portfolio.<sup>7</sup> On this basis, all but one Asian local bond market (Singapore) had a more favourable ratio of risk to return than its US Treasury counterpart. The largest constituent of the HSBC overall Asia index, Korea, had a very favourable negative ratio, owing to the negative covariance between Korean government bond returns in dollars and US Treasury returns.<sup>8</sup> To take another example, the low Sharpe ratio for Philippine bonds says that their additional return, compared to US Treasuries, is purchased at a high price in terms of the volatility of returns. Over the sample period, however, their returns covaried negatively with US Treasury returns. If systematic risk is the focus, then Philippine bonds are very attractive: their addition to a portfolio of US Treasury bonds could add return while lowering the portfolio's overall systematic risk. The next section examines the reasons for the moderate co-movement of Asian bonds with US Treasury notes.

<sup>7</sup> As a result, the Treynor ratios for the US Treasury baskets are their excess returns divided by one. This use of the US Treasury to proxy the global portfolio is subject to the Roll critique as being too narrow for this purpose. A broader global bond portfolio would include euro and yen government bonds in addition to US Treasuries. This would tend to raise the Treynor ratios for US Treasury bonds and thereby narrow the advantage of the Asian bonds. But even if the beta for US Treasuries were reduced to one third, while that for Asian bonds remained the same, the performance of the Asian bonds would still appear in a favourable light.

<sup>8</sup> Since this covariance is positive for won returns, the Korean won must have systematically weakened when US bond yields fell. One interpretation is that weak US activity led to higher US Treasury two-year note returns and a weaker won.

## Reasons for relatively low correlation with US dollar bonds

The relatively low correlation between returns on Asian local currency bonds and US Treasury notes could reflect the strong influence of domestic factors as well as incomplete integration into global capital markets. Domestic factors would include exchange rate policy and the credit standing of government issuers. The degree of integration with global markets has two aspects, namely the participation of global firms in domestic market-making and the involvement of non-resident investors. Each of the four factors is considered in turn.

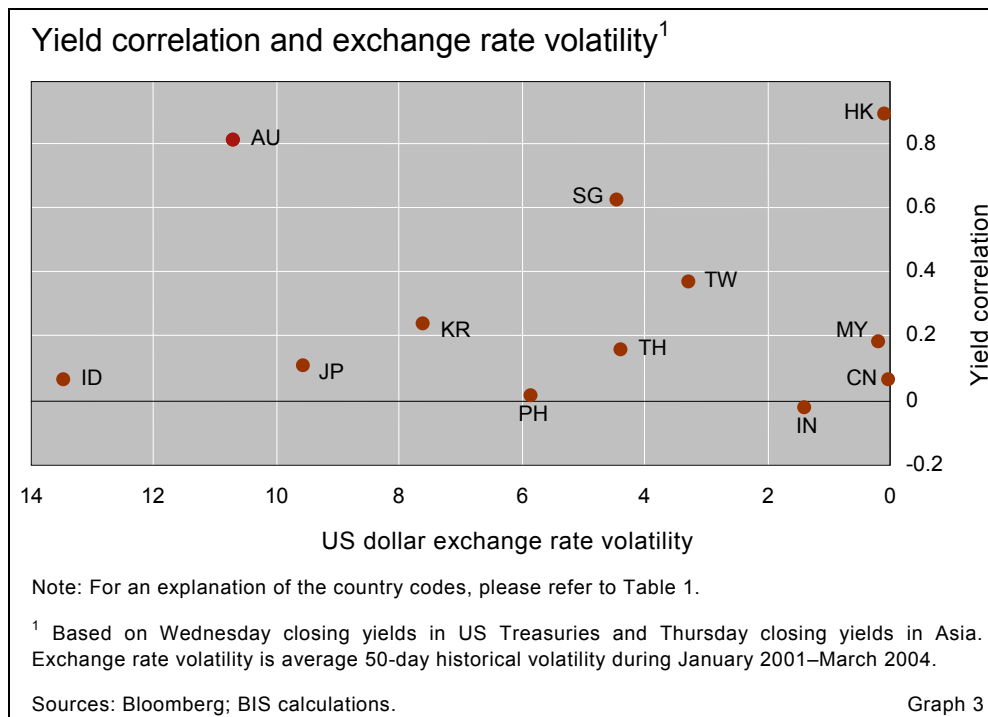
Relatively low correlations ...

### *Exchange rate policy and bilateral dollar exchange rate volatility*

There is a widespread view that East Asia is basically part of the dollar bloc of currencies. If true, this would imply that the region's bond markets offer little in the way of diversification possibilities for a portfolio already having a large share of US dollar bonds. However, both the dollar bloc view and the inference of extremely limited diversification possibilities are overstated.

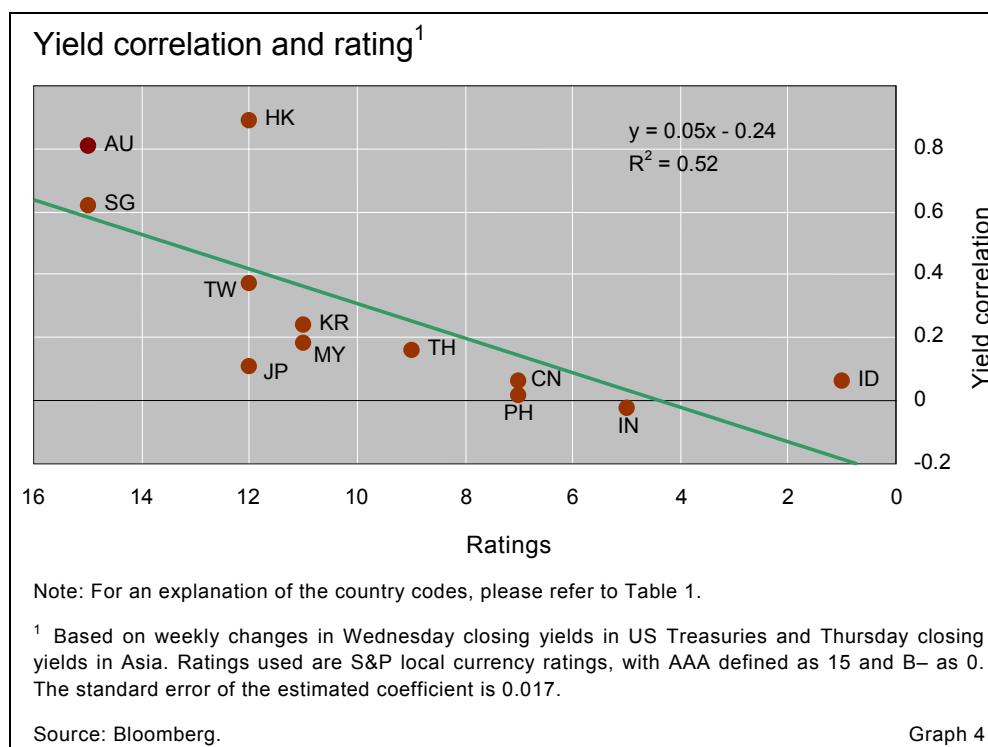
... not explained by exchange rates ...

Currencies in the region move against the dollar more than is generally recognised. Moreover, exchange rate stability is not systematically associated with higher co-movement between local currency bonds and their US Treasury counterparts (Graph 3). Despite currencies pegged to the dollar, yields on Chinese and Malaysian bonds move with US Treasury bonds only to a limited extent owing to effective capital controls. Conversely, Australian (and euro area) bonds share considerable yield movement with US Treasury bonds despite the volatility of the respective dollar exchange rates.<sup>9</sup>



<sup>9</sup> A simple regression of yield correlation coefficients on rating, dollar exchange rate volatility and a dummy variable reflecting capital controls in China and Malaysia shows that only credit rating has a significant effect on yield correlation. The regression result is as follows: Yield correlation =  $-0.166 - 0.182 \cdot \text{dummy} - 0.005 \cdot \text{exchange rate volatility} + 0.053 \cdot \text{ratings}$ . Only the coefficient on ratings is statistically significant at the 5% level.





### *Credit standing*

... but instead by credit risk and related factors ...

Lower-rated credits show lower correlations of weekly changes in yields (Graph 4). One way of interpreting this relationship is that country-specific factors, for instance political events like elections, weigh more heavily on bond markets in lower-rated economies. Note, however, that even for economies with medium to high ratings, such as Korea, Malaysia, Thailand and China, the pass-through or correlation coefficients are still relatively low. The implication would seem to be that realising the benefits of diversification does not necessarily entail taking on high levels of credit risk.

### *Globalisation of market-making in local bond markets*

... local market-making ...

Foreign banks' securities operations have become active in some domestic securities markets, even in the absence of a cross-border bid for local currency bonds. One measure of this is the turnover reported by a global trade association, EMTA, in local currency bonds, as a fraction of overall market turnover reported by national sources (Table 4). The share of foreign market-makers in domestic market turnover varies from almost 90% in Hong Kong SAR to about a third in Malaysia and Singapore and less than 10% elsewhere.

This share is associated with a stronger correlation with the US Treasury market. This is true even if the outlier of Hong Kong is excluded (Graph 5). One interpretation is that the firm-wide risk management techniques and risk appetite help to raise the co-movement of bond markets with a larger representation of global firms in market-making.

Trading volume in 2003 reported by international banks			
In millions of US dollars			
	Eurobonds	Local currency bonds	Foreign participation ratio
China	3,390	169	...
Hong Kong SAR	23,618	75,497	0.88
India	868	30,235	0.06
Indonesia	5,207	2,212	0.09
Korea	45,437	52,416	0.03
Malaysia	16,781	20,937	0.29
Philippines	34,030	3,048	0.04
Singapore	20,602	86,582	0.32
Taiwan, China	846	73,474	0.04
Thailand	1,939	3,374	0.06
Total	152,718	347,944	0.07
Percentage of emerging markets total	10	19	...

Note: EMTA's 2003 Annual Debt Trading Volume Survey reports secondary market purchases and sales of debt with original maturity over 12 months, excluding repos. The foreign participation ratio is EMTA-reported local currency bond trading divided by total local currency bond market turnover.

Sources: Barclays; Deutsche Bank; EMTA; BIS calculations. Table 4

### Scale of foreign investment

Equity markets in East Asia tend to be more correlated with the S&P 500 Index than regional bond markets are with the US Treasury market (Graph 6). Richards (2003) shows that non-resident purchases of Asian equities respond positively to the performance of the S&P 500, and in turn boost Asian equity prices. If portfolio equity flows underpin the correlation of equity markets, then the paucity of portfolio bond flows helps explain lower bond market correlation.

Korea represents an extreme case in that foreigners hold some 40% of Korean equities but less than 0.4% of Korean bonds. In Thailand, at end-2003, foreigners held about 28% of Thai equities, but again less than 1% of Thai bonds. Apparently, Indonesia's bond market has attracted most investment by non-residents in the region: foreign holdings reached about 2% last year.<sup>10</sup>

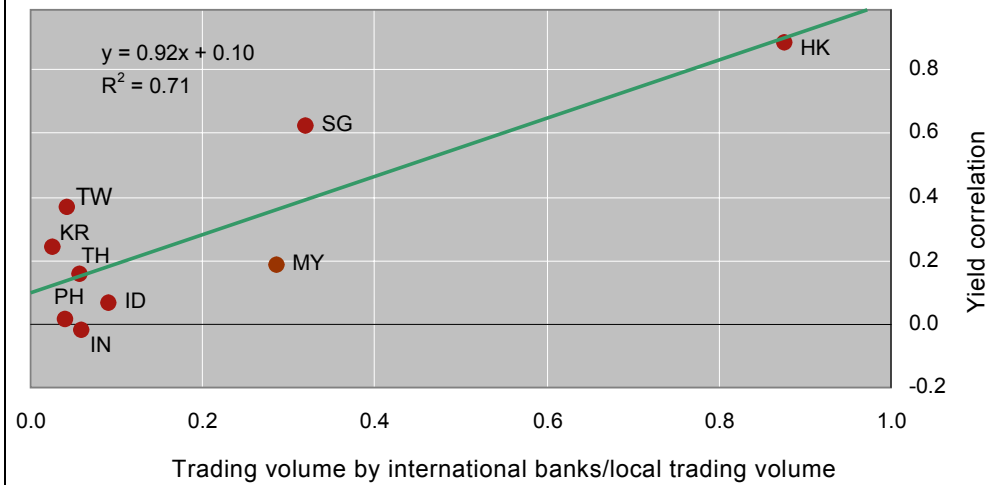
Precisely why equity markets are international while bond markets are local is not clear (Takeuchi (2004)). While a number of explanations have been suggested, many fail to stand up to scrutiny or lack generality. Capital controls have limited foreign investment in China and India, but these must be recognised as exceptional cases.<sup>11</sup>

... and the virtual absence of foreign investors

<sup>10</sup> Shirai (2001, pp 72, 81, 95, 108) reports that in 1999 non-residents held 0.3% and 0.1% of public and corporate bonds respectively in Korea, and 0.5% and 1.5% respectively of government securities and corporate bonds (November 2000) in Malaysia.

<sup>11</sup> Capital controls on investment in Taiwanese equities (albeit more liberal than Chinese or Indian barriers to foreign investment in their bonds) did not prevent these equities from being included in major global equity indices.

### Foreign market-making and yield correlation<sup>1</sup>



Note: For an explanation of the country codes, please refer to Table 1.

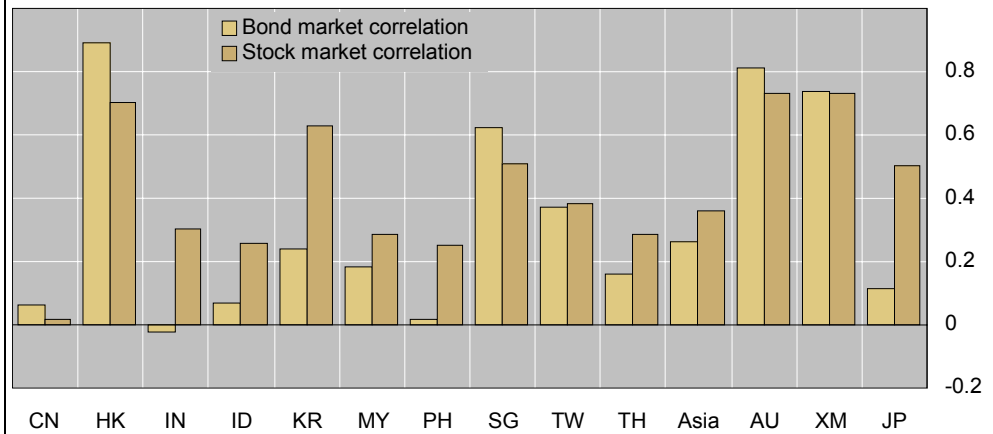
<sup>1</sup> Bond market correlation is based on weekly changes in benchmark yields at Thursday closing for Asia and Wednesday closing for US Treasuries. The period is from January 2001 to March 2004. Foreign participation is measured as the share of EMTA-reported trading volume by international banks in total local trading volume. The standard error of the estimated coefficient is 0.22.

Sources: Barclays; Bloomberg; EMTA; BIS calculations.

Graph 5

*Lack of hedging markets* and *weak infrastructure* are often cited as factors deterring foreign investors, but any such impediments have not sufficed to keep non-residents out of equity markets.<sup>12</sup> *Low credit ratings* have not prevented

### Bond and stock market correlations<sup>1</sup>



Note: For an explanation of the country codes, please refer to Table 1.

<sup>1</sup> Bond market correlation is based on weekly changes in benchmark yields at Thursday closing for Asia and Wednesday closing for US Treasuries. Stock market correlation is based on weekly changes in stock market price indices at Thursday closing for Asia and Wednesday closing for the S&P 500. The period is from January 2001 to March 2004.

Sources: Bloomberg; BIS calculations.

Graph 6

<sup>12</sup> Admittedly, this could particularly be the case for bonds given the greater propensity of bond investments to be hedged than equity investments. See Hohensee and Lee (2004) on hedging markets in general. Ma et al (2004) discuss how non-deliverable forward exchange markets in

Asian governments from selling dollar bonds to non-residents, even though these bonds generally carry lower ratings than their domestic currency counterparts (Kisselev and Packer (2004)).

Two other explanations may go further. *Withholding taxes* may in fact be a larger barrier than either the rates levied or the bilateral arrangements for reclaiming such taxes might suggest. “Real money” accounts often simply do not want to submit themselves to the administrative burden of taking advantage of tax treaty rights.<sup>13</sup> The *low levels of yields* in East Asia may also have dissuaded foreign buying (Schmidt (2004)): the increase in foreign ownership of Indonesian bonds to 2% in part reflects the allure of its relatively high yields. In the global bond market, “exotic” currencies like the South African rand or the Polish zloty have generally offered high coupons.

### Will low correlations continue?

This section considers whether the low correlations of Asian bonds with global bond markets should be expected to continue. This question has a trend aspect, related to the reasons just offered for relatively low correlations, and a cyclical aspect, related to the ongoing upturn in global bond yields.

#### *Integration with global financial markets and credit upgrades*

A possible implication of all the reasons offered for relatively low correlations is that Asian local bonds might offer less in the way of diversification possibilities over time. Higher credit ratings, more globalised domestic markets and increased foreign investment might undermine the rationale for investing in local bonds. As noted, higher correlations have not prevented global equity investors from investing in local stock markets in the hope of higher returns. Bond market investors, however, may be attracted more by low beta (prospect of diversification) than high beta (a leveraged play on global equity markets).

A trend towards higher correlations?

#### *Co-movement in a bear market*

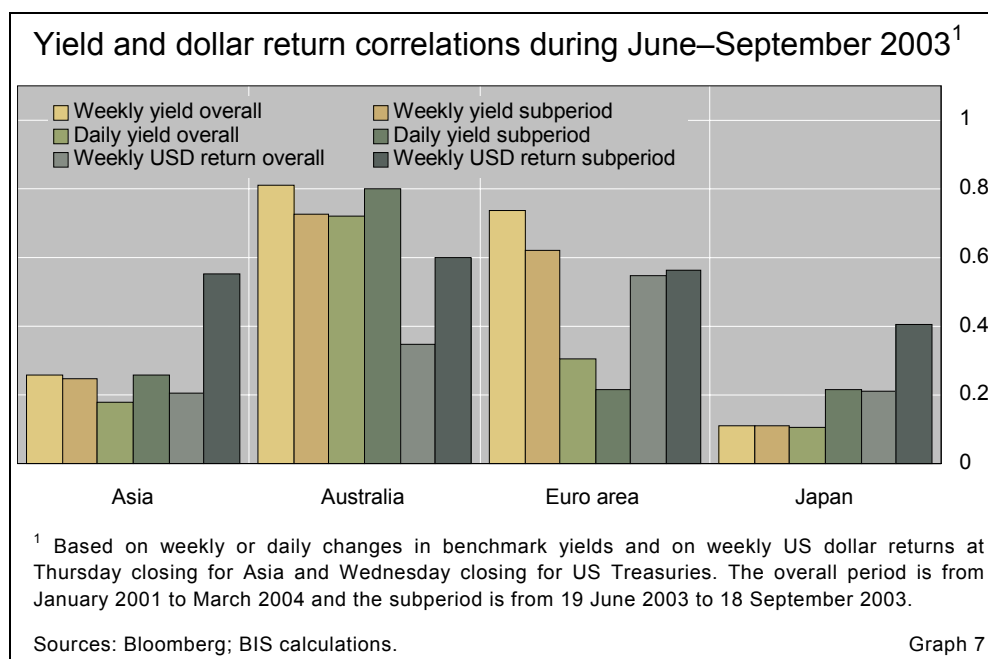
The hardest test of a diversification comes during a period of rising bond yields, especially for markets that have grown up during years of generally declining global yields. Markets that usually trade with low or moderate correlations can track each other more closely when prices fall. This may occur if, as has been observed, declining markets prove to be more volatile (Borio and McCauley (1996)). As argued by Loretan and English (2000), among others, higher volatility tends to result in higher correlations, even if the underlying process remains the same. Market dynamics can also lead to higher correlations during a bond market sell-off, as leveraged investors in one market

Higher correlations in bear markets?

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particular have developed to serve the hedging needs of equity investors. Braechevelt (2004) reviews shortcomings in clearing and settlement systems.

<sup>13</sup> The US dollar bond market before the repeal of withholding tax on bond interest in the mid-1980s provided strong evidence of the deterrent effect of the tax: top-rated US corporations were able to offer lower yields offshore through an offshore finance unit than those on comparable tax-withheld US Treasury bonds. This ended quickly after the repeal of the withholding tax.



experience losses and liquidate similar positions in another market – though such market dynamics may be less relevant in insular markets.

A test in mid-2003 ...

Asian local bond markets did not perform well during the sell-off in the US Treasury market starting in mid-2003. Correlations of weekly changes of yields showed a limited rise, although there was some increase at the daily frequency, as in Australia and Japan (Nakayama et al (2004); Graph 7). From the international investor's standpoint, the substantial increase in the correlation in weekly *US dollar* returns would have been bad news. When US Treasury yields rose, the US dollar tended to strengthen against the local currencies.

Worse news, however, was that two Asian local bond markets underperformed US Treasuries over the whole period, while three more suffered almost as large a rise in yields as US Treasuries. This performance to some extent reflected the initial conditions in which local bond yields in China, Malaysia, Singapore, Taiwan and Thailand had all fallen substantially below those on US Treasuries. Heightened by the outbreak of SARS, deflation fears drew on recent falls in consumer prices in most of these economies. Low inflation expectations and subdued economic activity in the first half of 2003 were reinforced by accommodative monetary policy, ample liquidity in the banking system and growing demand from institutional investors in depressing long-term government bond yields. As equity markets tended to recover in the second half of the year, bond yields in these economies rebounded towards expected GDP growth rates.

... and another in the second quarter of 2004

Asian local currency bonds again disappointed during the sell-off in the second quarter of 2004 (Table 5). This time, only one Asian market showed a substantially larger rise in yields than the US Treasury market. Still, these markets provided less of a refuge than might have been hoped, with more surprises in the direction of higher yields.

Performance of Asian bonds in the second quarter of 2004											
	Mid-2003				2004 Q2				Deltas		
	19 June		18 September		30 March		30 June		Estimated pass-through <sup>1</sup>	Actual $\Delta$ Own/ $\Delta$ UST <sup>2</sup>	
	Own	UST	Own	UST	Own	UST	Own	UST		Mid-2003	2004 Q2
CN	2.9	2.9	3.2	3.6	4.0	3.4	4.9	4.2	-0.09	0.35	1.13
HK	2.5	2.3	3.0	3.1	2.6	2.8	3.6	3.8	0.97	0.69	1.02
IN	5.8	3.4	5.3	4.2	5.1	3.8	5.8	4.6	-0.15	-0.54	0.92
ID	11.9	2.9	11.6	3.6	11.5	3.4	12.0	4.2	0.22	-0.38	0.58
KR	4.1	1.6	4.2	2.1	4.4	1.9	4.2	3.1	0.33	0.10	-0.16
MY	3.5	3.4	4.2	4.2	4.9	3.8	4.9	4.6	0.35	0.87	0.00
PH	9.5	1.6	9.9	2.1	11.4	1.9	11.4	3.1	0.30	0.82	0.07
SG	2.0	3.4	3.6	4.2	3.1	3.8	3.4	4.6	0.55	1.87	0.48
TW	1.5	3.4	2.8	4.2	2.3	3.8	2.9	4.6	0.54	1.61	0.91
TH	2.7	3.4	3.4	4.2	4.0	3.8	5.1	4.6	0.26	0.87	1.50
Asia	.	.	.	.	.	.	.	.	0.33 <sup>3</sup>	0.62 <sup>3</sup>	0.64 <sup>3</sup>
<i>Memo:</i>											
<i>AU</i>	5.6	4.0	5.1	3.6	5.4	3.8	5.9	4.6	0.88	0.87	0.56
<i>XM</i>	4.1	4.0	4.0	3.6	4.0	3.8	4.3	4.6	0.45	0.60	0.43
<i>JP</i>	0.7	4.0	1.1	3.6	1.4	3.8	1.9	4.6	0.06	0.83	0.63

Note: For country names in Column 1, see Table 1.

<sup>1</sup> Estimated betas based on weekly data from 1 January 2001 to 5 March 2004 for all economies, except for China and the Philippines, which start in October 2001, and Indonesia, which starts in January 2003. <sup>2</sup> Change over the period in own yield divided by change over the period in US yield; for 2004 Q2, Asian data cover 1 April–1 July, while US data cover 31 March–30 June, including the Federal Open Market Committee meeting on 30 June. <sup>3</sup> Average of above.

Sources: Bloomberg; CEIC; HSBC; BIS calculations. Table 5

The two biggest markets, those of China and India, showed as large a rise as US yields over the period as a whole, notwithstanding their indifference to US events over January 2001–March 2004 at the weekly frequency. Thailand's government bond yields also more than matched the rise in US Treasury yields. Almost as surprising on the other side was the performance of the Korean bond market, which managed a modest rally in the quarter, while Malaysian and Philippine bonds also held up better than one might have predicted. Taken as a group, Asian local currency bonds showed an increase in yields over the quarter twice as high as one might have anticipated based on the rise in US Treasury yields alone – and higher than that on euro area or Australian bonds.

In the two largest economies, rapid growth, rising inflation and speculation about increases in policy interest rates produced a cyclical position unusually similar to that of the United States. The People's Bank of China raised its rediscount rate in April, although it did not raise administered deposit and lending rates. Indian yields rose as the monetary policy statement hinted at higher policy rates and widened even more after the election as market participants feared pressure for a larger fiscal deficit. Rising headline inflation, despite well behaved core inflation, and recovering investment spending led Thai rates to follow US rates upwards and then not to retrace steps in June.

Expectations of a rise in overnight rates in Korea, by contrast, were pushed out as news of consumer sentiment and business investment disappointed.

Japanese bonds also suffered an unusual parallel sell-off in the second quarter. Yields rose as the country's growth prospects were upgraded and the end of the de facto zero interest rate policy seemed to market participants to be closer. In contrast, many observers remarked upon the "uncoupling" of the euro area bond market and the US Treasury market.

## Conclusions

This special feature has reviewed the evidence for the period January 2001–March 2004 and found that Asian local currency bonds offer scope for diversification. Their return correlations with the US Treasury market generally lie below those of the euro area or Australian government bond markets, although above that of the Japanese government bond market. Asian bond returns, taken in conjunction with their volatility, compare unfavourably with their US Treasury counterparts market by market. But an aggregate of Asian bonds gives a more positive picture, in part because aggregation reduces the volatility of returns. If the assessment of returns and risk focuses on Asian bonds' systematic risks, and thereby gives them credit for their moderate return correlations with US Treasury notes, the performance of Asian local currency government bonds compares favourably both severally and collectively.

The co-movement of Asian local currency bonds with US Treasury notes seems unrelated in general to exchange rate policy. The prior view that the stability of exchange rates in Asia against the dollar would produce very similar bond returns is not supported in the cross section. Instead, differences in credit standing and the openness of these markets help explain their varying co-movement. In particular, higher-rated government bonds show higher co-movement. At the same time, a greater role of foreign firms as market-makers seems to be associated with higher co-movement, even in the absence of much cross-border investment. The greater openness of equity markets in the region to international investment seems consistent with the generally higher correlation of the region's stock markets with the US stock market than of Asian bonds and US Treasury notes.

Will low correlations between Asian bond markets and global bond markets continue? Our findings suggest that the scope for diversification could narrow over the long run if the trend towards higher ratings in the region is sustained, and if the markets in the region open up. In the short run, the analysis of the second quarter of 2004 sounds a warning. Correlations or, equivalently, pass-through coefficients estimated over a period of mostly declining yields internationally may provide an unreliable basis for gauging performance during a bear market.

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