Asia Bond Monitor 2006

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The *Asia Bond Monitor* (ABM) reviews recent developments in East Asian local currency bond markets. In this issue, a theme chapter examines the dimensions and determinants of bond market liquidity, and highlights policy options for improving liquidity. The ABM covers the 10 Association of Southeast Asian Nations member countries plus the People's Republic of China; Hong Kong, China; and the Republic of Korea.

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How to reach us

Asian Development Bank
Office of Regional Economic Integration
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines

Telephone
+63 2 632 6688

Facsimile
+63 2 636 2183

E-mail
asianbondsonline_info@adb.org

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Emerging East Asian Local Currency Bond Markets: A Regional Update

Highlights

Bond Market Developments in the First Half of 2006

- Emerging East Asian bond markets continued to expand rapidly in the first half of 2006, reaching USD2.4 trillion in bonds outstanding, up from USD2.0 trillion at end-2005.
- Government bond market growth remains strong due to infrastructure spending, although better-than-projected tax revenues in some markets reduced the need for government issuance.
- Fuelled by demand for annuity assets from contractual savings institutions, corporate bond markets also posted strong growth in the first half of 2006.
- On average, turnover ratios in the region's government bond markets fell slightly, while those in corporate bond markets remained stable.
- Bond yield curves—after steepening during the first half of 2006—generally flattened across the region in the third quarter.
- Despite generally higher short term interest rates, currency appreciation and yield curve flattening pushed local currency index returns higher in 2006.

Bond Market Liquidity—Empirical Analysis, Market Survey, and Policy Options

- Bond market liquidity is a multidimensional concept, and is generally measured by indicators such as turnover ratio, bid-ask spread, and bond yield volatility.
- In emerging East Asia, bond market liquidity, although improving, generally remains low, with low turnover ratios,wide bid-ask spreads, and high bond yield volatility.
- An empirical analysis using a cross-country regression approach identifies market size, legal and regulatory systems, access to derivatives and hedging instruments, and exchange rate volatility as the key determinants of bond market liquidity.

Continued overleaf

Acronyms and Abbreviations

ABM	Asia Bond Monitor
ABF	Asian Bond Fund
ADB	Asian Development Bank
ARIC	Asia Regional Integration Center
ASIFMA	Asia Securities Industry & Financial Markets Association
BIBOR	Bangkok Interbank Offered Rate
BIS	Bank for International Settlements
CHIBOR	China Interbank Offered Rate
CGFS	Committee on the Global Financial System
CSI	contractual savings institution
EFN	exchange fund note
GDP	gross domestic product
HIBOR	Hong Kong Interbank Offered Rate
HKMA	Hong Kong Monetary Authority
HSTC	Ho Chi Minh Securities Trading Centre
IFI	Islamic financial institution
IMF	International Monetary Fund
JIBOR	Jakarta Interbank Offered Rate
KLIBOR	Kuala Lumpur Interbank Offered Rate
KORIBOR	Korea Interbank Offered Rate
LCY	local currency
MAS	Monetary Authority of Singapore
PHIBOR	Philippine Interbank Offered Rate
PRC	People's Republic of China
SGS	Singapore Government Securities
SIBOR	Singapore Interbank Offered Rate
SSX	Surabaya Stock Exchange
TIBOR	Tokyo Interbank Offered Rate
YTD	year-to-date

bps = basis points

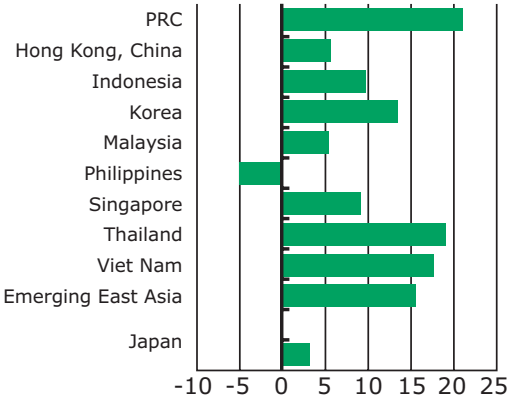
Note: To conform with market practice, the *Asia Bond Monitor* uses two-letter official ISO Country Codes and three-letter currency codes rather than ADB's standard symbols.

- Complementing the cross-country evidence, a survey of leading market makers in East Asia rated greater investor diversity, robust derivatives and repurchase markets, and consistent secondary market pricing as important factors for increasing bond market liquidity.
- Policies to improve bond market liquidity should thus focus on enlarging bond market size, strengthening legal and regulatory infrastructure, deepening market microstructures, developing derivatives markets, encouraging investor diversity, and enhancing regional cooperation.

Emerging East Asian Local Currency Bond Markets: A Regional Update

Bond Market Developments in the First Half of 2006

Figure 1: **Growth of Emerging East Asian Local Currency Bond Markets, 1 Jan–30 Jun 2006** (%)



Sources: Bank for International Settlements, *International Financial Statistics* (Tables 16A and 16B and local currency portion of Table 11), except Hong Kong, China (Hong Kong Monetary Authority); Singapore (Monetary Authority of Singapore); and Viet Nam (Ministry of Finance); *AsianBondsOnline* estimates.

1. SIZE AND COMPOSITION

Emerging East Asian bond markets continued to expand rapidly in the first half of 2006.

Aggregate local currency bonds outstanding in emerging East Asia[1] grew 15.6% during the first six months of 2006, reaching USD2.4 trillion as of 30 June 2006, up from USD2.0 trillion at end-2005 (Table 1).[2] Growth was strongest in People's Republic of China (PRC) (21%), Thailand (19%), and Viet Nam (18%), followed by Republic of Korea (Korea) (13%), Singapore (9%), and Indonesia (10%). Malaysia and Hong Kong, China reported growth rates above 5%, while in the Philippines, local currency bonds outstanding fell by 5% (Figure 1).

Emerging East Asia's bond market growth was higher than growth of the region's gross domestic product (GDP).[3] The ratio of local currency bonds outstanding to GDP increased from 50.3% at end-2005 to 54.2% as of 30 June 2006 (Table 2).

Currency adjustments were responsible for some of the net increase in bonds outstanding in USD terms. Since the start of 2006, emerging East Asian currencies—with the exception of

[1] In this report, emerging East Asia is defined as People's Republic of China; Indonesia; Hong Kong, China; Republic of Korea; Malaysia; Philippines; Singapore; Thailand; and Viet Nam.

[2] On 15 September 2006, the Bank for International Settlements (BIS) raised its 30 December 2005 estimate of total local currency government bonds outstanding for the PRC to USD615.5 billion, up from USD340.3 billion, or an increase of 81%. The restatement affected all data on government bonds outstanding since December 2002, and was the result of an expanded definition of government securities. People's Bank of China bonds (central bank obligations) were included for the first time, in addition to obligations of the central government. Also, corporate bonds outstanding increased as of December 2005 from USD265.0 billion to USD293.5 billion, reflecting obligations that were transferred from the government to "corporatized" institutions. *Asia Bond Monitor* uses the restated figures, with emerging East Asia's 2004 and 2005 growth rates adjusted upward. Turnover figures have also been readjusted to take into account the expanded definition of PRC government bonds (*BIS Quarterly Review*, September 2006).

[3] In the March 2006 issue of the *Asia Bond Monitor*, the local currency bond outstanding to GDP ratio for emerging East Asia was quoted at 48% as at the end of 2005. This was computed using Q3, 2005 GDP data for the PRC as full year results were unavailable. In the second quarter of 2006, the PRC revised the level of nominal quarterly GDP upward to take into account the greater contribution of the service sector. The revised regional ratio of 50.3% for 2005 takes into account the increased GDP numbers in addition to the upward adjustments in PRC bonds outstanding mentioned in footnote 2.

Table 1: **Size and Composition of Emerging East Asian Local Currency Bond Markets**

	2004		2005		1H06		Growth Rate (%)		
	Amount ($ billion)	% share	Amount ($ billion)	% share	Amount ($ billion)	% share	2004	2005	1H06
PRC									
Total	671.90	100.00	908.97	100.00	1,099.90	100.00	39.96	35.28	21.01
Government	473.31	70.44	615.52	67.72	751.90	68.36	44.22	30.05	22.16
Corporate	198.59	29.56	293.45	32.28	348.00	31.64	30.75	47.77	18.59
Hong Kong, China									
Total	78.21	100.00	85.59	100.00	90.42	100.00	8.86	9.44	5.64
Government	15.77	20.16	16.34	19.09	16.64	18.41	1.90	3.61	1.85
Corporate	62.44	79.84	69.25	80.91	73.77	81.59	10.78	10.91	6.53
Indonesia									
Total	61.23	100.00	54.89	100.00	60.25	100.00	(6.81)	(10.35)	9.75
Government	54.34	88.75	48.02	87.49	52.63	87.35	(9.60)	(11.63)	9.59
Corporate	6.89	11.25	6.87	12.51	7.62	12.65	23.22	(0.28)	10.92
Korea									
Total	569.32	100.00	656.65	100.00	745.13	100.00	27.62	15.34	13.47
Government	171.63	30.15	225.99	34.42	254.19	34.11	50.74	31.68	12.48
Corporate	397.69	69.85	430.66	65.58	490.93	65.89	19.70	8.29	14.00
Malaysia									
Total	110.88	100.00	123.97	100.00	130.68	100.00	12.21	11.81	5.41
Government	47.29	42.65	51.56	41.59	54.32	41.57	17.01	9.04	5.35
Corporate	63.59	57.35	72.41	58.41	76.36	58.43	8.95	13.86	5.46
Philippines									
Total	35.30	100.00	40.54	100.00	38.49	100.00	16.05	14.85	(5.05)
Government	35.02	99.22	40.22	99.20	37.67	97.87	15.44	14.83	(6.32)
Corporate	0.28	0.78	0.32	0.80	0.82	2.13	250.50	17.67	153.29
Singapore									
Total	79.39	100.00	83.12	100.00	90.68	100.00	18.09	4.70	9.10
Government	44.02	55.45	46.91	56.44	52.63	58.04	18.66	6.57	12.19
Corporate	35.37	44.55	36.21	43.56	38.05	41.96	17.40	2.36	5.10
Thailand									
Total	68.08	100.00	80.95	100.00	96.37	100.00	13.92	18.92	19.05
Government	36.20	53.18	38.01	46.96	44.91	46.60	18.04	5.00	18.14
Corporate	31.87	46.82	42.94	53.04	51.47	53.40	9.57	34.73	19.86
Viet Nam									
Total	3.78	100.00	4.31	100.00	5.07	100.00	31.39	13.91	17.64
Government	3.78	100.00	4.20	97.52	4.77	94.20	31.39	11.09	13.64
Corporate	0.00	0.00	0.11	2.48	0.29	5.80	-	-	175.04
Total Emerging East Asia									
Total	1,678.08	100.00	2,038.99	100.00	2,356.99	100.00	26.86	21.51	15.60
Government	881.36	52.52	1,086.77	53.30	1,269.67	53.87	33.74	23.31	16.83
Corporate	796.72	47.48	952.21	46.70	1,087.33	46.13	20.04	19.52	14.19
Japan									
Total	9,402.69	100.00	8,853.74	100.00	9,133.21	100.00	12.97	(5.84)	3.16
Government	6,891.73	73.30	6,644.54	75.05	6,906.12	75.62	16.94	(3.59)	3.94
Corporate	2,510.96	26.70	2,209.20	24.95	2,227.09	24.38	3.32	(12.02)	0.81

Notes:
1. 1H06 data (1 January – 30 June 2006) are *AsianBondsOnline* estimates.
2. Corporate bonds include issues by financial institutions.
Sources: Bank for International Settlements, *International Financial Statistics* (Tables 16A and 16B and local currency portion of Table 11), except People's Republic of China (ChinaBond); Hong Kong, China (Hong Kong Monetary Authority); Singapore (Monetary Authority of Singapore); and Viet Nam (Ministry of Finance); *AsianBondsOnline* estimates.

Table 2: **Size and Composition of Emerging East Asian Local Currency Bond Markets** (% of GDP)

	Amount Outstanding			
	2003	**2004**	**2005**	**1H06**
PRC				
Total	29.3	34.78	40.71	45.66
Government	20.0	24.50	27.56	31.21
Corporate	9.3	10.28	13.14	14.45
Hong Kong, China				
Total	45.2	47.05	48.00	49.30
Government	9.7	9.49	9.16	9.07
Corporate	35.5	37.56	38.83	40.23
Indonesia				
Total	28.0	24.07	19.54	19.15
Government	25.6	21.36	17.09	16.73
Corporate	2.4	2.71	2.44	2.42
Korea				
Total	73.3	83.48	83.39	89.91
Government	18.7	25.16	28.70	30.67
Corporate	54.6	58.31	54.69	59.24
Malaysia				
Total	95.0	93.60	94.78	93.27
Government	38.9	39.92	39.42	38.77
Corporate	56.1	53.68	55.36	54.50
Philippines				
Total	38.2	40.73	41.16	36.12
Government	38.1	40.41	40.83	35.35
Corporate	0.1	0.32	0.33	0.77
Singapore				
Total	72.5	73.80	71.21	73.84
Government	40.0	40.92	40.19	42.86
Corporate	32.5	32.88	31.02	30.99
Thailand				
Total	41.8	42.13	45.88	51.15
Government	21.5	22.41	21.54	23.83
Corporate	20.3	19.73	24.34	27.31
Viet Nam				
Total	7.3	8.32	8.15	9.59
Government	7.3	8.32	7.95	9.03
Corporate	-	0.00	0.20	0.56
Total Emerging East Asia				
Total	42.6	47.22	50.28	54.23
Government	21.2	24.80	26.80	29.21
Corporate	21.4	22.42	23.48	25.02

Notes:

1. 1H06 data (1 January – 30 June 2006) are *AsianBondsOnline* estimates.
2. Corporate bonds include issues by financial institutions.

Sources: Bank for International Settlements, *International Financial Statistics* (Tables 16A and 16B and local currency portion of Table 11), except Hong Kong, China (Hong Kong Monetary Authority); Singapore (Monetary Authority of Singapore); and Viet Nam (Ministry of Finance); *Asia Regional Integration Center* (ARIC) for GDP, except for China (CEIC—from 1995 to 2004 and National Bureau of Statistics of China for 2005 onward); *AsianBondsOnline* estimates.

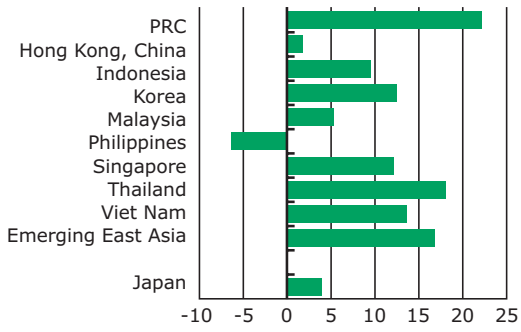
Hong Kong, China; and Viet Nam—have appreciated strongly against the USD (Table 3).

Table 3: **2005 Appreciation (Depreciation) of Emerging East Asian Currencies** (%)

	Against USD	
Currency	**2005**	**2006 YTD**
CNY	2.55	2.04
HKD	0.24	(0.49)
IDR	(5.71)	6.58
KRW	2.71	6.31
MYR	0.54	2.49
PHP	5.63	5.63
SGD	(1.82)	4.64
THB	(5.42)	8.83
VND	(0.92)	(0.83)
JPY	(14.06)	(0.21)

Notes:
1. Appreciation (depreciation) is computed for each year using natural logarithm of end-of-period rate/start-of-period rate.
2. 2006 year-to-date (YTD) as of 30 September 2006.
Source: Reuters.

Figure 2: **Growth of Emerging East Asian Local Currency Government Bond Markets, 1 Jan–30 Jun 2006** (%)



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Government bond market growth remains strong due to infrastructure spending and sterilization requirements, although better-than-projected tax revenues in some markets reduced the need for government issuance.

Government bond markets in emerging East Asia grew 16.8% from 1 January to 30 June 2006, with net issuance strongest in PRC, Thailand, Viet Nam, Korea, and Singapore (Figure 2). The following market specific factors contributed to growth in 2006:

- The high growth rate in the PRC (22%) was due to the issuance of central bank bonds to absorb excess liquidity. While the government has reduced issuance of long term special bonds to fund infrastructure programs—as part of a strategy to gradually withdraw from proactive fiscal policy—it has also raised the reserve requirement on banks to prevent speculative lending to the booming real estate and construction sectors, resulting in surplus cash funneling into the government bond market.

- In Thailand (18%), the high growth rate was due to continuing financing requirements for infrastructure, while the Government Savings Bank issued a 30-month bond to satisfy retail demand.

- In Viet Nam (14%), the government issued bonds for infrastructure projects, which retail investors and the nascent asset management and insurance industries eagerly purchased.

- In Korea (12%), the KRW27.8 billion in net new government bond issuance was fuelled largely by the demand for more public spending on health and defense. The increased issuance is expected to continue for the rest of 2006 and into 2007.

- In Singapore (12%), growth was due to the government's policy of increasing the size of existing Singapore Government Securities (SGS) benchmark issues to improve liquidity. Only one bond series matured, but net issuance increased as the existing 10-year on-the-run SGS and three other issues were reopened to boost benchmark size.

- In Indonesia (10%), confidence in bond markets returned after difficult currency and interest rate conditions in August–September 2005. The growth in local currency government bonds outstanding partially reversed the 10% contraction in 2005. The strengthening IDR exchange rate and declines in interest rates led to renewed demand from pension funds and international investors, while the first issue of government bonds aimed at the retail sector was heavily oversubscribed due to the attractive coupon.

- In Malaysia (5%), most of the growth in government bonds outstanding was due to *sharia*-compliant Islamic issuance of *sukuk* bonds and T-bills. Malaysia is now the largest Islamic capital market in the world (Box).

- In Hong Kong, China (1.8%), issuance of exchange fund notes covered redemptions, as strong economic growth brought in increased tax revenues. However, the government announced a possible fiscal deficit for 2006/07 if the proposed introduction of a value-added tax is not passed. This may require additional issuance to cover the budget shortfall.

- In the Philippines, the size of peso-denominated government bonds outstanding contracted by 6.3%. In spite of the government's preference for issuing local currency debt over foreign debt, buoyant economic conditions and improvements in tax collection procedures ensured that deficit funding was substantially below budget plans.

- In Brunei Darussalam, initial issues of short-term *sukuk al-ijara* paper were offered as a first step to develop an Islamic capital market in the country.

Box: **Demand for Islamic Bonds on the Rise**

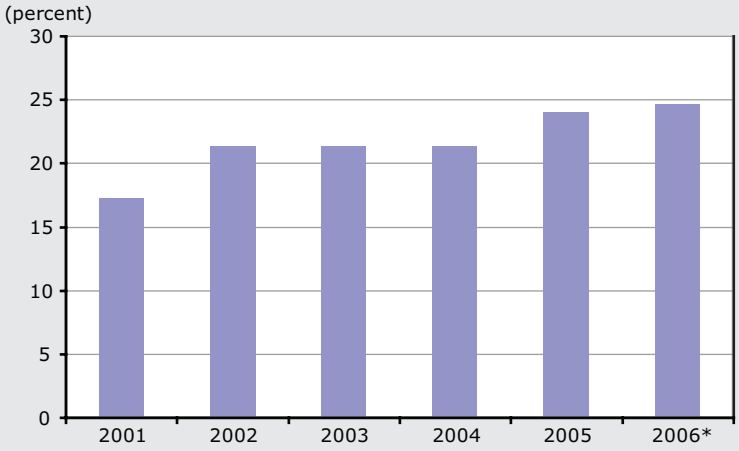
Demand for Islamic bonds has grown substantially, but still lags behind mainstream debt markets. They operate within the rules and principles of Islamic law (*sharia*) and presently remain in markets where investors hold bonds to maturity. Islamic bonds have gained universal acceptance as a viable alternative to conventional products.

Aside from the obvious attractiveness among Muslim investors, Islamic bonds may also appeal to conventional investors looking for attractively-priced instruments for regular income and capital gains. The strong investor demand offers issuers access to an alternative cost effective fundraising option.

Moreover, efficient price discovery processes for Islamic securities in some countries—for example, the issuance of Islamic Treasury Bills and Government Issues in Malaysia—has led to the establishment of an Islamic benchmark yield curve.

The international Islamic bond market is divided into sovereign (and quasi-sovereign) and corporate certificate (*sukuk*) markets. A prerequisite for an Islamic issue is *sharia* compliance, which prohibits the charging of interest (*riba*). *Sukuk* markets are particularly innovative and are rapidly expanding with significant new issuance. Islamic bonds are structured financial instruments based on a specific contract of exchange that can be made through the sale and purchase of an asset based on deferred payment, leasing of specific assets, or participation in joint-venture businesses. They are issued internationally by sovereign or corporate entities and are generally of medium-term maturity with risk/return characteristics similar to conventional debt securities. Structuring Islamic bonds requires approval from recognized *sharia* advisors to ensure compliance with Islamic rules and principles. In addition, Islamic bonds can be structured to provide investors additional protection against late payment, prepayments, and potential write-offs, among others. This protection comes as part of credit and/or liquidity enhancement schemes.

Figure B: **Islamic Bonds as a Percentage of Total Outstanding Bonds, Malaysia**



* as of July 2006
Source: Bank Negara Malaysia.

Introducing accounting and supervisory standards and best practices for Islamic bonds has accelerated along with an increasing number of cross-border memorandums of understanding to facilitate international Islamic finance transactions. In particular, work is underway to (i) build transparency and cost effectiveness in cross-border transactions by streamlining regulations across different regions; (ii) cooperate on enforcement across jurisdictions; (iii) strengthen channels for information exchange, cooperation, and consultation; and (iv) promote capacity building and other training initiatives. Moreover, in mid-September 2006, the International Swaps and Derivatives Association and the International Islamic Financial Market signed a memorandum of understanding as a basis for developing a master agreement for documenting privately negotiated *sharia*-compliant derivatives transactions. Unlike conventional counterparts, institutions offering Islamic financial services (IFIs) have a limited range of "allowed" financial instruments for investment, particularly hedging instruments. Limited risk-management options available to IFIs could delay the development of a more efficient and active Islamic financial market, rendering IFIs less competitive against conventional financial services.

Malaysia is at the forefront of Islamic bond market development in emerging East Asia, and aims to become a global Islamic finance hub. The country pioneered *sukuk* issuance and is now expanding its reach to the Middle East, particularly the Gulf region. In 2005, Islamic bonds accounted for 71% of all bonds issued in Malaysia, with *sharia*-compliant bonds nearly 25% of Malaysia's total outstanding issuance (Figure B). In November 2006, Malaysia also allowed domestic *sukuk* issues in currencies other than MYR, a move aimed at furthering Malaysia's premier status as an Islamic center. Demand for Islamic bonds is fuelled by the extremely liquid Gulf markets, which are currently awash with petrodollars. The Gulf region is also providing a large percentage of issuers as the construction boom in the region requires finance. Malaysia's Islamic bond market grew 8% during the first half of 2006, and has more than doubled in size since 2001.

Fuelled by demand for annuity assets from contractual savings institutions, corporate bond markets also posted strong growth in the first half of 2006.

Growth was particularly impressive in Viet Nam and the Philippines (175% and 153% respectively, albeit from a very low base), Thailand (20%), PRC (19%), and Korea (14%). Indonesia; Hong Kong, China; Malaysia; and Singapore saw growth in excess of 5% (Figure 3). Aggregate growth in emerging East Asian local currency corporate bond markets was 14.2%.

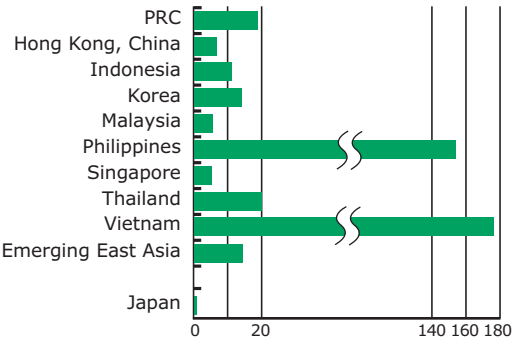
Contractual savings institutions (CSI), particularly insurance companies, led the regional appetite for local currency fixed-income corporate assets. New insurance business premiums in Singapore expanded 31% in the first half of 2006, and Viet Nam's insurance company assets expanded 30% in the same period. This trend is occurring elsewhere in the region, with insurance density ratios—a measure of insurance companies' appetite for assets—rising rapidly. In the PRC, for example, density ratios expanded fivefold since 1996, although from a low base (Table 4). The sector is creating demand for fixed-income annuity assets of varying credit quality in local currencies to match the rapid growth in CSI contributions.

Individual economies have also recognized the benefits of a deeper corporate bond market and have turned their attention to essential legal reform, streamlining issuance regulations, and stimulating investor appetite through tax concessions. Specific market developments that stimulated corporate bond market growth include the following:

- In Viet Nam, the passage of Decree 52/2006 in June 2006 allows corporations to issue bonds without a credit guarantee from a financial institution. Authorities eased other issuing requirements as well, paving the way for many newly "equitized" corporations to issue VND-denominated bonds.

- In the Philippines, issues by Ayala Corporation and government-controlled National Development Corporation bonds were heavily oversubscribed. Managers also upsized Petron Corporation's September 2006 issue to accommodate demand. Corporate issues this year have benefited from reduced government borrowings and changes to the asset

Figure 3: **Growth of Emerging East Asian Local Currency Corporate Bond Markets 1 Jan–30 Jun 2006** (%)



Sources: Bank for International Settlements, *International Financial Statistics* (Tables 16A and 16B and local currency portion of Table 11), except PRC (ChinaBond); Hong Kong, China (Hong Kong Monetary Authority); Singapore (Monetary Authority of Singapore); *AsianBondsOnline* estimates.

Table 4: **East Asian Insurance Density Ratios**[1]

Market	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
CN	7.86	10.86	12.08	13.38	15.25	19.97	28.77	36.28	40.14	45.99
HK	844.00	947.45	995.42	1,064.63	1,170.44	1,377.70	1,582.73	1,806.85	2,174.49	2,556.38
ID	13.65	13.21	5.72	7.37	8.43	9.09	12.20	14.61	17.26	19.42
KR	1,372.22	1,233.29	1,008.35	1,121.49	1,241.28	1,067.23	1,191.22	1,256.82	1,431.01	1,717.25
JP	4,125.72	3,885.90	3,600.73	3,947.65	3,965.52	3,491.18	3,497.29	3,703.43	3,873.17	3,731.02
MY	218.75	198.75	135.66	143.68	180.89	201.25	198.98	223.91	252.27	276.58
PH	17.84	17.58	12.56	13.79	13.36	12.64	14.53	14.62	14.94	16.93
SG	1,160.49	1,309.76	942.63	937.76	986.88	1,242.25	2,192.60	2,064.04	2,325.07	2,351.89
TH	76.43	52.46	41.83	45.74	49.73	53.62	64.96	77.45	89.44	98.45

[1]Calculated as total insurance premium divided by population.

Sources: Swiss Re (Sigma) for Insurance Premium; Asian Development Bank (Statistical Database System) for population, except Japan (Statistics Bureau).

mix in offshore banking units that favor peso-denominated debt securities over peso loans.

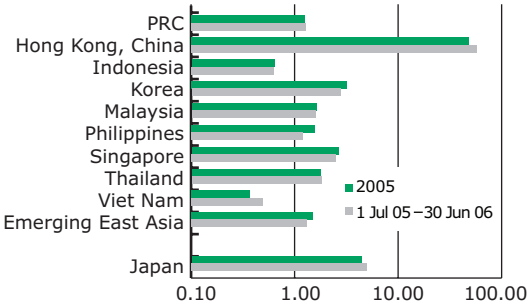
- In the PRC, the passage of a new bankruptcy code—effective June 2007—benefited the corporate bond market. The new law clarifies creditor rights, adds certainty to debtor status in the event of default, and should thus boost investor confidence. Bank issues of tier 1 and 2 subordinated debt have proved popular with investors. Although financial sector bonds continue to dominate the corporate sector, issuer diversity has expanded to include publicly-listed corporations such as Air China, and asset-backed securities covered by receivables and real estate assets. Corporate bonds outstanding grew despite a temporary slowdown in National Development and Reform Commission reviews of corporate bond issue applications—due to concerns about economic overheating.

- In Hong Kong, China, growth was fuelled by Real Estate Investment Trust bond sales, with many issues oversubscribed. Retail bonds issued by Hong Kong Mortgage Corporation continue to be popular with retail investors.

- In Thailand, tax reforms to stimulate investor diversity paid dividends. Foreign holding of bonds increased 143% in the first half of 2006, after the government waived withholding taxes for international investors. The government also clarified the tax status of Special Purpose Vehicles, paving the way for more securitized issues.

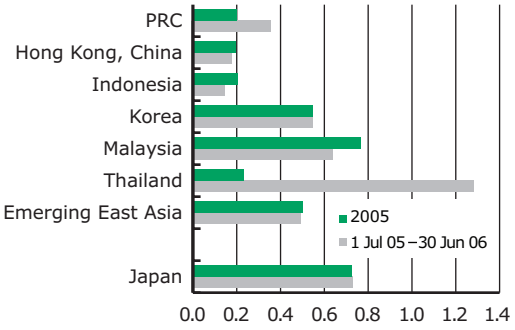
- In Malaysia, growth in corporate bonds outstanding benefited from the surge in demand for *sharia*-compliant investments, with 80% of new issues tapping this funding base. Demand

Figure 4: **Government Bond Turnover Ratios,[1] 2005 and 1 Jul 2005–30 Jun 2006**



[1]Calculated as local currency (LCY) trading volume (sales amount only) divided by year-end LCY value of oustanding bonds.
Sources: PRC (ChinaBond); Hong Kong, China (Hong Kong Monetary Authority); Indonesia (Bank Indonesia and Surabaya Stock Exchange); Japan (Japan Securities Dealers Association); Korea (KoreaBondWeb); Malaysia (Bank Negara Malaysia); Singapore (Monetary Authority of Singapore); Thailand (Thai Bond Market Association); Viet Nam (Ministry of Finance and Ho Chi Minh City Securities Trading Center).

Figure 5: **Corporate Bond Turnover Ratios,[1] 2005 and 1 Jul 2005–30 Jun 2006**



Note: Philippines, Singapore, and Viet Nam corporate turnover ratios are unavailable.
[1]Calculated as local currency (LCY) trading volume (sales amount only) divided by year-end LCY value of oustanding bonds.
Sources: PRC (ChinaBond); Hong Kong, China (Hong Kong Monetary Authority); Indonesia (Bank Indonesia and Surabaya Stock Exchange); Japan (Japan Securities Dealers Association); Korea (KoreaBondWeb); Malaysia (Bank Negara Malaysia); Singapore (Monetary Authority of Singapore); Thailand (Thai Bond Market Association).

is particularly strong from the Middle East for Islamic instruments in local currency, as well as euro- and yen-denominated products, as investors look to diversify away from USD holdings, reducing currency exposure from dollar-denominated oil revenues.

- In Indonesia, corporate bond markets grew with issues of both conventional and Islamic securities. As in Malaysia, *sharia*-compliant products are finding a willing investor base both domestically and internationally. However, domestic investors, including pension funds, selectively purchased conventional debt products after the mutual fund crisis of 2005 highlighted liquidity problems with lightly-traded corporate issues.

- In Korea, financial institution issuance—rather than industrial corporations—dominated corporate bond market growth. Net issues by financial corporations surged by KRW25 billion, while net industrial issuance contracted KRW2.4 billion.

2. Turnover

On average, turnover ratios in the region's government bond markets fell slightly, while those in corporate bond markets remained stable.

As of June 2006, emerging East Asian government bond turnover ratios fell slightly from 1.54 to 1.36 (Figure 4). Corporate bond market turnover ratios were unchanged (0.50 to 0.49) compared with 2005 (Figure 5).

Government securities turnover ratios in Hong Kong, China continue to increase rapidly, while those in Thailand, PRC, and Viet Nam also saw some improvement. Turnover ratios in Malaysia, Korea, Singapore, and Philippines all declined, while ratios in Indonesia remained unchanged. In markets where corporate bond turnover data are available, market performance was very mixed, with exceptional increases in Thailand and the PRC, unchanged ratios in Korea and Hong Kong, China, and reductions in Malaysia and Indonesia. Economy-specific factors that led to the changes in turnover ratios include the following:

- In the PRC, the government bond market turnover ratio rose from 1.30 in 2005 to 1.34 as of 30 June 2006,[4] as banks sought local currency bonds to cover increased reserve requirements. Large investment demand drove a substantial increase in the corporate bond turnover ratio from 0.20 to 0.35, with bank-issued subordinated bonds accounting for much of the transaction volume. A decision to allow corporate paper to trade on the interbank market in addition to the Shenzhen and Shanghai exchanges helped raise turnover on the corporate bond market.

- In Thailand, the rapid increase in corporate bond market turnover ratios—from 0.23 to 1.28—overshadowed the slight increase in government bond turnover ratios—from 1.86 to 1.88. Increased demand by international investors—due to an appreciating THB and accommodative tax regime—boosted trading while hybrid securities issues[5] proved a popular trading vehicle. The range of investment products and issuer diversity has also increased. The Bank of Thailand is also closing its repurchase facility and moving to a more flexible market-based system where participants can transact with each other, which will further boost liquidity.

- In Hong Kong, China, the government securities turnover ratio increased—from 53.35 to 63.87. A combination of flexible repurchase arrangements for market makers and heavy usage of USD-based derivative products such as swaps and futures to hedge rate risk[6] continues to promote a very active exchange fund note (EFN) market. Corporate turnover remains significantly lower than government securities turnover and is relatively unchanged from 2005 levels—0.20 to 0.18.

- In the Philippines, the government's highly successful bond swap and buyback program resulted in the government bond market turnover ratio falling from 1.63 to 1.26, as investors redeemed short-term bonds for longer maturities. The drop

[4] PRC government bond turnover for 2004 and 2005 has been restated to include central bank bonds.

[5] Hybrid securities have both equity and debt characteristics. They are popular with investors because, aside from paying a coupon, they also allow bondholders to participate in gains from equity appreciation of the issuing company.

[6] With the HKD/USD peg, market participants access more liquid USD-based derivatives products to hedge rate risk, as well as price arbitrage opportunities.

in turnover ratio is expected to be temporary, as the program has substantially boosted the size of benchmark issues, which should improve liquidity in the future.

- In Singapore, the government bond turnover ratio fell from 2.80 to 2.61 due to the uncertain rate environment in the first half of the year. The 10-year auction and other issue reopenings may have temporarily reduced turnover as traders awaited tender results.

- In Malaysia, the government bond turnover ratio fell slightly from 1.69 to 1.64, while the corporate bond market turnover ratio was down from 0.77 to 0.64. The decision to concentrate on Islamic *sharia*-compliant investment vehicles found plenty of investment demand, where buy-to-hold strategies are increasingly common due to the explosive growth in assets under management and the limited supply thus far.

- In Korea, the turnover ratio in government bond markets fell from 3.37 to 2.87 due to record outward investment in foreign securities by domestic investment houses. Overseas investment funds have become popular with domestic investors seeking to diversify holdings away from domestic stocks and bonds. Assets under management in this asset class rose 80% in the first half of 2006. The corporate bond market turnover ratio remained relatively stable at 0.55. Although the trend to outward investment also affected corporate turnover, the popularity of hybrid securities and asset-backed securities issued by the finance sector counterbalanced any drop in turnover of other securities.

- In Indonesia, the government bond market turnover ratio was unchanged at 0.64 while corporate bond market turnover ratio fell from 0.21 to 0.14. As in the Philippines, the government embarked on a bond-swap program, but it has been less successful, as investors have not viewed the yield pick-up as sufficient to compensate for the longer maturity of the newly issued bonds. While foreign buyers returned to bond markets after the difficult conditions in 2005, they seem to prefer government securities over corporate debt unless there is sufficient yield pick-up to justify the added risks from lack of liquidity.

- In Viet Nam, there was another increase in the bond market turnover ratio—from 0.37 to 0.50. Regular sales of government securities through the Ho Chi Minh Securities Trading Centre—and the transition to a market rate setting environment—means that secondary market trading opportunities remain limited, although investor demand continues to grow.

3. Bond Yields

Bond yield curves—after steepening during the first half of 2006—generally flattened across the region in the third quarter.

In the first half of 2006, heightened inflationary expectations stemming from rapidly rising commodity prices, caused emerging East Asia's policy makers to raise short-term policy rates—similar to the US Federal Reserve, the European Central Bank, and the Bank of Japan (which abandoned its zero interest rate policy after 5 years). As a result, funding rates rose across most emerging East Asian markets. The exceptions were Hong Kong, China, where policy rates remained unchanged; the Philippines, where interest rates for banks' deposits with the central bank were eased; and Indonesia, where interest rates were eased in response to improving economic fundamentals and appreciating exchange rates (Table 5).

Yield curves generally steepened in the first half of 2006 as longer-term bond rates rose in response to the upward shifts in funding rates and concerns about how long inflationary pressures would last. However, inflationary pressures started subsiding

Table 5: **Short-term Interest Rates**

Market	Reference Rate	31-Dec-04	31-Dec-05	31-Mar-06	30-Jun-06	30-Sep-06
PRC	CHIBOR 1 Month	1.77	1.90	1.80	2.71	2.15
Hong Kong, China	HIBOR 1 Month	0.28	4.10	4.15	4.19	4.28
Indonesia	JIBOR 1 Month	7.44	13.60	13.03	12.67	11.29
Korea, Rep. of	KORIBOR 1 Month	3.25	3.80	4.04	4.30	4.54
Malaysia	KLIBOR 1 Month	2.81	3.13	3.40	3.81	3.66
Philippines	PHIBOR 1 Month	7.94	7.81	7.31	7.81	7.69
Singapore	SIBOR SGD 1 Month	1.38	3.19	3.38	3.50	3.53
Thailand	BIBOR 1 Month	2.27	4.30	4.81	5.26	5.27
Japan	TIBOR 1 Month	0.06	0.06	0.08	0.18	0.37
US	Federal Funds Rate O/N	2.25	4.25	4.75	5.25	5.25

Sources: Bloomberg LP, except KORIBOR (Korea Federation of Banks).

in the third quarter. In July 2006, the US Federal Reserve also paused its tightening cycle and—combined with appreciating East Asian currencies—investor confidence returned to emerging East Asian local currency bond markets. As a result local currency yield curves across the region generally flattened in the third quarter (Figure 7).

The following specific market factors shaped yield curves in individual East Asian local currency bond markets:

- Singapore saw one of the largest relative shifts in the yield curve in the third quarter, with the 2–10 year yield curve spread flattening from 58 basis points (bps) to 21 bps. The new supply of 10-year SGD government bonds was absorbed relatively easily with strong exchange rate performance, adding to investor confidence.

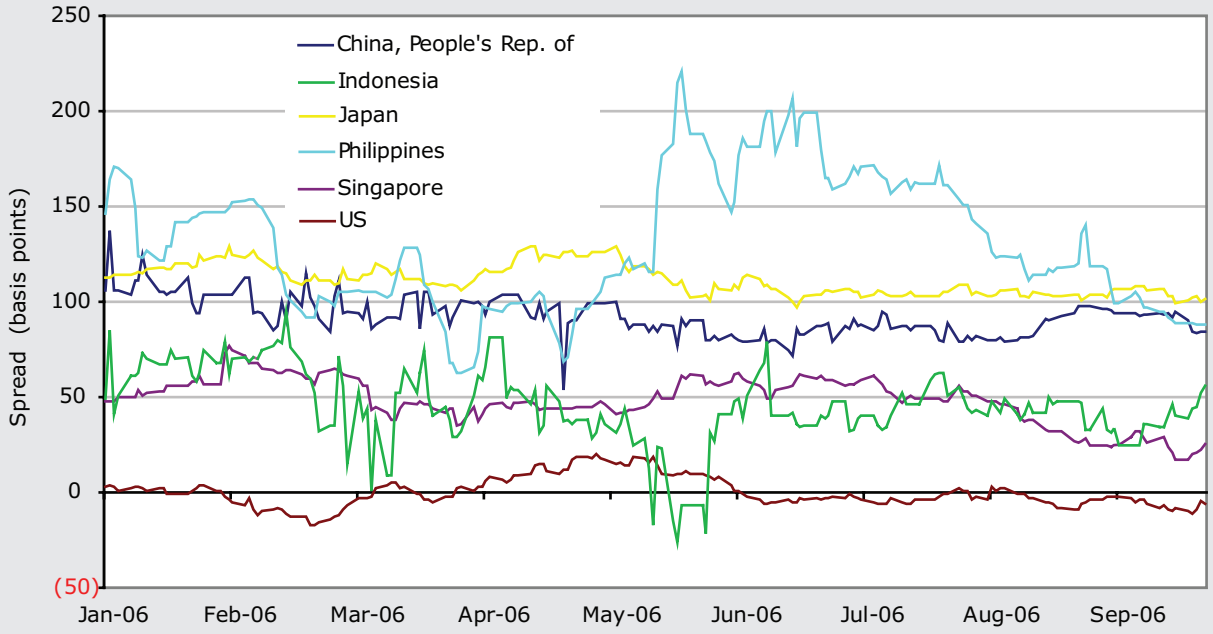
- Unlike most other markets in Asia, Korea's yield curve has flattened steadily throughout the year, with the 2–10 year spread declining from 72 bps in January to 22 bps by the end of September. The Bank of Korea raised policy rates three times, citing inflationary pressures. However, the appreciating KRW encouraged international investors to buy longer maturities.

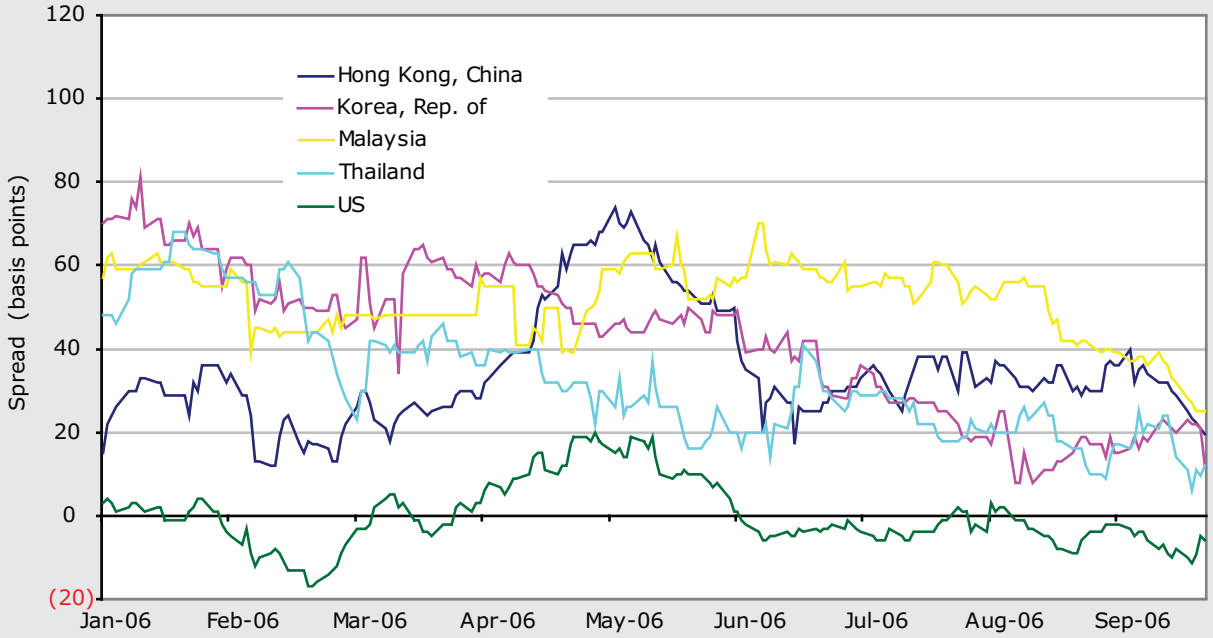
- In Thailand, due to inflationary concerns and political instability, the 2–10 year THB yield curve differential rose from 48 bps to 68 bps by the end of January 2006. An appreciating exchange rate and subsequent buying of longer maturity bonds by international and local investors pushed the 2–10 year spread to 12 bps as of end-August 2006. Political uncertainties resulted in a slight sell off of 10-year bonds in early September but the yield curve spread has subsequently returned to the end August levels.

- In addition to increasing policy rates twice, the PRC also lifted bank reserve requirements three times to limit over lending to certain sectors of the economy. Strong buying of government bonds to meet reserve requirements pushed the 2–10 year RMB yield curve spread[7] from 137 bps to 84 bps as of end-September 2006.

[7] The RMB 2–12 year yield curve spread was replaced by a 2–10 year yield curve by ChinaBond on 18 August 2006.

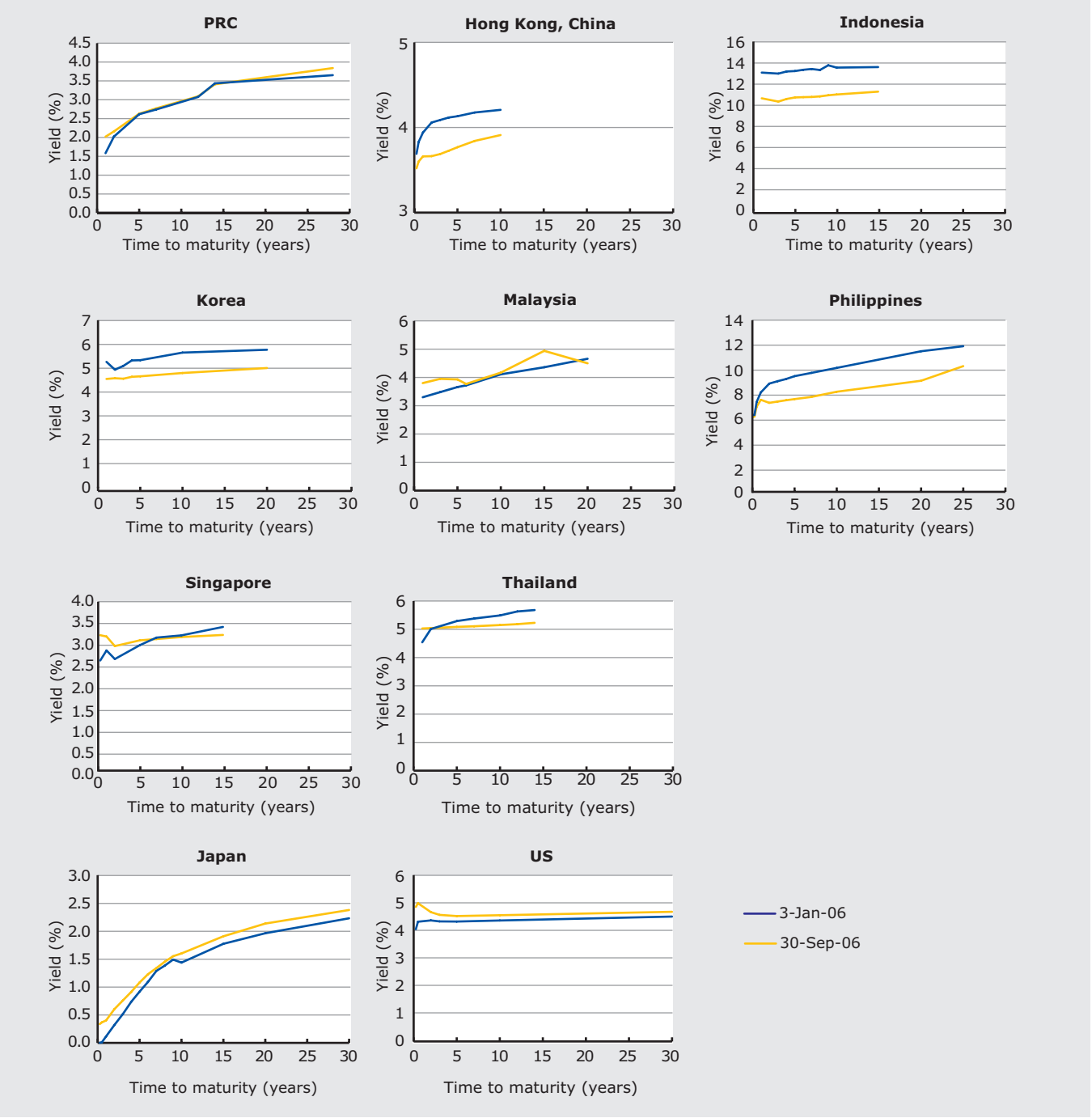
Figure 6: **Interest Rate Spread—2-Year and 10-Year Local Currency Bonds**





Note: Indonesia and Malaysia are 3-year and 10-year local currency bonds.
Source: *AsianBondsOnline.*

Figure 7: **Benchmark Yield Curves—Local Currency Government Bonds**



Source: *AsianBondsOnline.*

- In Hong Kong, China, movements in the 2–10 year HKD yield curve spread largely followed movements in US rates, with a gradual sell off in the first two quarters followed by strong buying of longer dated EFN paper after the US Federal Reserve paused its tightening cycle. In the third quarter, the yield curve spread declined from 50 bps to 25 bps.

- In the Philippines, the 2–10 year yield curve steepened during the first two quarters of 2006 in line with crude oil price pressures, moving from 150 bps to 207 bps as of end-June 2006. Since then, the reduction in crude oil prices and an appreciating peso has led to improved sentiment, which brought the yield curve down to 89 bps. Record remittances from overseas workers also increased domestic liquidity available for investment.

- Indonesia's 3–10 year IDR yield curve spread has been very volatile and moves sharply depending on order flow in bond markets and intraday currency movements, partly due to policy rates being eased six times from 12.75% to the current 10.25%.

- In Malaysia, the 3–10 year MYR yield curve steepened from 39 bps to 62 bps from February to end-June as policy rates were increased. They have since flattened to 25 bps.

4. Bond Index Returns

Despite generally higher short-term interest rates, currency appreciation and yield curve flattening pushed local currency index returns higher in 2006.

On an unhedged USD basis, the iBoxx ABF Pan-Asia Index of local currency bonds has returned 9.51% for the year to date. A US Treasury Index of similar duration returned 2.74% for the same period (Table 6). In local currency terms, Indonesia (19.29%) and the Philippines (12.95%)—markets with falling short-term interest rates—had the greatest gains. However, all market returns were positive as yield curve flattening pushed the prices of longer duration bonds higher. Local currency appreciation also added considerably to returns on a USD unhedged basis, with currency gains adding 9% to Thailand, 6.5% in Indonesia, over 4% in Korea, Singapore, and Philippines, and 2% in the PRC. Hong Kong, China was the only market not to benefit from currency gains due to its pegged exchange rate.

Table 6: **iBoxx ABF Index Family Returns**

Market	Modified Duration (years)	2005 Returns (%)		2006 Returns, year-to-date (%)	
		Local Currency Bond Index	USD Unhedged Total Return Index	Local Currency Bond Index	USD Unhedged Total Return Index
PRC	4.56	11.96	14.48	1.48	3.48
Hong Kong, China	3.48	(1.58)	(1.30)	4.15	3.68
Indonesia	4.09	(1.28)	(6.87)	19.29	25.74
Korea, Rep. of	3.17	(0.61)	1.69	5.90	12.58
Malaysia	3.85	5.19	5.73	2.59	5.11
Philippines	3.65	20.89	26.69	12.95	18.36
Singapore	4.51	(0.71)	(2.56)	2.47	7.13
Thailand	4.47	0.57	(4.88)	5.20	14.28
Pan-Asian Index	3.91	NA	2.57	NA	9.51
US Govt 1–10 years	3.45		1.51		2.74

Notes:
1. Market bond indexes are from iBoxx ABF Index Family. 2006 year-to-date returns as of 30 September 2006.
2. Annual return is computed for each year using natural logarithm of year-to-date index value/beginning-year index value.
3. Duration as at 30 September 2006.
Sources: *AsianBondsOnline*, Bloomberg for US Government Bond Index.

5. Institutional and Regulatory Developments

Across the region, several initiatives have been introduced to strengthen the institutional and regulatory frameworks governing bond markets.

- Regionally, the Asian Development Bank (ADB) launched a USD10 billion Asian Currency Note program, the first multicurrency bond platform since the 1997 Asian financial crisis. The program represents a major regulatory milestone, as it links the domestic capital markets of Singapore and Hong Kong, China, and later Malaysia and Thailand. Under the scheme, Asian local currency bonds are issued in domestic markets under a single, unified framework with a common set of documents governed by English law. This structure offers significant savings in legal and transaction costs. It also means that leading issuers will not be constrained by any one Asian capital market—be it size, currency, or investor appetite. Upon approval by other regulators within the region, other markets in the region may join the program.

- In October 2006, regional finance industry participants formed the Asia Securities Industry and Financial Markets Association (ASIFMA), aimed at promoting the growth and development of Asia's capital markets and their continued integration into the global financial system. ASIFMA will also act as an advocate and lobbying organization for market participants, and hopes to interact with policy makers on issues such as standard documentation and clearing and settlement issues.

- In the PRC, the authorities allowed HSBC and Standard Chartered Bank to transact the first RMB interest rate swap, which should pave the way for further derivative transactions. In order to promote short selling, the People's Bank of China (in November 2006) introduced rules for securities lending in the interbank market, allowing banks to borrow or lend bonds for a maximum of 365 days. Subject to final regulatory approval, Jiangsu Expressway Company intends to restructure its debt by issuing RMB asset-backed securities, covered by toll receivables, while Dynasty Asset Management's RMB commercial mortgage-backed securities—backed by mainland

property—are also expanding the variety of instruments available to investors.

- In Hong Kong, China, the Hong Kong Monetary Authority (HKMA) launched the Central Moneymarkets Unit Bond Price Bulletin website in January 2006, providing retail investors with convenient online access to indicative bond prices quoted by major banks in Hong Kong, China. In October 2006, HKMA released a comprehensive review of the HKD debt market. Key recommendations include issuing EFNs past the existing 10-year maturity to satisfy investment demand and create a benchmark for corporate debt, and concentrating benchmark issues through re-openings. Supranationals will also be allowed to issue short term debt with tenor under 3 years, which should lead to the availability of high grade corporate paper across the yield curve.

- The role of Indonesia's clearing and guarantee corporation—PT Kliring Penjaminan Efek Indonesia—has been expanded to include retail sovereign and corporate bond settlement through the Surabaya Stock Exchange (SSX). It aims to address settlement deficiencies in the transaction environment and to raise transparency. A planned merger between SSX and the Jakarta Stock Exchange means that all exchange-listed financial instruments can be traded on a single bourse, which should also aid liquidity by expanding the investor base.

- In Korea, the government plans to introduce new types of fixed-income products such as inflation-indexed bonds, floating-rate bonds, and small-lot Korea Treasury Bills for individuals, aimed at diversifying the investor base. The maturity profile of government debt is set to lengthen with a larger proportion of 10–20 year government bonds due to be issued in 2007. This should encourage issuance of longer dated debt away from the traditional 3–5 year bracket presently favored by corporations.

- Malaysia has offered favorable tax treatment for real estate investment trusts for a 5-year period, which will encourage issuance of both conventional and Islamic instruments. The proposed buyout of energy firm Malakoff Berhad by MMC Corporation Berhad, the largest in Malaysian corporate

history, is to be funded completely by the issue of Islamic securities. In January 2007, the government will reintroduce short selling for the first time since 1997 in order to increase securities turnover.

- In the Philippines, reflecting the growing investor appetite for local currency bonds, the government has issued and reopened longer dated government benchmark issues and will alter its borrowing mix for 2007 to include a greater proportion of local currency-denominated debt (67% of total borrowings, up from 58% in 2006). However, regulatory bottlenecks continue to hold back further capital market development, particularly for corporate bonds. While issuers such as Ayala Corporation and Home Guaranty Corporation access the markets for a small proportion of their debt requirements, the supply of corporate paper needs to be more continuous before the market can be regarded as a serious financing alternative. There are currently proposals before the government for accounts with the Personal Equity and Retirement Account to receive tax breaks that should encourage further investment in the local capital markets. Congress is also examining taxes on insurance products, which are presently taxed at higher rates than other long-term products. The Philippines is the only market in emerging East Asia without an expanding insurance sector (See Table 4).

- In Singapore, the Monetary Authory of Singapore (MAS) is emphasizing transparency, and has launched an e-bond trading platform for government securities to attract more global traders to the market. Hong Kong, China's largest property company—Sun Hung Kai Properties Limited—supported the MAS policy to internationalize Singapore's issuer base by issuing its first SGD-denominated bond.

- Thailand continues to improve corporate governance with the introduction of tighter and more regular reporting requirements for issuers of corporate debt. ADB issued 10-year THB bonds to help promote longer-dated issuance beyond the 5-year tenor favored by Thai corporations. Foreign issuance is set to expand with Thai authorities easing issuance guidelines for both multilateral and sovereign issuers. KfW Bankengruppe is expected to follow soon with a 3–5 year issue. The new government continues to target foreign

investment with another series of international roadshows planned for 2007.

- In Viet Nam, the government is increasing benchmark and transaction sizes and specifying larger lot sizes for trade on the Ho Chi Minh Securities Trading Centre. Issuer diversity is also improving as more new corporate issuers are attracting both local and foreign investors. The Ministry of Finance has announced that all state owned commercial banks are to be "equitized," which will increase issuer diversity as they are expected to increasingly access the local capital markets. The Viet Nam Bank for Agriculture and Rural Development (Agribank), the largest local bank by assets, issued 10- and 15-year bonds, extending the present duration of corporate issues past the existing 10-year tenor.

- In Cambodia, the Department of Financial Industry, which oversees financial market development, signed a memorandum of understanding with Korea to develop a stock exchange. It is envisaged that the exchange will list both debt and equity instruments.

- Myanmar announced plans to establish a Securities and Exchange Commission, to oversee development of the MYK local currency bond market.

One of the major challenges in developing emerging East Asia's bond markets is to improve corporate bond markets and the transaction environment. To create a diverse and robust market, there needs to be a balance between the rapidly increasing demand of buy-to-hold investors for annuity-based assets, and the need to create a functional market that consistently, efficiently, and accurately prices financial assets.

This presents a delicate trade-off. If there are too many buy-to-hold investors, then the market's function as an efficient pricing tool for financial assets is compromised by the absence of transaction data. Too many active investors without access to the appropriate risk-shifting mechanisms could leave markets unable to cope with the increased bond market turnover that results from active investors shifting risk preferences. Key to the success of this requirement is a need to increase transaction liquidity in local currency bond markets, which is discussed in much greater detail in the following section.

Bond Market Liquidity—Empirical Analysis, Market Survey, and Policy Options

Over the past decade, the growth of local currency bond markets in emerging East Asia has been remarkable in terms of size. In fact, contrary to common perception, they now compare quite favorably worldwide with bond markets in economies with similar per capita income levels.[8] As these bond markets develop further, one major challenge is to increase market liquidity.

At the time of the 1997/98 Asian financial crisis, local currency bond markets in the region were nascent, economies were over-reliant on bank-intermediated financing, and there were difficulties in borrowing longer term, particularly in local currency. The crisis gave impetus to many emerging East Asian governments to prioritize the development of alternative vehicles for financial intermediation. Domestic bond markets received particular emphasis as they are an essential building block for improving the efficiency of financial intermediation and reducing potential currency and maturity mismatches. Led by the increasing issuance of government debt, local currency debt markets in the region have expanded quickly. However, the rise in outstanding debt has not led to a corresponding rise in bond market liquidity.

Market liquidity is important for ensuring the smooth functioning of the financial system and conditioning the activities of economic agents, including pricing, trading, and risk management. However, liquidity is not always well defined—largely because it is multidimensional. Adequate bond market liquidity allows buying and selling with little or no impact on price. Markets are often considered liquid when trading costs are low and volumes are high. A highly liquid market leads to low transaction costs for both issuers and investors. Conversely, when liquidity is low, financial market distortions intensify. Deep and liquid bond markets provide a safety valve when access to bank credit tightens—by providing an alternative source of financing. Of equal importance is a regular and reliable database—a by-product of liquid markets—that offers participants a highly transparent way to determine the current market value of financial assets.

[8] See "Financial Deepening in Emerging East Asia—An International Perspective," *Asia Bond Monitor*, March 2006.

This section first explores the dimensions and measurement of bond market liquidity. It then identifies the key determinants of bond market liquidity using two different but complementary approaches—a statistical method relying on cross-country regression estimates and a survey of market makers' views on factors that could increase market liquidity. Finally, the section outlines the various policy options that, if implemented, could contribute to greater market liquidity across emerging East Asia's local currency bond markets.

A note of caution is necessary in interpreting the results of both the cross-country regression method and the market survey. First, due to data constraints, the regression results are based on a sample of only 29–30 economies—thus it is possible that the results would be sensitive to the inclusion of other economies in the sample. Second, in the absence of a generally accepted and rigorous economic model of the determinants of bond market liquidity, the specifications of the estimations are based on a heuristic explanation of what is thought to affect bond market liquidity. Third, turnover figures are drawn from a variety of sources and may reflect differences in methodology. Attempts are made to base them on a uniform methodology of total bond market transaction volume on single-sided turnover excluding repurchase transactions. However, in some domiciles this has not been possible. Fourth, the market survey consists of a series of questions designed to elicit both quantitative responses and qualitative assessments of determinants of bond market liquidity. The 45 survey respondents are drawn from leading market makers[9] in government securities and underwriter league tables, and are active in emerging East Asian debt. Notwithstanding these limitations, the description here is unique in that it assembles data on various indicators of bond market liquidity (turnover ratio, bid-ask spread, and bond yield volatility) for the sample economies over a 5-year period, and makes an early attempt to analyze the determinants of bond market liquidity in a systematic way.

[9] Market makers are defined as sell-side banks and financial institutions that actively make two-way prices in local currency bond markets.

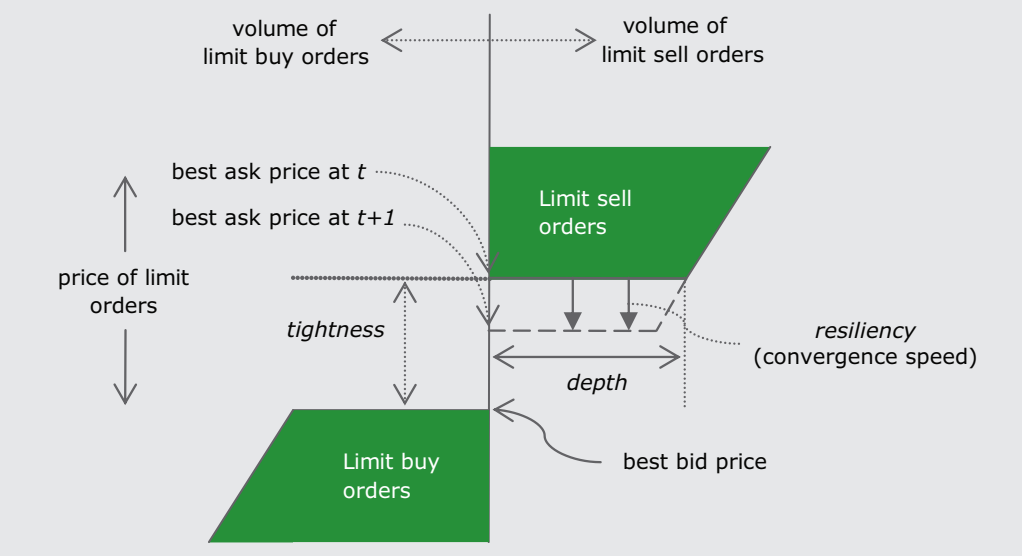
1. Dimensions and Measurement of Market Liquidity

Liquidity is a multidimensional concept—including market depth, tightness, and resiliency—and is generally measured by indicators such as turnover ratio, bid-ask spread, and bond yield volatility.

There are at least three dimensions to market liquidity: (i) *market depth*—the volume of trades possible without significantly impacting either prevailing market prices or the number of orders market makers can process at a given time; (ii) *market tightness,* which captures how far transaction prices diverge from the mid-market price—the general costs incurred irrespective of the level of market prices; (iii) *market resiliency*—the speed of convergence from one trade to the next equilibrium price or bid-ask spread (Figure 7).

Empirical proxies generally used for market depth are the turnover ratio coupled with an assessment of price stability, such as spread deviation. A commonly used measure of market tightness is the spread between the bid (purchase) and the ask (sale) price. An alternative measure of bond market tightness is bond yield volatility as measured by the standard deviation of daily yields. A measure of market resiliency is the frequency at which a bid-ask spread deviates from the average spread over a given period.

Figure 7: **Dimensions of Market Liquidity**

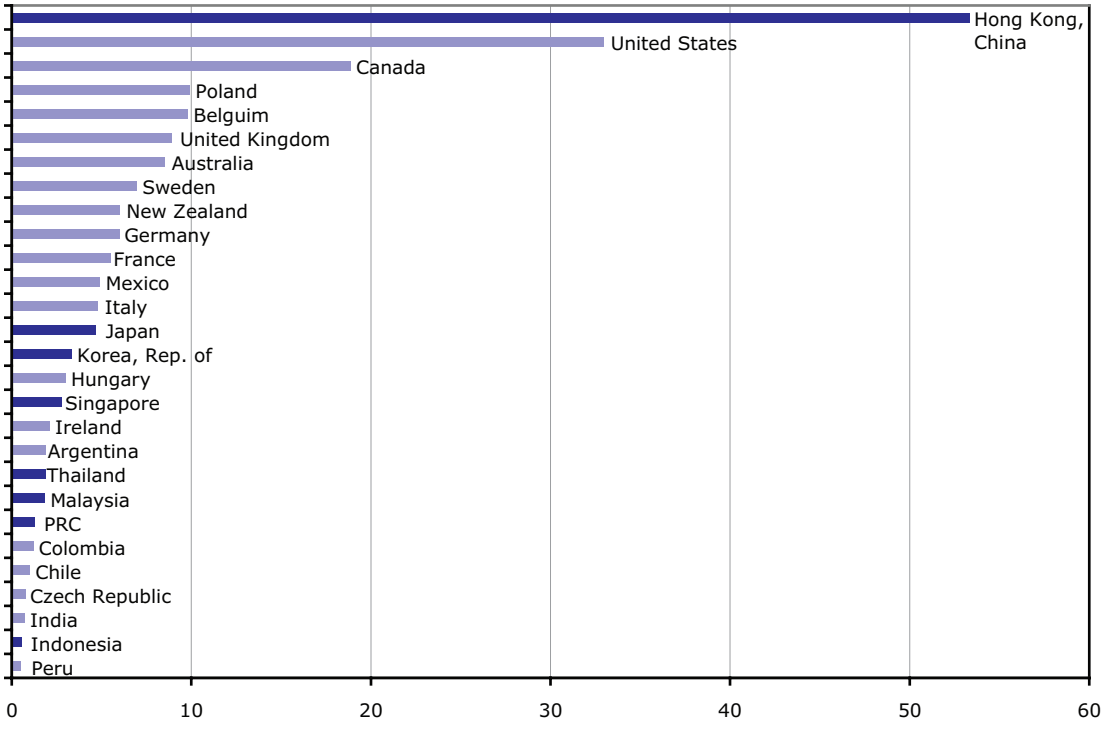


Source: Committee on Global Financial Systems (CGFS), "Market Liquidity: Research Findings and Selected Policy Implications," *CGFS Publications No.11*. May 1999.

Despite increasingly active government bond markets in emerging East Asia, turnover ratios—a measure of market depth—lag behind those of developed markets.

The turnover ratio measures the extent of trading in the secondary market relative to the value of bonds outstanding—the higher the turnover ratio, the more active the secondary market. Globally, there has been an uneven pattern to bond turnover. Data inspection reveals that turnover ratios for developed economies continue to outperform those in emerging East Asia (Figure 8), in part due to the symbiotic relationship between active derivatives markets and turnover. However, using a 2000–2005 sample period, physical turnover ratios peaked in Europe in 2003 and have been falling since, while in the US they continue to rise steadily. Turnover ratios have been increasing in Latin America (albeit from a low base). In emerging East Asia, however, they have tapered off. Government bond market deepening in emerging East Asia—as measured by government bond market size as a percentage of GDP against per capita income (see footnote 8)—has been accompanied by a rapid increase in buy-to-hold investors, as the growing contractual savings industry

Figure 8: **Local Currency Government Bonds Turnover Ratio, 2005**



Source: *AsianBondsOnline,* Bloomberg.

continues to search for scarce local currency assets to match liabilities. Insurance companies traditionally have played a smaller role in Latin America, but recent pension reform could be behind the growth in turnover ratios.

Over the 2000–2005 period in emerging East Asia, turnover ratios for government bonds increased in Singapore (from 2.6 in 2000 to 2.8 in 2005), PRC (from 0.1 to 1.3), Thailand (from 1.6 to 1.9), and Indonesia (from 0.4 to 0.6). Although the turnover ratio in Hong Kong, China decreased (from 56.9 to 53.3), it continues to outperform the US market (which rose dramatically from 17.5 to 33.0),[10] largely due to regulatory refinements in the mechanics of the repurchase market. Turnover ratios in Japan (from 5.2 to 4.7), Korea (from 4.6 to 3.3), and Malaysia (from 2.5 to 1.9) also fell during the period, which can partly be attributed to compressed bond yields.

Bid-ask spreads—a proxy for market tightness—have generally narrowed but remain relatively wide.

Market tightness can be measured by bid-ask spreads, which are based on supply and demand during trading. They represent the difference in price between the highest price that a buyer is willing to pay for an asset and the lowest price for which a seller is willing to sell. Wide spreads mean high transaction costs, leading investors to take a more passive approach to portfolio management—to hold bonds until maturity. Tight bid-ask spreads imply low transaction costs, which allow investors to take a more active approach in managing their fixed-income portfolios.[11] Under these conditions, bondholders are encouraged to "switch" investments more regularly based on assessments of relative value, which leads to a general increase in transaction volume.

Although bid-ask spreads in 2005 were generally higher in emerging market government bonds than in developed markets such as the US (0.4 bps), Australia (0.5 bps), and Canada (0.6 bps), data indicate that over time, bid-ask spreads in 10-year local currency government bonds have narrowed (Figure 9).

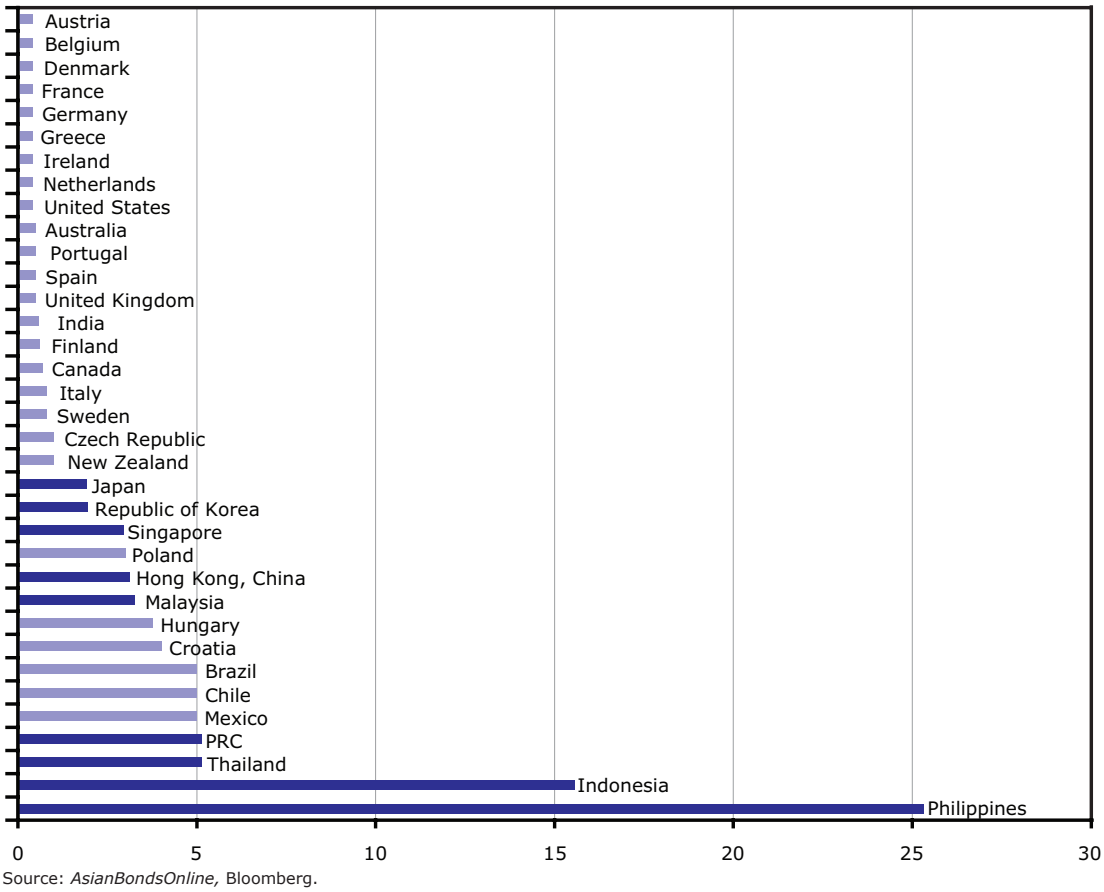
[10] The US market turnover ratio increased rapidly beginning in 2001 due to the "Dot Com" decline in equity markets, which caused a flight to quality as investment shifted into government bonds.

[11] See Jiang, G. and R.N. McCauley, "Asian Local Currency Bond Markets. *BIS Quarterly Review*, June 2004.

Bid-ask spreads on emerging market government bonds vary considerably. In emerging East Asia, for example, spreads vary from 1.9 bps in Korea to 3.0 bps in Singapore; 3.1 bps in Hong Kong, China; 3.3 bps in Malaysia; 5.1 bps in the PRC and Thailand; to 15.6 bps in Indonesia; and 25.3 bps in the Philippines. The large spreads in Indonesia and the Philippines may partly reflect high nominal interest rates. For Latin American economies, spreads are 5.0 bps in Brazil, Chile, and Mexico. Although bid-ask spreads in some parts of East Asia appear at first sight to be quite narrow, this may reflect government or exchange rules that constrain market makers' spreads. These rules can undermine the willingness of market makers to deal in large trades, and hence, reduce market depth.

Survey results for 10-year corporate bond bid-ask spreads in emerging East Asia were slightly higher than their government counterparts and ranged from 3.0 bps to 10.8 bps for Korea;

Figure 9: **Bid-Ask Spreads of Local Currency Government Bonds, 2005** (basis points)



Source: *AsianBondsOnline,* Bloomberg.

Table 7: **Bid-Ask Spreads for Emerging East Asian Bonds Traded in Secondary Markets**

	Corporate Bonds Bid-Ask Spread (basis points)		Government Bonds Bid-Ask Spread (basis points)	
	2000	2006	2000	2006
China, People's Rep. of	–	10.8	15	7.6
Hong Kong, China	8.0	6.3	3.5	3.0
Indonesia	100.0	68.8	100.0	16.9
Korea, Rep. of	5.0	3.0	1.8	1.4
Malaysia	15.0	18.8	4.9	2.3
Philippines	40.0	30.0	47.5	25.3
Singapore	10.5	5.5	1.6	2.7
Thailand	10.0	10.8	2.8	3.0
Viet Nam	–	14.9	NA	NA
Memo:				
Japan	9.3	6.0	0.6	0.6

Source: *AsianBondsOnline* survey.

Singapore; Hong Kong, China; Thailand; and PRC; between 14.9 bps to 30.0 bps for Viet Nam, Malaysia, and Philippines; with Indonesia the widest spread at 68.8 bps (Table 7).

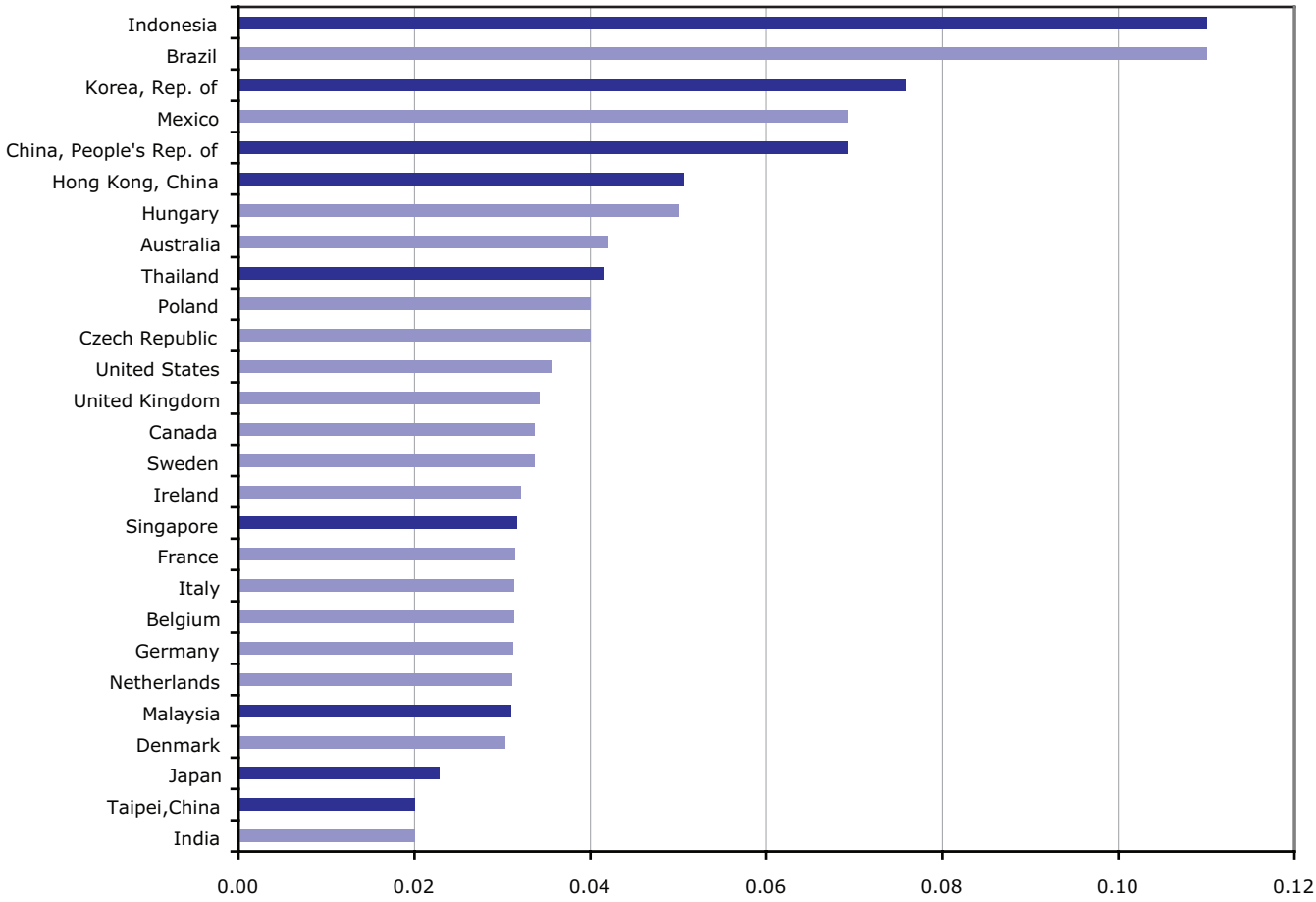
In the corporate bond market, issue size has increased, and there has been a general improvement in corporate bond market bid-ask spreads. However, the market remains relatively inactive, in part due to the prevalence of buy-to-hold investors. Low turnover suggests that spreads need to narrow further before more active investment management strategies can be employed.

Bond yield volatility—another proxy for market tightness—varies substantially, but remains relatively high within emerging East Asia.

Bond yield volatility is an alternative measure of market tightness. Generally, bond yield volatility varies substantially across markets, economies, and regions—with a higher volatility in developing markets than in more developed economies (Figure 10), it indicates a higher degree of uncertainty in investment and trading decision-making.

The external environment can help explain the generally higher bond yield volatility in emerging economies as compared with more developed economies. First, the investor base in emerging markets tends to be more unstable. Dedicated investors are a smaller proportion of emerging market asset holders than

Figure 10: **Government Bond Yield Volatility, 2005**



Source: *AsianBondsOnline,* Bloomberg.

speculative investors. Thus, emerging market assets become more vulnerable to shifts in investor preferences as a result of external shocks. Second, emerging markets—relatively small compared with global capital markets—are significantly affected when benchmark indexes are reweighted. Moreover, past boom-bust cycles have prevented building a broad investor base—which is critical for the development of capital markets.

Although market resiliency in emerging East Asia has improved, fluctuations from average bid-ask spreads remain larger than those in more developed markets.

From time series data, a measure of resiliency can be constructed by comparing bid-ask spreads with transaction volumes at a specific point in time. This data can be obtained from inter-dealer

trading platforms where market-makers provide continuous pricing.[13] Data provided by inter-dealer platforms in developed economies have proven valuable when measuring the time required for bid-ask spreads to converge to the next equilibrium price or bid-ask price, as long as (i) they capture a substantial market share and (ii) data history is available. However, these platforms are generally unavailable in emerging economies,[14] including those in emerging East Asia.

Although less complete, an alternative measure of bond market resiliency is the frequency at which bid-ask spreads deviate from the average price. Survey data on emerging East Asia markets indicate a strong linkage between bid-ask spreads, the number of trading days bid-ask spreads diverge from the average price, and bond market liquidity. Markets with lower turnover in general tend to have higher bid-ask spreads and also deviate from average price on more days per quarter.

For local currency government bonds in emerging East Asian economies, significant variations in deviation frequency remain, with a majority of survey respondents indicating bid-ask spreads deviating from average bid-ask price either 1- to 3-trading days per month, or 3- to 10-trading days per quarter (Table 8). Only two of the 45 respondents indicated that bid-ask spreads never deviated from average bid-ask spreads, and seven respondents indicated an average deviation of 10 or more trading days. Markets with low bid-ask spreads tend to be more developed, have higher trading volumes, allow short selling, and have vibrant local currency bond futures markets. However, data on deviation frequency are not available for a large number of markets, making it difficult to construct a "market resiliency" index for a cross-country regression analysis.

Table 8: **Frequency of Deviation of Daily Bid-Ask Spreads from Average Bid-Ask Spreads per Quarter, Local Currency Government Bonds** (# of trading days)

	2004	2006
China, People's Rep. of	-	0-3
Hong Kong, China	0-3	0-3
Indonesia	over 10	>3-10
Korea, Rep. of	0-3	>3-10
Malaysia	Over 10	>3-10
Philippines	-	over 10
Singapore	0-3	0-3
Thailand	>3-10	>3-10
Viet Nam	-	0-3

Source: *AsianBondsOnline* survey.

[13] Inter-dealer platforms such as EuroMTS and Bloomberg E-Bond provide continuous best bid and ask price combined with simultaneous transaction data.

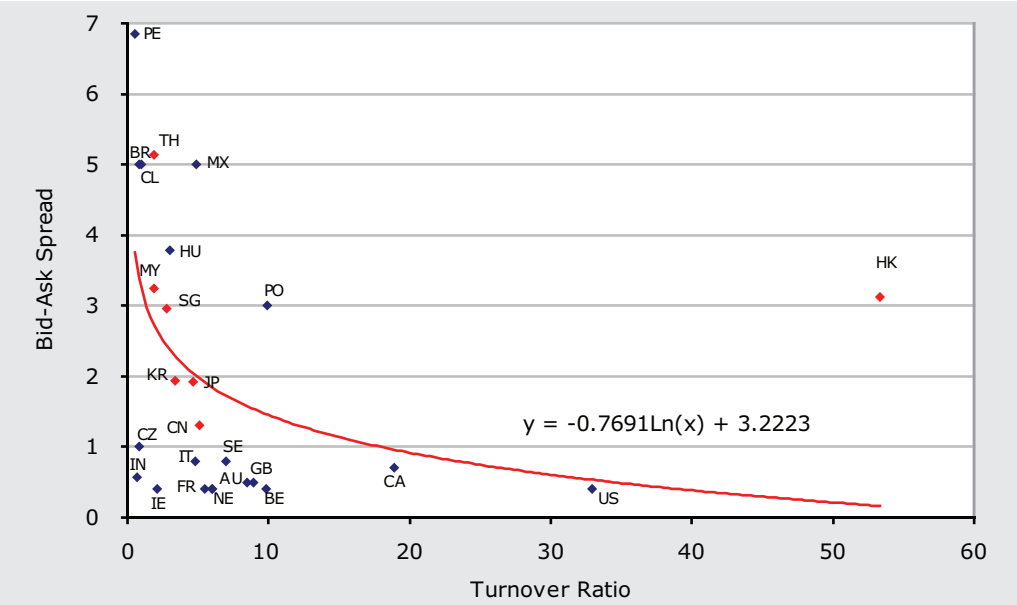
[14] Bloomberg E-bond implemented its integrated quotation system in Singapore in May 2006 and it is currently being implemented in Indonesia and the Philippines.

Preliminary investigation of cross-country data shows three measures of liquidity—turnover ratio, bid-ask spread, and bond yield volatility—are correlated and mutually reinforcing.

Because of limitations in data availability for both developed and emerging economies, turnover ratios have been compiled using data from several sources. Where available, national sources were used. In countries where national sources were not available, composite figures were calculated using data from HSBC, Eurex, and EuroMTS. For Latin American economies, turnover data was based on data from the Emerging Market Trading Association and the Bank for International Settlements. Attempts have been made to base turnover data on a uniform methodology of total bond market transaction volume on single-sided turnover excluding repurchase transactions.

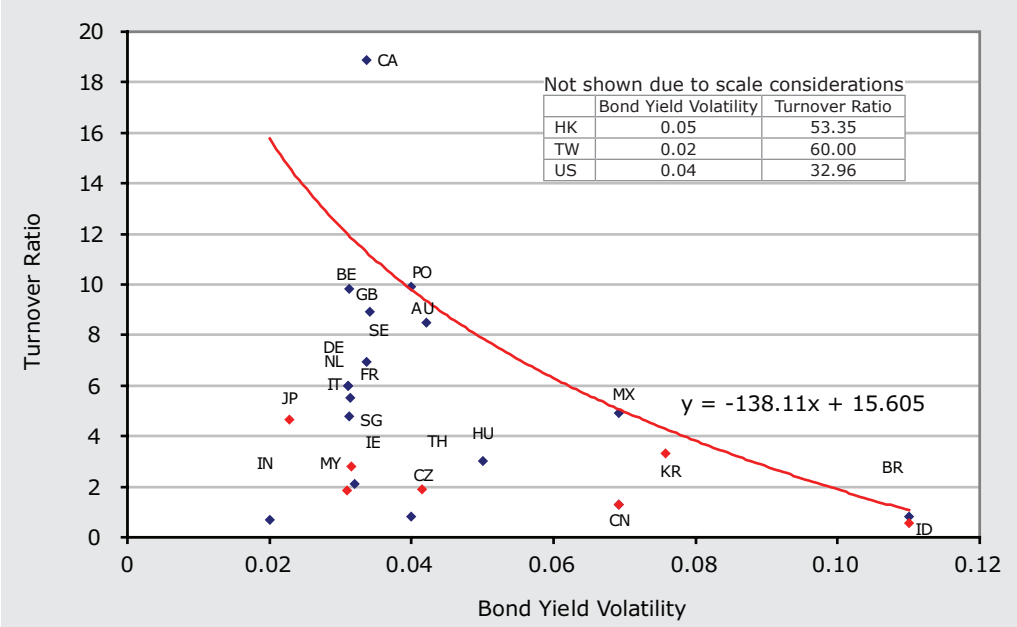
Bid-ask spreads are for emerging East Asia based on national sources. For areas outside emerging East Asia, excluding Latin America, bid-ask spreads are based on composite sources, which include market makers, trading platforms such as EuroMTS and Eurex, as well as brokers. For Latin American economies, data is from the Bank for International Settlements. Because of these data limitations, regression results should be interpreted with some caution. Simple bivariate cross-country regressions portray the intuitive relationship between the individual measures of bond market liquidity— turnover ratio, bid-ask spread, and bond yield volatility—using data for 2005. In general, economies with high turnover ratios tend to have narrow bid-ask spreads and low bond yield volatility. (Figures 11–13).

Figure 11: **Bid-Ask Spread vs. Turnover Ratio, 2005**



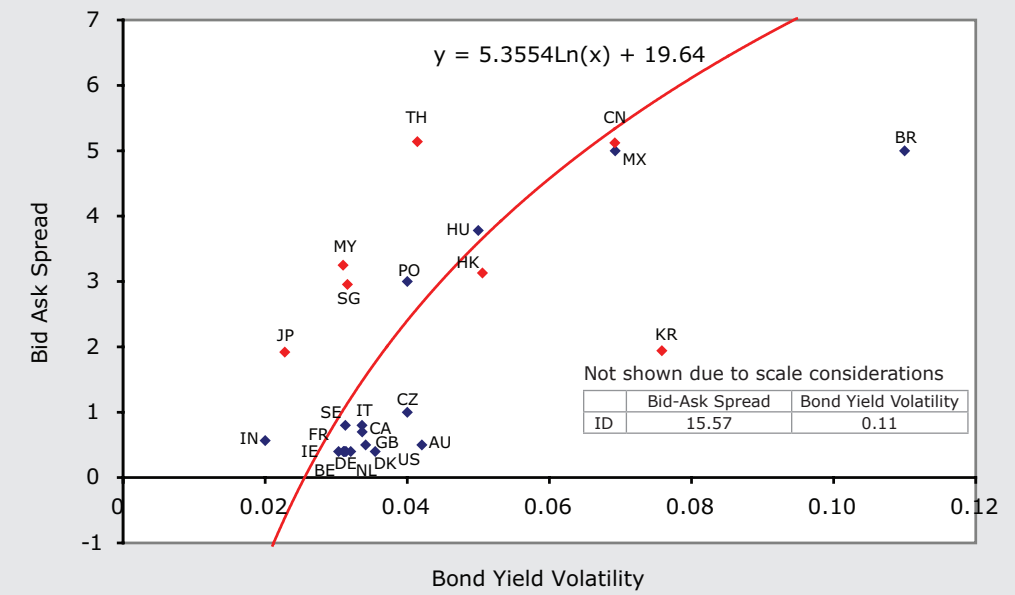
Notes:
1. See Appendix 2 for ISO Country Codes.
2. Turnover ratios are taken from various available market sources and are derived based on annualized single-sided transactions excluding repurchases.
3. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline,* Bank for International Settlements, and Bloomberg.

Figure 12: **Turnover Ratio vs. Bond Yield Volatility, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economies listed in table are not shown due to scale considerations. They are, however, included in the regression trend line.
3. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
4. Turnover ratios are taken from various available market sources and are derived based on annualized single-sided transactions excluding repurchases.
Sources: *AsianBondsOnline*, Bank for International Settlements, and Bloomberg.

Figure 13: **Bid-Ask Spread vs. Bond Yield Volatility, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economy listed in table is not shown due to scale considerations. It is, however, included in the regression trend line.
3. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
4. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, Bank for International Settlements, and Bloomberg.

2. Determinants of Bond Market Liquidity

Five Hypotheses to be Tested

In this section five hypotheses are tested to explain the determinants of bond market liquidity in emerging East Asian economies: (i) market size, (ii) rule of law, (iii) futures exchanges, (iv) capital controls, and (v) foreign exchange rate volatility.

(i) Large bond market size tends to raise market liquidity by increasing the availability of potentially tradable instruments.

Small markets limit the feasible range of available instruments and the extent to which they can be traded. For example, local currency bond markets need to be of a minimum size to qualify for inclusion in global bond market indexes, which raise the demand for an economy's fixed-income assets. Similarly, a small market may lack the minimum efficient scale needed for deep and liquid bond markets, because the amount of money that can be raised by issuing on the local bond market may be too small to attract

multinational corporate issuers and other potential foreign issuers. Conceptually, large size should lead to high turnover ratios, narrow bid-ask spreads, and low bond yield volatility.

(ii) Rule of law—a proxy for the quality of overall legal and regulatory systems—promotes bond market liquidity by enhancing investor confidence and strengthening market microstructures.

Trust in the judicial system for an unbiased enforcement of laws and regulations is generally perceived to be weaker in emerging economies than in developed economies. It is widely acknowledged that legal protection, adequate standards of governance, and transparency are especially important in building sufficient investor confidence to enter into contracts in local currency bond markets. Confidence in the rule of law may thus lead to a wider and more diverse investor base, which is crucial to enhancing bond market liquidity through higher turnover ratios and low bid-ask spreads and bond yield volatility.

(iii) Active futures exchanges—a proxy for the availability of derivatives and hedging instruments—improve bond market liquidity by facilitating active and efficient portfolio management.

Derivatives and hedging instruments have come to play an increasingly important role in building more liquid bond markets. The nexus between bond market liquidity and the availability of derivatives is a symbiotic one. Derivatives make it possible for borrowers and lenders to customize risk exposures, adjust them over time, and mitigate problems associated with information asymmetries in financial markets. Derivatives are thus a useful tool for risk management as they can reduce costs, enhance returns, and allow investors to manage risks with greater certainty and precision. Effective hedging mechanisms can also encourage asset managers to transact larger parcels of bonds and assume greater portfolio risk. Access to these products could also encourage greater investor diversity, as they would allow more active portfolio management, which in turn would further increase turnover in both derivatives and bond markets and contribute to to narrower bid-ask spreads and lower bond yield volatility.

(iv) Capital controls—a proxy for the degree of financial openness—negatively impact bond market liquidity by limiting foreign investor participation and thus narrowing investor diversity.

The need for prior approval for the purchase or sale of bonds by nonresidents, discriminatory taxes, and controls on derivatives and other transactions may discourage foreign participation in local currency bond markets. Bond markets operating in an environment where capital controls exist are frequently dominated by buy-to-hold investors, which can lead to low turnover in the secondary market, wider bid-ask spreads, and higher bond yield volatility.

(v) High foreign exchange rate volatility reduces market liquidity by adding exchange rate risk for foreign investors and amplifying bond market liquidity.

Foreign exchange rate volatility limits the market for local currency-denominated securities as it can generate uncertainty—particularly for foreign investors—and amplify overall financial market volatity, making trade and investment decisions as well as price discovery more difficult. It can also increase the risk of holding financial assets and discourage investor participation. Market makers may thus need to be compensated for the higher risk leading to wider bid-ask spreads, higher bond yield volatility, and lower turnover ratios.

Regression Results and Interpretations

For testing the five broad hypotheses of the determinants of bond market liquidity, cross-country regressions have been estimated using a sample of 29–30 economies, covering both developing economies in emerging East Asia and Latin America as well as more developed economies. The analysis uses the turnover ratio, bid-ask spread, and bond yield volatility as the dependent variable, and the stock of bonds outstanding, rule of law, futures markets, capital controls, and exchange rate volatility as independent variables.

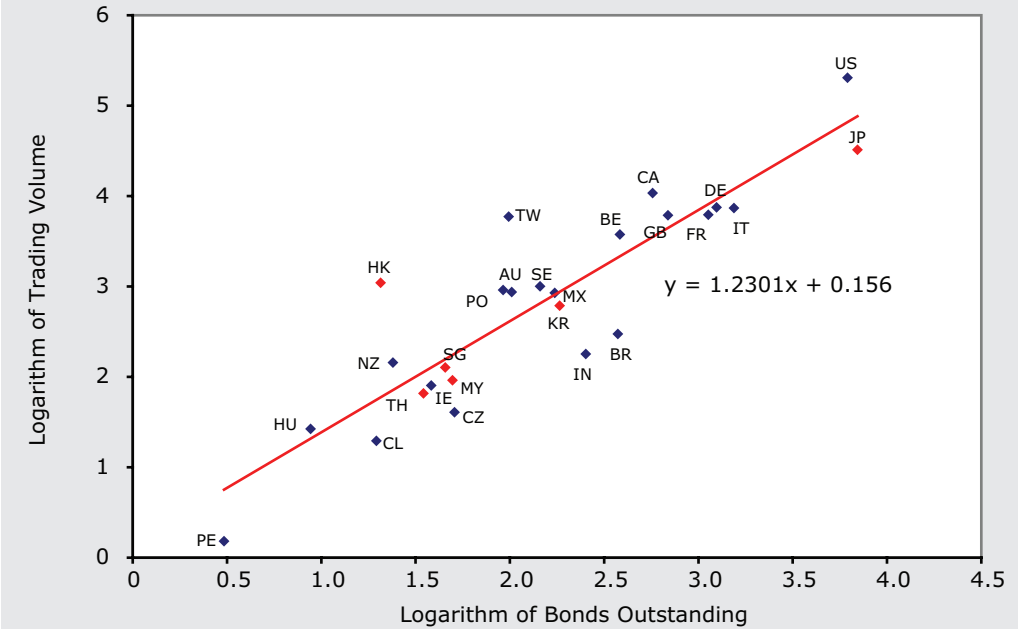
In summary, the regressions, using turnover ratios as the dependent variable, show that bond market size, rule of law, and the existence of future exchanges have a positive effect on turnover ratios, while foreign exchange volatility and

capital controls have a negative effect, although the effects are sometimes statistically insignificant. Similar regressions using bid-ask spreads as the dependent variable show that bond market size, rule of law, and the existence of future exchanges lead to narrower bid-ask spreads, while capital controls and foreign exchange volatility cause wider bid-ask spreads. Finally, the cross-country regressions indicate that bond yield volatility is reduced (negatively impacted) by greater bond market size and better rule of law, while capital controls and foreign exchange volatility lead to higher bond yield volatility. The result that the existence of active futures exchanges increases bond yield volatility may appear counter-intuitive and requires further intepretation.

Bond market size has a strong effect on trading volume, but only a modest effect on turnover ratio, bid-ask spread, and bond yield volatility.

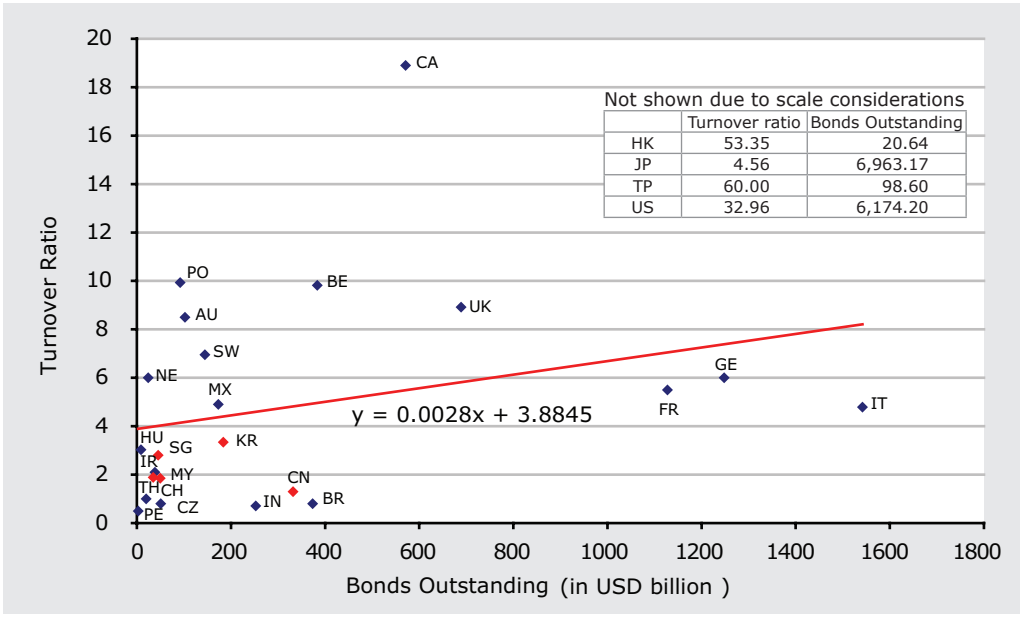
Cross-country data support the hypothesis that bond market size has a strong positive correlation with trading volume (Figure 14a). A regression on trading volume against bonds outstanding shows that for every 1% increase in bonds outstanding, trading volume across all markets increases by about 1.2%. This implies that an increase in the size of the bond market leads to a more-than-proportionate increase in the trading volume, and consequently an increase in turnover ratio—trading volume divided by total bonds outstanding. Although not statistically significant, regressions show that bond market size positively affect turnover ratio and negatively affect bid-ask spread and bond yield volatility. These correlations are visually supported by bivariate relationships (Figures 14b-14d). Overall, these results suggest that although market size is important in generating market transactions, other factors may be critical in determining bond market liquidity.

Figure 14a: **Trading Volume vs Bonds Outstanding, 2005**



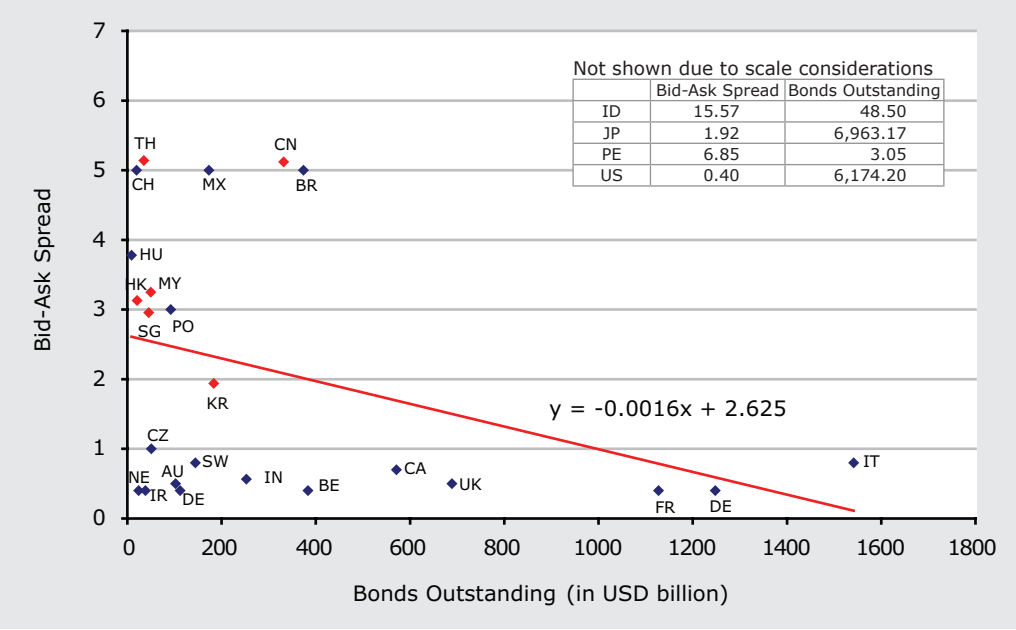
Notes:
1. See Appendix 2 for ISO Country Codes.
2. Bonds outstanding are derived from Bank for International Settlements.
3. Trading volume is the annualized USD equivalent of one-sided transactions excluding repurchases.
Sources: *AsianBondsOnline*, Bank for International Settlements.

Figure 14b: **Turnover Ratio vs Bonds Outstanding, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economies listed in table are not shown due to scale considerations. They are, however, included in the regression trend line.
3. Bonds outstanding are derived from Bank for International Settlements.
4. Turnover ratios are taken from various available market sources and are derived based on annualized single-sided transactions excluding repurchases.
Sources: *AsianBondsOnline*, Bank for International Settlements.

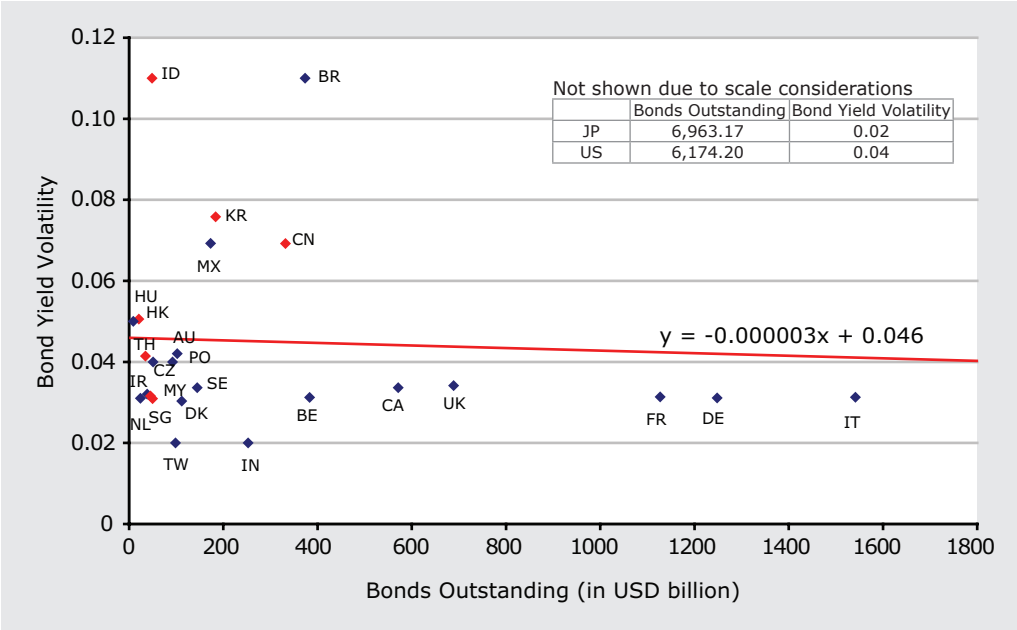
Figure 14c: **Bid-Ask Spread vs Bonds Outstanding, 2005**



	Bid-Ask Spread	Bonds Outstanding
ID	15.57	48.50
JP	1.92	6,963.17
PE	6.85	3.05
US	0.40	6,174.20

Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economies listed in table are not shown due to scale considerations. They are, however, included in the regression trend line.
3. Bonds outstanding are derived from Bank for International Settlements.
4. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, Bank for International Settlements, and Bloomberg.

Figure 14d: **Bond Yield Volatility vs Bonds Outstanding, 2005**



	Bonds Outstanding	Bond Yield Volatility
JP	6,963.17	0.02
US	6,174.20	0.04

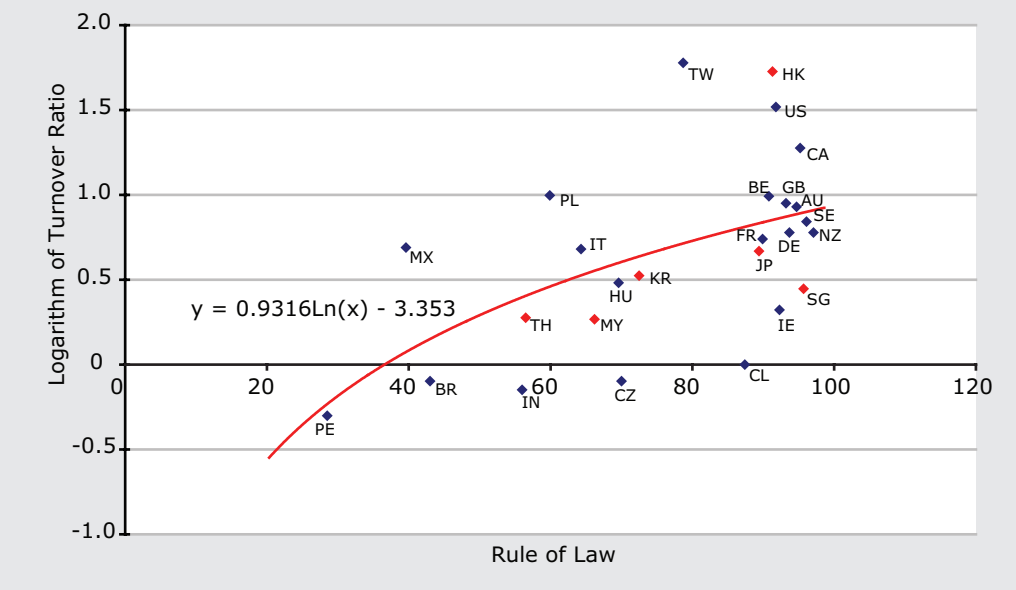
Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economies listed in table are not shown due to scale considerations. They are, however, included in the regression trend line.
3. Bonds outstanding are derived from Bank for International Settlements.
4. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, Bank for International Settlements, and Bloomberg.

Regression results indicate that rule of law promotes bond market liquidity.

The regression estimations indicate that rule of law—defined by an aggregate index of several indicators measuring crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts—promotes bond market liquidity. In the regressions, rule of law consistently has a strong and statistically significant effect on all three indicators of liquidity—a positive effect on turnover ratio and a negative effect on bid-ask spread and bond yield volatility (Figures 15a–15c).

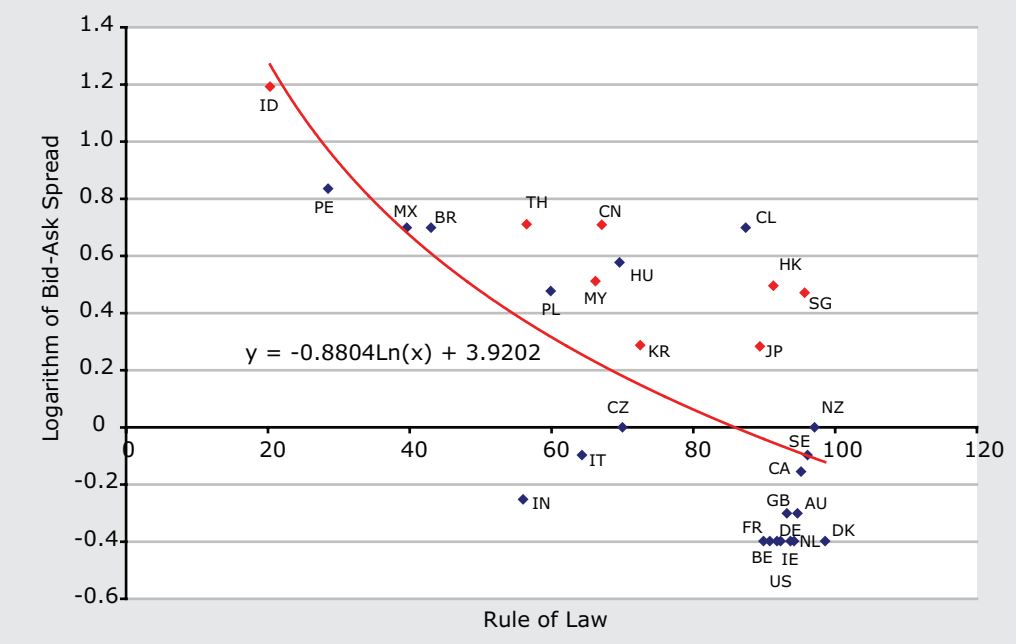
This suggests that effective legal institutions, strong governance, and law enforcement increase investor willingness to particpate in local currency bond markets as rights and obligations are well defined and legal and regulatory certainty ensured.

Figure 15a: **Turnover Ratio vs. Rule of Law, 2005**



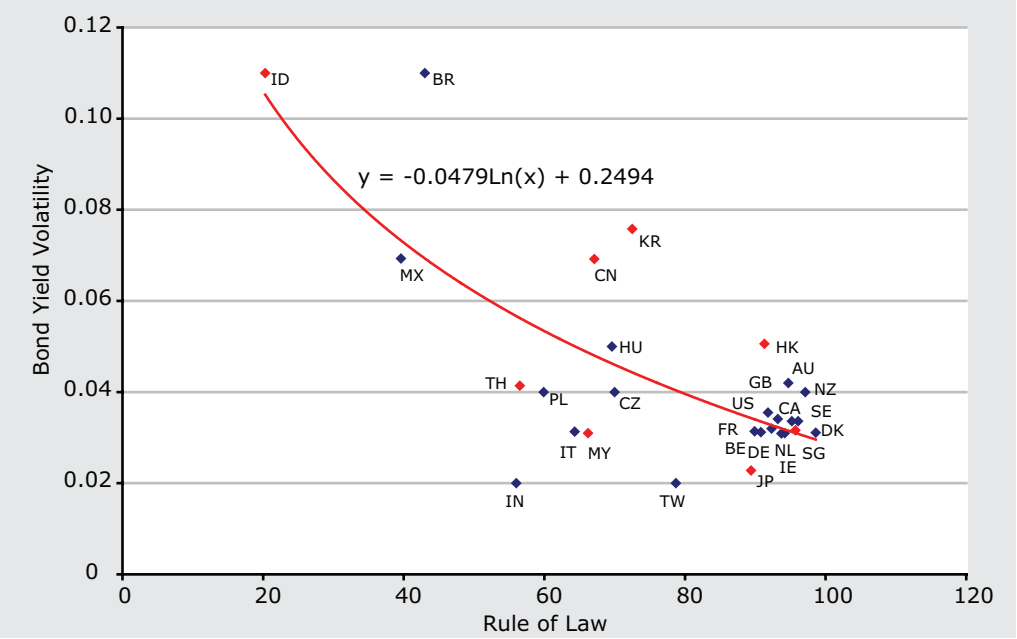
Notes:
1. See Appendix 2 for ISO Country Codes.
2. The Rule of Law Index combines several indicators that measure the extent to which agents have confidence in and abide by the rules of society (see Appendix 1 for a more complete definition).
3. Turnover ratios are taken from various available market sources and are derived based on annualized single-sided transactions excluding repurchases.
Sources: *AsianBondsOnline*, World Bank.

Figure 15b: **Bid-Ask Spread vs Rule of Law, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. The Rule of Law Index combines several indicators that measure the extent to which agents have confidence in and abide by the rules of society (see Appendix 1 for a more complete definition).
3. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: World Bank, Bloomberg.

Figure 15c: **Bond Yield Volatility vs. Rule of Law, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. The Rule of Law Index combines several indicators that measure the extent to which agents have confidence in and abide by the rules of society (see Appendix 1 for a more complete definition).
3. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, World Bank, Bloomberg.

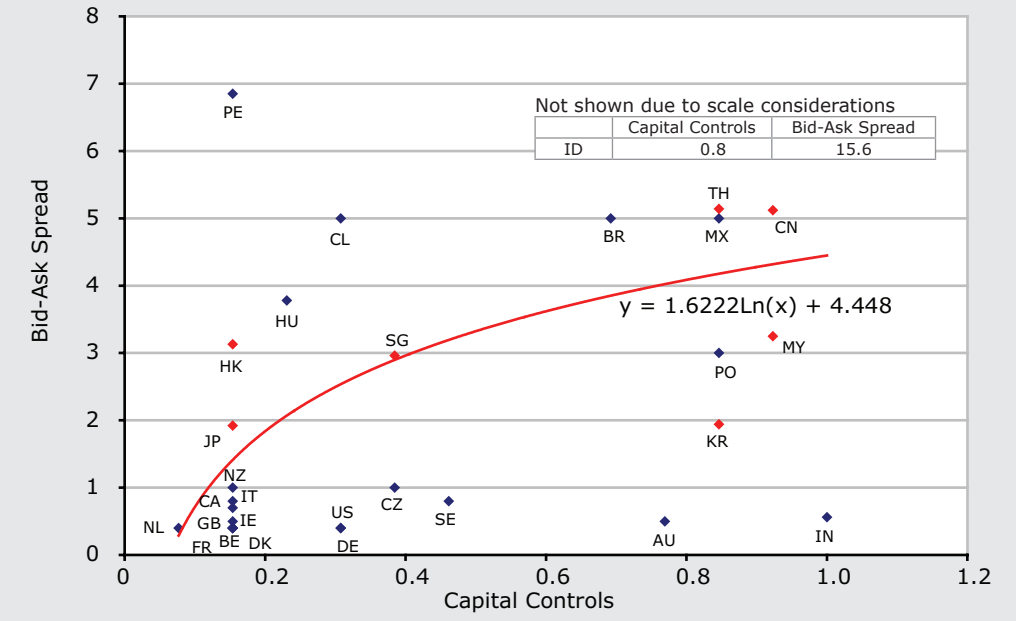
The presence of futures exchanges—proxied by a dummy variable—has a positive effect on turnover ratios and a negative effect on bid-ask spread and bond yield volatility.

The results suggest that futures exchanges play an important role in enhancing bond market liquidity, as they increase the availability of derivatives and hedging instruments. Interestingly, regression results show that futures exchanges have a dual impact on the measures of liquidity. On the one hand, they work well in facilitating secondary market trading, thus raising turnover ratios and reducing bid-ask spreads. On the other hand, futures exchanges tend to increase bond yield volatility, which can be destabilizing in financial markets.

Capital controls have a positive correlation with bid-ask spread and bond yield volatility, but regressions indicate they are not a significant determinant of bond market liquidity.

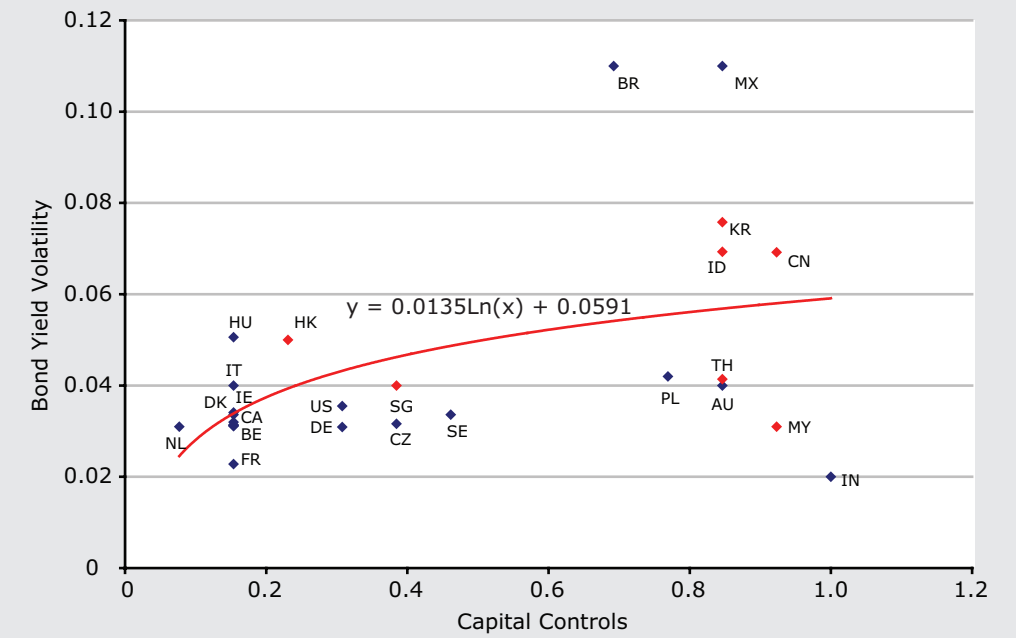
Regression estimations indicate that capital controls are not a statistically significant determinant of bond market liquidity as measured by the turnover ratio, bid-ask spread, and bond yield volatility. Though statistically insignificant, a positive correlation is found between capital controls, bid-ask spread, and bond yield volatility (Figures 16a, 16b). The results suggest that the system of prior approval for purchase and sale of bonds by nonresidents and other discriminatory measures—which discourages foreign participation—may well be one of the factors that limit investor diversity and hence market liquidity. However, any stronger conclusion can not be drawn based on the sample data.

Figure 16a: **Bid-Ask Spread vs. Capital Controls, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Indonesia is not shown due to scale considerations. It is, however, included in the regression trend line.
3. For a definition of capital controls, see Appendix 1.
4. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, International Monetary Fund, and Bloomberg.

Figure 16b: **Bond Yield Volatility vs. Capital Controls, 2005**

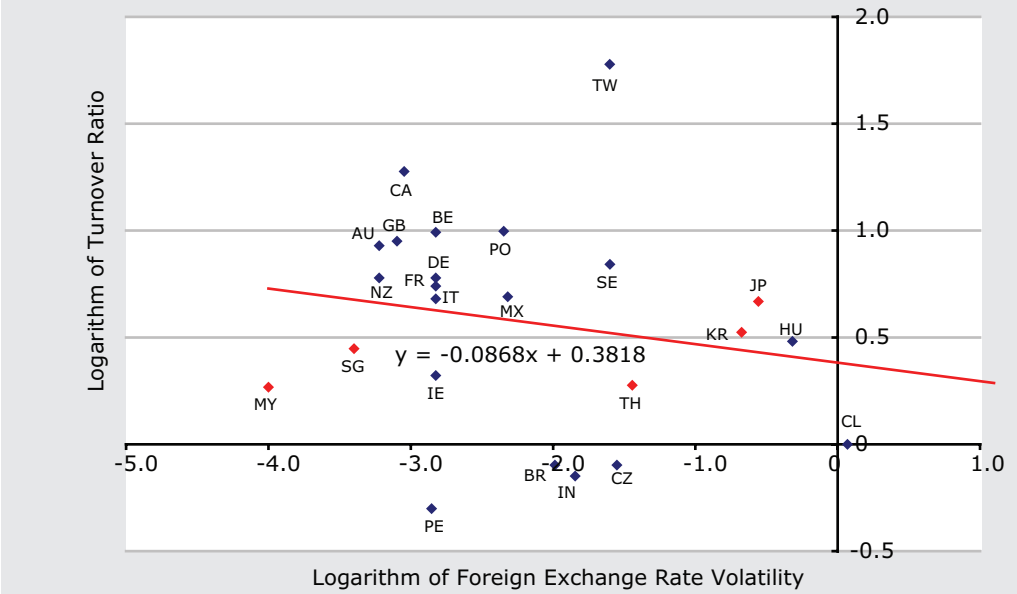


Notes:
1. See Appendix 2 for ISO Country Codes.
2. For a definition of capital controls, see Appendix 1.
3. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, International Monetary Fund, and Bloomberg.

Exchange rate volatility has a statistically significant negative effect on turnover ratio and a positive effect on bid-ask spread and bond yield volatility.

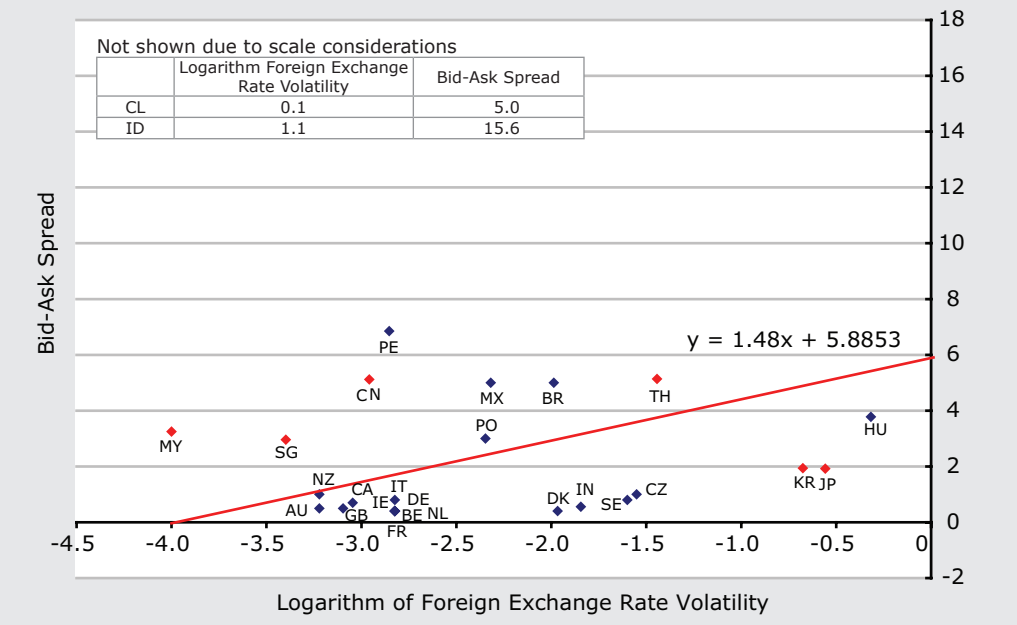
Regressions show that exchange rate volatility has a statistically significant negative effect on turnover ratio and a positive effect on bid-ask spread and bond yield volatility. The results are consistent with the view that foreign exchange rate volatility generates uncertainty, particularly for foreign investors, making investment and trading decisions, and price discovery more difficult. The respective positive and negative effects are shown in Figures 17a–17c.

Figure 17a: **Turnover Ratio vs. Foreign Exchange Rate Volatility, 2005**



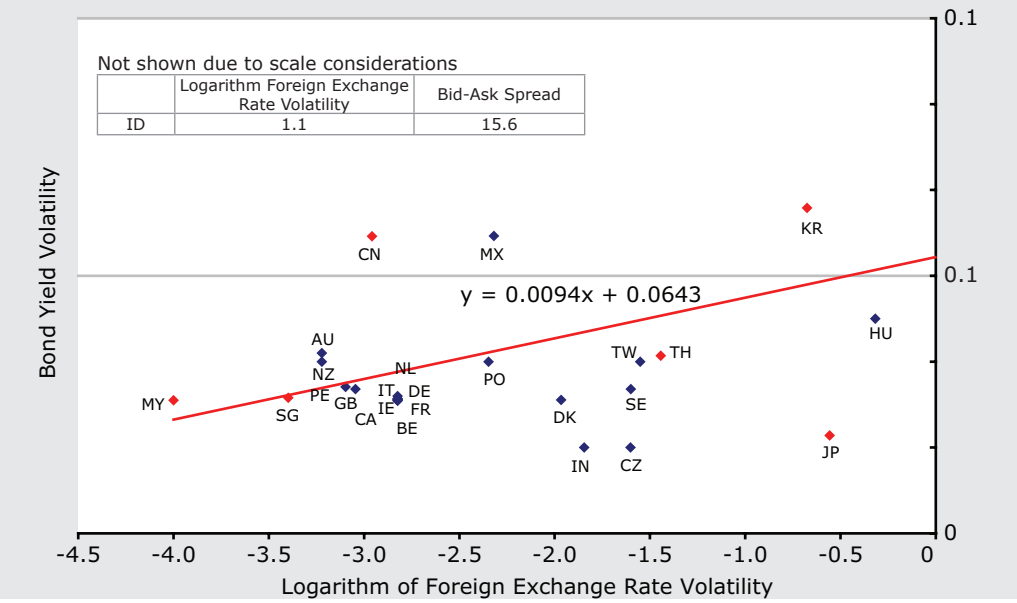
Notes:
1. See Appendix 2 for ISO Country Codes.
2. Foreign exchange volatility is calculated as the standard deviation of the change in daily exchange rates.
3. Turnover ratios are taken from various available market sources and are derived based on annualized single-sided transactions excluding repurchases.
Sources: *AsianBondsOnline*, Bloomberg.

Figure 17b: **Bid-Ask Spread vs. Foreign Exchange Rate Volatility, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economies listed in table are not shown due to scale considerations. They are, however, included in the regression trend line.
3. Foreign exchange volatility is calculated as the standard deviation of the change in daily exchange rates.
4. Bid-ask spreads are based on market maker pricing on inter-dealer transactions or with prime customers for the 10-year (or nearest) local currency on-the-run benchmark government securities.
Source: Bloomberg.

Figure 17c: **Bond Yield Volatility vs. Foreign Exchange Rate Volatility, 2005**



Notes:
1. See Appendix 2 for ISO Country Codes.
2. Economy listed in table is not shown due to scale considerations. It is, however, included in the regression trend line.
3. Foreign exchange volatility is calculated as the standard deviation of the change in daily exchange rates.
4. Bond yield volatility is based on the 21-day moving average of closing daily yields for 10-year (or nearest) local currency on-the-run benchmark government securities.
Sources: *AsianBondsOnline*, Bloomberg.

3. Liquidity—The Market Makers' View

AsianBondsOnline conducted a survey on bond market liquidity in September 2006. Forty-five market-makers from emerging East Asian bond markets responded to questions in relation to the markets where they are active. In addition to providing quantitative information on bid-ask spreads, price volatility, and transaction volume, respondents were asked to make qualitative judgments on the effectiveness of certain initiatives in raising liquidity in both government and corporate local currency bond markets. This section summarizes the survey results (Table 9) based on a scoring system that ranges from 4 ("very important") to 0 ("don't know/not applicable"). A score approaching 4 suggests that most market-makers feel significant attention is needed in a particular category in order to foster improvements in overall liquidity. Lower scores mean that market makers assign less importance to these initiatives in their markets.

Encouraging greater diversity of investors scored highest in both government and corporate bond markets.

Encouraging greater diversity of investors scored highest in both government (3.57) and corporate (3.52) bond markets, highlighting concerns that the present investor base remains too narrow. Scores were high regardless of the relative state of bond market development, with no market grouping assigning a rating less than 3.0 to the importance of this type of initiative. Over 75% of the respondents felt corporate bond markets were particularly illiquid, with buy-to-hold investors dominating the underwriting process, leading to bonds being rapidly absorbed into portfolios without secondary market turnover. Although this indicates healthy demand from the contractual savings sector, the illiquid secondary market makes it difficult to gauge a continuous market valuation of credit risk. Many respondents expressed the view that foreign participation in their markets would enhance liquidity as overseas investors based their investment decisions on different investment parameters to those of local investors.

Table 9: ***AsianBondsOnline* Survey Results, 2006**

	Average Score	China, People's Rep. of	Hong Kong, China	Indonesia	Japan	Korea, Rep. of	Malaysia	Philippines	Singapore	Thailand	Viet Nam
Government Bond Market Reforms											
Improving clearing and settlement	2.60	3.60	1.25	3.20	2.67	1.25	2.00	3.00	2.63	3.00	3.00
Mandatory bid/ask spreads by market makers	2.82	3.20	2.50	3.00	2.00	2.50	2.75	3.00	3.00	2.75	3.00
Increasing investor diversity	3.58	3.60	3.75	3.60	3.00	3.00	3.75	3.40	3.88	3.75	3.67
Improving repurchase markets	3.16	3.40	2.25	3.60	3.00	3.00	3.00	3.20	3.25	3.00	3.67
Increased availability of hedging products	3.20	3.80	2.25	3.60	3.00	3.00	3.25	3.20	3.38	3.25	2.67
Increasing intraday price transparency	2.80	3.20	2.25	3.40	2.00	2.50	2.50	2.80	3.25	2.00	3.33
Increasing tax incentives	2.69	2.60	1.00	3.00	3.00	2.25	1.75	4.00	3.13	2.50	3.00
Corporate Bond Market Reforms											
Greater multilateral issuance	2.32	2.00	2.25	2.80	1.67	1.50	2.50	3.00	2.25	2.67	2.33
Greater access to guarantees	2.37	1.80	1.67	2.60	2.00	1.50	2.75	3.00	2.25	3.00	3.33
Credit rating harmonization	2.70	2.80	1.33	3.20	1.67	1.75	3.50	3.00	3.00	3.00	2.67
More consistent secondary market pricing	3.16	3.80	2.00	3.40	2.67	2.75	3.50	3.60	3.00	3.33	3.00
Introducing pricing agencies	2.58	2.80	1.67	2.60	2.33	2.50	2.75	2.60	2.50	3.00	3.00
Greater access to credit derivatives	3.05	3.00	3.00	3.40	3.00	2.75	3.50	3.00	3.13	3.00	2.33
Increased availabiity of hedging products	3.09	4.00	2.00	3.40	2.67	2.25	3.50	3.20	3.25	3.33	2.33
Increasing tax incentives	2.81	2.80	1.33	3.40	3.33	1.75	2.25	3.80	2.75	3.00	3.50
Increasing investor diversity	3.52	4.00	3.67	3.60	3.33	3.00	4.00	3.20	3.38	3.33	4.00
Number of Respondents (total)	*45*										

Notes: 4= very important; 3= important; 2= somewhat important; 1= not important at all; 0 = don't know/not applicable.
Source: *AsianBondsOnline* survey.

Robust derivatives and repurchase markets were also high on the list of factors affecting bond market liquidity.

Developing robust derivatives and repurchase markets was also seen by survey respondents as an important factor for increasing liquidity in both government and corporate bond markets. The high scores for improving repurchase markets (3.16) and expanding the availability of hedging instruments (3.20) in government bond markets were also reflected in the corporate market, where the need to increase availability of hedging instruments (3.09) and credit derivatives (3.05) scored high. Access to these products encourages a greater diversity of investor participants—as

they allow dynamic hedging of interest rate and credit risks, which eventually leads to greater pricing certainty and lower transaction costs. Several respondents pointed out the symbiotic relationship between liquid derivative markets and liquid bond markets. In this category there was a clear delineation between the "haves" and "have nots," with market makers from Hong Kong, China (2.0); Japan (2.67); and Korea (2.25) rating increased access to derivatives products as less important. All of these markets have reasonably active futures, derivatives, and repurchase markets. In the case of Hong Kong, China, the close relationship of HKD interest rates with USD interest rate movements allows US derivatives to be used to hedge risks. In the PRC, where the derivatives markets are in their early stages, market makers would welcome greater access to hedging tools for both government and corporate bond markets.

For corporate bond markets, consistent market-maker pricing ranked second in importance.

Consistent market-maker pricing rated second in importance in raising liquidity in corporate bond markets (3.16). Several respondents pointed out that trading activity in corporate markets was generally between banks and customers, and with little activity between market makers themselves. This resulted in little or no pre-trade or post-trade transparency. Not surprisingly, respondents from more developed bond markets such as Hong Kong, China (2.0); Japan (2.67), and Korea (2.75) saw consistent pricing by market makers as less important. However, the high scores from respondents in Malaysia (3.5), one of the most developed corporate bond markets in the region, indicate the need for more transparency. The relatively low scores for formal bond pricing agencies and credit rating harmonization suggest that they are not viewed by market makers as a universal remedy to the market pricing issue. Once again, in more highly developed markets in the region—such as Hong Kong, China; Japan; and Korea—credit rating harmonization scored much lower than in other markets in East Asia.

There was a wide divergence of views on the importance of tax reform to raise liquidity.

Market makers from low tax environments such as Hong Kong, China, attached little importance to further tax reform, while

respondents from the Philippines ranked the tax environment as the greatest impediment to corporate bond market liquidity (due to issues with a documentary stamp tax and heavy taxation on insurance products). Additionally, more developed markets viewed clearing and settlement as less important than markets such as PRC, Indonesia, and Philippines, where clearing and settlement systems are still being refined.

Regional initiatives that promote bond market development ranked quite high as a means for promoting bond market liquidity.

Multilateral institutions' issuance and guarantee mechanisms—creating benchmark yield curves for corporate bond markets—which ranked lowest in terms of impact on liquidity, have other tangible benefits as they raise international awareness of a market's development, and also ensure greater issuer diversity.

AsianBondsOnline also informally polled the contractual savings sector ("buy-side") for their views on factors affecting liquidity. Several responded that although bid-ask spreads are generally tighter in 2006 than in 2000, the markets still had some way to go before they could begin to adopt more active management strategies for their Asian debt portfolios. They attributed the lack of liquidity to the relative "youth" of the market, combined with the limited diversity of issuers and the absence of interest rate and credit derivatives. This forces them to "passively" manage their investments. Asset managers were generally very positive about initiatives to raise liquidity. Several commented that they were impressed with the collective commitment being shown by governments and regional agencies in recognizing the liquidity problem and taking steps to address the issue. As one respondent put it, "I would rather be actively managing my portfolios, and the minute I think the market is ready, I will be."

4. Policy Options to Improve Bond Market Liquidity

The empirical analysis of the determinants of bond market liquidity and the market survey on liquidity suggest that several policy initiatives can be taken to bolster bond market liquidity.

- ***Enlarge bond market size.***

It is evident that efforts to deepen and enlarge government bond markets—which have provided the necessary benchmark yield curve for price discovery—have been strengthened over the past decade, but corporate bond markets remain largely underdeveloped and illiquid in emerging East Asia.

To encourage private and quasi-public corporations to issue local currency bonds instead of relying on bank finance, policies to remove discriminatory taxes and reform of the regulatory infrastructure would help. In addition, given that the small size of average issuances hinders liquidity (Table 10), concentrating government issuance in a limited number of benchmarks, and reopening them when necessary, can improve liquidity.[15] Average transaction size could be increased by concentrating debt in a few maturities[16]—reducing issue frequency—or by conducting several consecutive reopenings. Prior announcement of issuance schedules should also facilitate a dealer's ability to make markets by improving their ability to anticipate customer demand and thus decreasing inventory risk. Well-established and liquid government bond markets offer a basis for broadening and deepening corporate bond markets.

- ***Develop legal and regulatory infrastructure (rule of law).***

Strengthening legal protection, standards of corporate governance and transparency, and adherence to international accounting standards establishes legal certainty and increases investor confidence. A governance structure that enforces contracts and

[15] Many emerging markets have taken initiatives to develop benchmark issues: Thailand replaced a large amount of maturing bonds by reissuing with existing features; Singapore shifted to replacing a maturing security with a new issue with similar tenor and fixing a minimum size for benchmark issues.

[16] Jiang and McCauley (2004), and McCauley and Remolona ("Size and Liquidity of Government Bond Markets." *BIS Quarterly Review*, November 2000) outline a few ways of increasing average transaction size. More frequent and predictable primary issuances may also help generate market interest and contribute to greater liquidity. However, there is a tradeoff between issue size and issue frequency.

Table 10: **Survey Results on Transaction Size, Corporate and Government, 2000 and 2006** (USD million)

	Government Bonds Transaction Size		Corporate Bonds Issue Size	Corporate Bonds Transaction Parcel
	2000	2006	2006	2006
China, People's Rep. of	3.46	9.60	100.65	7.34
Hong Kong, China	5.30	5.30	32.12	3.64
Indonesia	3.03	2.89	57.91	3.10
Korea, Rep. of	13.87	15.61	78.17	10.42
Malaysia	1.51	2.44	118.34	2.45
Philippines	0.75	1.13	54.53	0.99
Singapore	3.17	3.17	71.31	10.90
Thailand	0.77	0.77	40.27	0.95
Viet Nam	–	1.92	29.97	1.92
Memo:				
Japan	65.37	106.41	85.12	2.99

Source: *AsianBondsOnline*.
Note: Exchange rate used is at 13 September 2006.

resolves disputes in a credible, speedy, and predictable manner is key in developing sophisticated financial markets. Institutional investors evaluate enforcement of financial contracts, efficient insolvency and collateral systems, and dispute resolution procedures prior to entering markets. In this context, mechanisms for contract enforcement and resolving disputes are as important as the laws themselves.

- ***Deepen market microstructures.***

Encouraging the development of inter-dealer platforms would allow the monitoring of trading activity and prices from several competing dealers. In addition, the introduction of inter-dealer platforms can contribute to foreign participation in local bond markets and thus expand the investor base. Data provided by inter-dealer platforms in developed economies have proven to be valuable when measuring liquidity, if they capture a sufficiently large market share and data history is available.

Improving transparency in trading activity facilitates trade as those interested in the market can quickly, easily, and inexpensively observe the details of quotes and trades. Such trading tends to be active when there is a significant flow of information about the credit quality of issuers. In this way credit rating agencies can play an important role in the growth of corporate bond markets—provided they compile necessary information to help investors make appropriate decisions on credit risk and pricing spreads of corporate bonds.

- ***Develop derivative markets.***

Developing derivatives markets can create more liquid bond markets as they help reduce costs, enhance returns, and allow investors to manage risks with greater certainty and precision. The importance of developing deep forward foreign exchange and interest rate swap markets is critical to widening the investor base generally and to attracting foreign investors in particular. The challenge is to create the market instruments required to attract investors to the market. But local markets must reach a critical mass before offering these types of instruments. In addition, some local authorities are reluctant to allow hedging in foreign exchange markets, as the resulting capital flows can be difficult to monitor. Encouraging derivatives trading on exchanges that can be monitored by regulators may contribute to circumventing the reluctance of relevant authorities to license derivatives. Central banks can also make an important contribution to the liquidity of bond markets by developing more active and well-functioning repurchase markets using government and other high-grade securities as collateral for lending operations.[17]

There is wide consensus among central banks that market volatility tends to be higher when market makers are unable to short sell, particularly when large buy or sell orders enter the market. Insofar as short-selling lowers effective volatility, it promotes market liquidity.[18] While short-selling adds to pricing efficiency and overall liquidity, there are valid concerns about agents' ability to take on highly-leveraged positions. This emphasizes the need for local institutions to strengthen risk management systems and enhance supervision of the financial system.

- ***Encourage greater investor diversity.***

Although investor diversity is broadening in emerging East Asia, greater issuance will not automatically translate into higher liquidity, especially as the investor base remains generally homogenous, focused on buy-to-hold strategies and dominated by government-controlled provident funds, insurance companies, and banks.

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[17] Mares, Arnaud. 2002. "Market Liquidity and the Role of Public Policy." *BIS Papers No.12.,* and Chabchitrchaidol, A. and S. Panyanukul. 2005. "Key Determinants of Liquidity in the Thai Bond Market," *Discussion Paper 07*, Bank of Thailand.

[18] Mohanty, M.S. 2002. "Improving Liquidity in Government Bond Markets: What Can be Done?" *BIS Papers No.11*.

Encouraging more provident, pension, and insurance funds to participate as well as reducing cross-border transactions barriers to encourage participation of international financial intermediaries and foreign investors in local currency bond markets are measures that can contribute to greater investor diversity and liquidity in emerging East Asian bond markets. These are all issues that could be addressed at the domestic level with more vigor.[19]

- ***Strengthen regional cooperation.***

It is generally believed that financial markets in the euro area have developed rapidly since the inception of the European monetary union, which effectively raised overall market size.[20] In East Asia, a currency union is only a long-term possibility, but enhanced financial cooperation could widen the region's effective market size through regulatory coordination and joint initiatives to promote economies of scale—in particular in the case of secondary market liquidity. There are indications that the Asian Bond Funds and the creation of the Pan-Asian Index Fund are leading to a degree of convergence in market microstructures in the region, including harmonizing regulatory and other institutional frameworks like clearing and settlement, rating agencies, taxation, and relaxation of exchange controls. Improvements in regional bond market infrastructure have also been taking place under the Asian Bond Markets Initiative with the aim of addressing impediments to local currency and regional bond market development.[21] There are clear positive externalities from these and other initiatives aimed at integrating regional bond markets, not least in terms of raising the overall size of the bond market, but in building market liquidity as well.

[19] Selected country experiences at developing corporate bond markets are discussed in *BIS Papers No.26*.

[20] This reflects the view that the European experience and development emphasizes the importance of, in addition to a common currency that removes intraregional exchange rate variability, the need for a common and integrated financial market to facilitate market liquidity (see footnote 18, Mohanty, 2002).

[21] See Park, Y.C. and D. Park's paper, "Creating Regional Bond Markets in East Asia: Rationale and Strategy." 2003, and G. Rhee's "Regionalized Bond Markets: Are the Region's Markets Ready?" 2000, for detailed discussions of developing regional bond markets in Asia. McCauley and Park offer a useful overview of what is meant by "regional" bond markets in "Developing the Bond Market(s) in East Asia: Global, Regional, or National," forthcoming in *Asian Bond Markets: Issues and Prospects*, edited by B. Eichengreen, R.N. McCauley and Y.C. Park. Bank for International Settlements, 2006.

Appendix 1: **Determinants of Bond Market Liquidity: Cross-Country Regression Results**

One approach to identify the determinants of bond market liquidity is to estimate regression equations with measures of liquidity such as the turnover ratio, bid-ask spread, and bond yield volatility as dependent variables. The regressions in this study were estimated using data for 29–30 developed and developing economies for the years 2000–05. The independent variables in the regression estimates included (i) the value of government bonds outstanding, both in absolute terms and relative to an economy's GDP; (ii) an index of rule of law as a proxy for the quality of legal, judicial, and regulatory framework; (iii) access to future exchanges as a proxy for the availability of hedging instruments; **(iv)** an index of capital controls; and (v) a measure of foreign exchange volatility.

Table A reports some of the regression results using this method.

Table A: **Estimations for Cross Country Regressions, 2005**

Dependent Variable / Independent Variable	Turnover Ratio (Log)	Bid-Ask Spread (Log)	Bid-Ask Spread	Bond Yield Volatility
Constant Term	-5.4363	3.6185	8.9654	0.0622
	(2.76)*	(6.77)*	(6.69)*	(2.05)*
Bond Market Size (Log)	0.0698 /1	-0.1026 /1	-0.2474 /1	-0.0014 /1
	(0.75)	(1.18)	(1.81)*	(0.72)
Rule of Law (Log or Level)	1.1966 /1	-0.0222	-0.0579	-0.0005
	(2.43)*	(3.01)*	(4.21)*	(1.93)*
Futures Exchange (Dummy variable)	0.9739	-0.6070	-1.2304	0.0209
	(2.51)*	(1.74)	(1.99)*	(2.11)*
Capital Controls (Log or Level)	0.0973 /1	0.1629 /1	-0.3985	0.0193
	(0.46)	(0.83)	(0.45)	(1.19)
Exchange Rate Volatility (Log or Level)	-0.1077 /1	0.0918 /1	0.7349	0.0037
	(-1.82)*	(1.82)*	(6.69)*	(2.20)*
Adjusted R-squared	0.5192	0.6490	0.8631	0.5264
Number of Observations	29	29	29	30

Notes:
1. /1 log value of independent variable.
2. * coefficient is significant at the 5% level.
3. Parentheses denote t-values.
Source: *AsianBondsOnline*

In summary, the regression estimations indicate that rule of law, futures exchanges, and foreign exchange rate volatility are significant determinants of bond market liquidity as measured by the three measures of liquidity—turnover ratio, bid-ask spread, and bond yield volatility. Estimations using the determinant bond market size showed, as expected, a positive relationship with turnover ratio and a negative relationship with bid-ask spread and bond-yield volatility, (however, the regressions were not significant). Similarly, estimations using the determinant capital controls showed a positive relationship with bid-ask spread and bond-yield volatility, but again these regressions were not significant.

Cross-country and panel data regressions were also run for the years covering 2000 through 2005 with results largely similar to the ones found in the table above. Lack of data comparability across countries due to different definitions and data collection methods employed in individual countries sometimes gave contradictory patterns in the statistical analysis.

Overall, the cross-country regressions provide us with a "first cut" on what factors determine bond market liquidity, despite the limitations of the exercise (see page 25 for an explanation of these limitations). Coupled with market survey

results, these regression results offer a modest start to understanding the determinants of bond market liquidity and for assessing policy options.

Below is a list of the variables used in the estimations and their specifications:

- **Turnover Ratio, Government Bonds**
  The Annual Bonds Turnover Ratio is a measure of bond market liquidity. The ratio shows the extent of trading in the secondary market relative to the amount of bonds outstanding. The average amount of bonds outstanding is computed by determining the average amount of bonds outstanding at the end of the previous and current years. Government bonds include obligations of the central government, local governments, and the central bank. (Source: *AsianBondsOnline*).

- **Bid-Ask Spread, Government Bonds**
  Bid-ask spread is an indicator of market tightness, a dimension of market liquidity. It is calculated as the difference between the bid and ask offer prices of a financial instrument. Bid is the highest price a prospective buyer is prepared to pay at a particular time, and ask is the lowest price accepted to a prospective seller for trading a unit of a given security (Source: IMF, *FSI 2006*).

- **Bond Yield Volatility, Government Bonds**
  Bond yield volatility is calculated as the standard deviation of the change in daily yields of local currency benchmark 10-year government bonds. Yield volatility is an indicator of risk arising from movements in interest rates. High volatility suggests less predictability of daily movements in bond yields. A number near zero indicates that daily bond yields are clustered around the average yield. This implies that yields are relatively stable during the period covered (Source: *AsianBondsOnline*).

- **Bonds Outstanding, Government Bonds**
  Government bonds outstanding shows the absolute amount of local currency bonds outstanding in USD. Government bonds include obligations of the central government, local governments, and the central bank. Financial institutions comprise both private and public sector banks and other financial institutions. Bonds are defined as long-term bonds and notes, treasury bills, commercial paper, and other short-term notes (Source: *AsianBondsOnline*).

- **Capital Controls**
  Capital controls describe regulations influencing both inward and outward capital flows. The concept of controls on capital transactions is interpreted broadly. Thus, controls on capital transactions include prohibitions; need for prior approval, authorization, and notification; dual and multiple exchange rates; discriminatory taxes; and reserve requirements or interest penalties imposed by the authorities that regulate the conclusion or exclusion of transactions or transfers, or the holding of assets at home by nonresidents and abroad by residents. The coverage of the regulations applies to receipts as well as to payments and to actions initiated by nonresidents and residents. In addition, because of the close association with capital transactions, information is also provided on local financial operations conducted in foreign currency, describing specific regulations in force that limit residents' and nonresidents' issuing of securities denominated in foreign currency or, generally, limitations on contract agreements expressed in foreign exchange (Source: Controls on capital transactions as published in the *Annual Report on Exchange Arrangements and Exchange Restrictions*, IMF, 2005).

- **Dummy Variable for Futures Exchange**
  Proxy for active futures exchanges and thus the impact of the availability of hedging instruments on bond market liquidity. Economies with active futures exchanges are assigned "1", economies with no active futures exchange are assigned "0".

- **Foreign Exchange Rate Volatility**
  Foreign exchange volatility is calculated as the standard deviation of the change in daily exchange rates.

Volatility represents the degree to which a variable changes over time. The larger the magnitude of a variable change, or the more quickly it changes over time, the more volatile it is. Volatile exchange rates increase exchange rate risk, i.e., the potential of losing money because of a change in the exchange rate.

- **Rule of Law**
  Rule of Law includes several indicators which measure the extent to which agents have confidence in and abide by the rules of society. These include perceptions of the incidence of crime, the effectiveness and predictability of the judiciary, and the enforceability of contracts (Source: World Bank 2006).

Appendix 2: **Economies Included in Estimations**

Country	Abbreviation
Australia	AU
Belgium	BE
Brazil	BR
Canada	CA
Chile	CL
China, People's Rep of	CN
Czech Republic	CZ
Denmark	DK
France	FR
Germany	DE
Hong Kong, China	HK
Hungary	HU
India	IN
Indonesia	ID
Ireland	IE
Italy	IT
Japan	JP
Korea, Rep. of	KR
Malaysia	MY
Mexico	MX
Netherlands	NL
New Zealand	NZ
Peru	PE
Poland	PL
Singapore	SG
Sweden	SE
Taipei,China	TW
Thailand	TH
United Kingdom	GB
United States	US

Source: ISO Country Codes, see http://www.iso.org/iso/en/prods-services/iso3166ma/02iso-3166-code-lists/list-en1.html.

About the Asian Development Bank

ADB, based in Manila, is dedicated to reducing poverty in the Asia and the Pacific region through pro-poor sustainable economic growth, social development, and good governance. Established in 1966, it is owned by 66 members—47 from the region. In 2005, it approved loans and technical assistance totaling $5.8 billion and $198.8 million, respectively.

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