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Asia Bond Monitor 2005

November 2005 asianbondsonline.adb.org

The *Asia Bond Monitor* (ABM) reviews the development of East Asian local currency bond markets. It examines market size and composition, market liquidity, and yields and returns. Recent policy reforms are also highlighted. The ABM covers the 10 Association of Southeast Asian Nations member countries plus the People's Republic of China and the Republic of Korea.

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Development of East Asian Local Currency Bond Markets: A Regional Update

Highlights

Market Performance in 2005

- Emerging East Asian local currency government bond markets grew more modestly in the first half of 2005 than in previous years, due to a rise in interest rates and fiscal consolidation.
  - Thailand and Viet Nam registered the strongest growth, followed by PRC, Korea, Malaysia, Singapore, and Philippines, with Indonesia declining slightly.
  - In USD terms, outstanding local currency government bonds grew 6.9% for East Asia as a whole, compared with 32% in 2004 and a 27% average annual growth from 1997 to 2003.
- Corporate bond market growth again lagged behind, with outstanding local currency corporate bonds increasing 5.9% in USD terms during the first half of 2005 in markets where data are available, compared with 10% for 2004 and an 18% average annual growth from 1997 to 2003.
- Turnover was high in the first half for most government bond markets covered, with average daily trading volume up significantly over 2004 levels. Trading was mixed in the corporate sector.
- Except in PRC, Malaysia, and Philippines, local currency government bond yields have risen in most emerging East Asian markets across all maturities since the beginning of the year, due to increases in funding rates in response to US Fed rate hikes and inflationary expectations as a result of high growth and high oil prices. In almost all markets, yield curves have flattened with 2–10 year bond spreads declining.
- Because of rising yields, bond returns are down on average from 2004. The USD return on the iBoxx ABF Pan-Asian Index was 0.26% as of end-October, well below the 11.8% in 2004 calculated from a composite East Asian local currency bond index.
- In 2005, East Asian governments continue to implement institutional and regulatory reforms that will speed development of local currency bond markets. These include improving market infrastructure; introducing new products; promoting retail investment and attracting offshore investors; opening local currency bond markets to supranationals and foreign financial institutions; and pursuing regional cooperation.

Continued overleaf

Acronyms and Abbreviations

ABF	Asian Bond Fund
ABM	Asia Bond Monitor
ABMI	Asian Bond Markets Initiative
ADB	Asian Development Bank
APEC	Asia-Pacific Economic Cooperation
ARIC	Asia Regional Information Center
ASEAN	Association of Southeast Asian Nations
BEX	Bond Electronic Exchange
BIS	Bank for International Settlements
BOT	Bank of Thailand
CAGAMAS	National Mortgage Corporation
CBRC	China Banking Regulatory Commission
CIRC	China Insurance Regulatory Commission
CMBS	commercial mortgage-backed securities
CSRC	China Securities Regulatory Commission
DVP	delivery versus payment
EMEAP	Executives' Meeting of East Asia-Pacific Central Banks
ETF	exchange-traded funds
EU	European Union
Fed	United States Federal Reserve
FIE	Fixed Income Exchange
GDP	gross domestic product
HSTC	Ho Chi Minh Securities Trading Center
IFC	International Finance Corporation
IMF	International Monetary Fund
JBIC	Japan Bank for International Cooperation
KHFC	Korea Housing Finance Corporation
MGS	Malaysian Government Securities
MSB	monetary stabilization bond
NAFTA	North American Free Trade Agreement
OTC	over-the-counter
PAIF	Pan-Asian Bond Index Fund
PBC	People's Bank of China
QFII	Qualified Foreign Institutional Investor
REIT	real estate investment trust
RMBS	residential mortgage-backed securities
SDRC	State Development and Reform Commission
STRIPS	Separate Trading of Registered Interest and Principal of Securities

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

Monitoring Financial Integration in East Asia

- In East Asia, cross-market differentials in interest rates and bond yields are significant, and intraregional cross-border portfolio investment is small relative to the region's total cross-border portfolio flows. These suggest that the level of financial integration remains low.
- Yet, cross-market differentials in interest rates and bond yields are declining, cross-market co-movements in money and bond markets are increasing, and intraregional cross-border portfolio investment is growing. These indicate some progress toward financial integration. East Asian investors also purchase a significant proportion of USD- and EUR-denominated debt issued by East Asian issuers. And the region's banks are major participants in the region's syndicated loan markets.
- East Asian equity markets are more integrated than money markets or bond markets, with a higher level of cross-market co-movements in stock returns than money market rates or bond yields. A higher proportion of the region's total cross-border equity investment is directed to the region itself compared with fixed-income investment.
- The low level of financial integration in East Asia is partly a result of institutional and regulatory barriers to cross-border capital flows.
  - Among the 10 East Asian economies examined, Japan; Singapore; and Hong Kong, China are the most open markets, with no or minimal restrictions on cross-border investment by either residents or nonresidents. Korea has also increasingly opened its markets to cross-border investment.
  - In other markets, various restrictions remain, despite progress in liberalizing financial sectors and opening capital accounts. This is particularly true for residents investing abroad.
- The relatively small size, low liquidity, and various structural weaknesses of the region's financial markets also hinder financial integration, as these limit investor choice, increase transaction costs, and lead to high perceived risks.
- Continued policy and institutional reform is the key to accelerating East Asian financial integration. East Asian governments should continue efforts aimed at capital market development and financial liberalization, with a well-sequenced program supported by a strong institutional and regulatory framework.
- Regional cooperation is important in facilitating East Asian financial market development and integration. Monetary and financial cooperation has indeed moved forward, especially under the ASEAN+3 Finance Ministers' Process, with many initiatives filtering into reform agendas. These efforts should be applauded, and accelerated.

East Asian Local Currency Bond Markets in 2005: A Regional Update

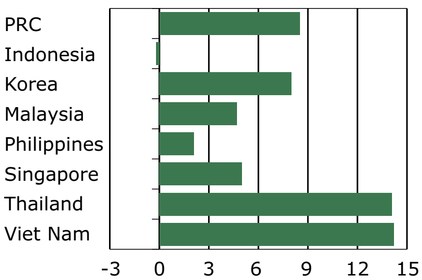
Bond Market Development in 2005

Size and Composition

Emerging East Asian local currency government bond markets continue to grow in 2005, but more modestly than in previous years.

In the first half of 2005, most emerging East Asian (ASEAN+3[1] excluding Japan) local currency government bond markets grew from end-2004, by about 14% in Thailand and Viet Nam, 8% in the People's Republic of China (PRC) and the Republic of Korea (Korea), 5% in Malaysia and Singapore, and 2% in the Philippines (Figure 1). In Indonesia, outstanding local currency government bonds declined slightly. In USD terms, outstanding local currency government bonds grew 6.9% for emerging East Asia as a whole, compared with 32% in 2004 and a 27% average annual growth from 1997 to 2003. The slower growth this year probably reflects higher interest rates and fiscal consolidation in many economies.

Figure 1: **Growth of Emerging East Asian Local Currency Government Bond Markets in the First Half of 2005** (%)



Notes:
1. Calculated using data from national sources.
2. PRC excludes bills or securities with original tenors of less than or equal to 1 year.
Sources: PRC (Bank of China), Indonesia (Bank Indonesia), Korea (KoreaBondWeb), Malaysia (Bank Negara Malaysia), Philippines (Bureau of the Treasury), Singapore (Monetary Authority of Singapore), Thailand (Bank of Thailand) and Viet Nam (Ministry of Finance).

There are country-specific factors driving growth of emerging East Asian local currency government bond markets:

- In Thailand, increased issuance of Bank of Thailand (BOT) Bonds to meet strong demand drove the growth of the government bond market. BOT Bonds are used to adjust market liquidity. This year, BOT issued bonds with maturities above one year.
- In Viet Nam, strong growth of outstanding government bonds was largely driven by the increasing need for infrastructure financing. Issuance of bonds also aims to aid monetary policy management and meet investment demand.
- In Korea, the 8% growth was largely due to expanded issuance of Korea Treasury Bonds, as the government increased fiscal spending to support economic growth. Compared with the robust 2004 growth of over 40%, issuance during the first half of 2005 was relatively small. This was due in part to reduced issuance of Financial Stability Bonds in the light of the relatively stable currency.
- The PRC's local currency government bonds outstanding also increased by 8%. In recent years, the PRC has been issuing Treasury Bonds to finance infrastructure projects.
- Singapore's growth at 5% largely came from issuance of government bills, rather than long-term bonds.

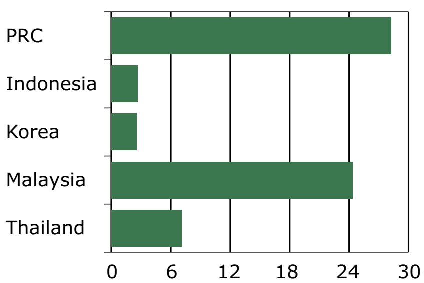
[1]ASEAN+3 comprises the 10 members of the Association of Southeast Asian Nations (Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Viet Nam) plus People's Republic of China, Japan, and Republic of Korea.

- In Malaysia, the need for fiscal consolidation and continued support for bond market development resulted in a moderate growth of 4.7% in government bonds outstanding. Issuance of 10-year conventional and Islamic bonds as well as the reopening of 3-year bonds contributed to moderate growth.
- In the Philippines, the continued need for deficit financing resulted in a 2.1% growth during the first half of 2005. The Philippines is stepping up issuance of local currency bonds as part of an overall deficit financing strategy to reduce reliance on foreign borrowing.
- In Indonesia, market conditions were difficult. Outstanding local currency government bonds declined by 0.2% in the first half of 2005.

On average, corporate bond market growth continues to lag behind government bond market growth.

Corporate bond market growth reached 28.3% in PRC, 24.4% in Malaysia, and 7.1% in Thailand, but only about 2.5% in Indonesia and Korea (Figure 2). In USD terms, outstanding local currency corporate bonds grew by 5.9% during the first half of 2005 for the five emerging East Asian markets (where data are available) as a whole, compared with 10% for 2004 and an 18% average annual growth from 1997 to 2003.

Figure 2: **Growth of Emerging East Asian Local Currency Corporate Bond Markets in the First Half of 2005** (%)



Notes:
1. Calculated using data from national sources.
2. Indonesia data are as of August 2005.
Sources: PRC (Bank of China), Indonesia (Bank Indonesia), Korea (KoreaBondWeb), Malaysia (Bank Negara Malaysia), and Thailand (Bank of Thailand).

In the PRC, strong growth in the local currency corporate bond market was partly supported by government reforms, allowing more companies to issue bonds as an alternative to bank loans; and in Malaysia, the increase was driven by investment demand from both Islamic and conventional bond investors. In Thailand, the modest growth was due to issuance by both state-owned enterprises and private corporations, mainly to finance infrastructure projects. Partly due to poor market conditions, Indonesia's corporate bond growth was well below the 30% in 2004. Korea's moderate growth came from improved market conditions from March to June, as a result of renewed optimism in corporate performance. However, the threat of higher interest rates ensured that this trend was relatively subdued.

Government bonds account for nearly half of the total local currency bonds outstanding in emerging East Asia.

Latest Bank for International Settlements (BIS) data, more comparable across markets than national data, show that, as of March 2005, government bonds accounted for 48.9% of total local currency bonds outstanding in emerging East Asia, up from 39.1% in 1997, but down marginally from the 49.5% at end-2003 (Table 1). Issuance of nongovernment bonds was strongly skewed toward financial institutions, reflecting growth in securitized structures backed by financial assets.

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

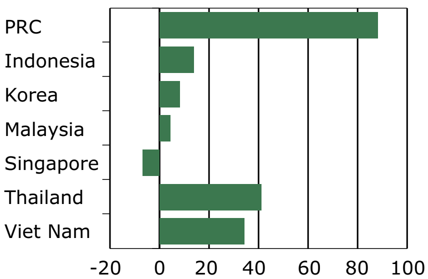
	Amount Outstanding (USD billion)			**% Share**		
Market	**Dec 1997**	**Dec 2003**	**Mar 2005**	**Dec 1997**	**Dec 2003**	**Mar 2005**
PRC						
Government	67.40	287.40	331.80	57.9	65.3	62.9
Financial Institutions	42.70	140.80	183.70	36.7	32.0	34.8
Corporate Issuers	6.30	12.20	12.20	5.4	2.8	2.3
Total	116.40	440.40	527.70	100.0	100.0	100.0
Indonesia						
Government	0.90	60.10	46.00	20.0	91.5	87.1
Financial Institutions	1.58	2.50	2.90	35.0	3.8	5.5
Corporate Issuers	2.03	3.10	3.90	45.0	4.7	7.4
Total	4.51	65.70	52.80	100.0	100.0	100.0
Korea						
Government	21.60	113.90	185.30	16.6	25.6	30.6
Financial Institutions	51.70	164.10	263.80	39.7	36.8	43.6
Corporate Issuers	57.00	167.78	156.11	43.7	37.6	25.8
Total	130.30	445.79	605.21	100.0	100.0	100.0
Malaysia						
Government	19.40	40.40	49.20	34.0	40.9	42.9
Financial Institutions	16.80	13.48	20.28	29.5	13.6	17.7
Corporate Issuers	20.80	44.94	45.20	36.5	45.5	39.4
Total	57.00	98.82	114.68	100.0	100.0	100.0
Philippines						
Government	18.40	24.00	27.50	99.5	99.5	98.8
Financial Institutions	-	0.10	0.20	-	0.4	0.7
Corporate Issuers	0.09	0.02	0.12	0.5	0.1	0.4
Total	18.49	24.12	27.82	100.0	100.0	100.0
Singapore						
Government	13.05	37.10	43.80	54.9	55.2	55.9
Financial Institutions	-	-	-	-	-	-
Corporate Issuers	10.73	30.13	34.57	45.1	44.8	44.1
Total	23.77	67.23	78.38	100.0	100.0	100.0
Thailand						
Government	0.30	30.70	36.60	2.8	50.9	51.2
Financial Institutions	1.32	8.35	12.47	12.4	13.8	17.5
Corporate Issuers	9.04	21.30	22.40	84.8	35.3	31.3
Total	10.66	60.35	71.47	100.0	100.0	100.0
Viet Nam						
Government	-	2.88	3.78	-	100.0	100.0
Financial Institutions	-	-	-	-	-	-
Corporate Issuers	-	-	-	-	-	-
Total	-	2.88	3.78	-	100.0	100.0
Total Emerging East Asia						
Government	141.05	596.48	723.98	39.1	49.5	48.9
Financial Institutions	114.10	329.33	483.35	31.6	27.3	32.6
Corporate Issuers	105.99	279.48	274.50	29.3	23.2	18.5
Total	361.13	1,205.29	1,481.83	100.0	100.0	100.0

- = no data.
Notes:
1. The figures for Singapore corporate bonds include issues by financial institutions.
2. Singapore: Corporate outstanding for March 2005 is based on December 2004 outstanding (latest published data).
3. Viet Nam: Government outstanding for March 2005 is based on December 2004 outstanding (latest data provided by Ministry of Finance).
Sources:
Bank for International Settlements, International Financial Statistics (Tables 16A and 16B and local currency portion of Table 11), except Singapore (Monetary Authority of Singapore), and Viet Nam (Ministry of Finance).

Market Liquidity

Average daily trading volume was strong during the first half of 2005 in most local currency government bond markets.

Figure 3: **Growth of Government Bond Trading Volume[1] in Emerging East Asia in the First Half of 2005**



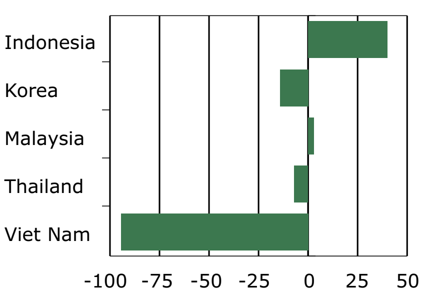
[1]Calculated by comparing average daily trading volumes in the first half of 2005 with 2004.
Notes: Data for Malaysia, Singapore, Thailand, and Viet Nam include bills. Data for Korea exclude monetary stabilization bonds.
Sources: PRC (Bank of China, exchange and interbank markets), Indonesia (Surabaya Stock Exchange), Korea (KoreaBondWeb), Malaysia (Bank Negara Malaysia), Singapore (Monetary Authority of Singapore), Thailand (Thai Bond Dealing Centre), and Viet Nam (Ho Chi Minh City Securities Trading Center).

Available data show that the average daily trading volume in the first half of 2005 grew in most government bond markets compared with 2004, by about 88% in PRC, 41% in Thailand, 34% in Viet Nam, 14% in Indonesia, 8% in Korea, and 4% in Malaysia. The exception was in Singapore, where average daily trading volume decreased 7% compared with last year (Figure 3).

The PRC's growth came largely from increased market interest in local currency government bonds due to bond market reform. Increased activity in Thailand's government bond market was driven by strong investor demand during the early part of 2005, partly due to a waiver of withholding taxes on bond returns. In Viet Nam, increased issuance and the launch of new trading platforms in the government bond market have contributed to increased trading activity. Despite recent volatility, Indonesian bond trading volume has been improving. In Korea, increased government bond trading could be attributed to increased bonds outstanding. Malaysia's stable economy and speculation of a MYR revaluation supported government bond trading. In contrast, increasing bond yields have generally reduced government bond trading in Singapore.

Trading is mixed in the corporate bond market.

Figure 4: **Growth of Corporate Bond Trading Volume[1] in Emerging East Asia in the First Half of 2005**



[1]Calculated by comparing average daily trading volumes in the first half of 2005 with 2004.
Note: Data for Malaysia, Singapore, Thailand, and Viet Nam include bills.
Sources: Indonesia (Surabaya Stock Exchange), Korea (KoreaBondWeb), Malaysia (Bank Negara Malaysia), Thailand (Thai Bond Dealing Centre), and Viet Nam (Ho Chi Minh City Securities Trading Center).

Trading in corporate bond markets was well below that in government bond markets. For the first half of 2005, the average daily trading volume grew 40% in Indonesia and 3% in Malaysia, but declined by 95% in Viet Nam, 14% in Korea, and 7% in Thailand (Figure 4). No trading data are available for PRC, Singapore, and Philippines.

Indonesia's growth in corporate bond trading was largely spurred by selling pressures due to rising yields. Strong investor demand supported corporate bond trading in Malaysia. While in Korea and Thailand, negative growth was partly attributed to investors switching to government securities in an increasing interest rate environment. The sharp decline in trading in Viet Nam was because only one state-owned enterprise bond, issued in 2004, is on issue. Most are now held in investor portfolios.

Yields and Returns

Since the beginning of the year, local currency bond yields have risen in most emerging East Asian markets, partly in response to hikes in US interest rates, except in PRC, Malaysia, and Philippines.

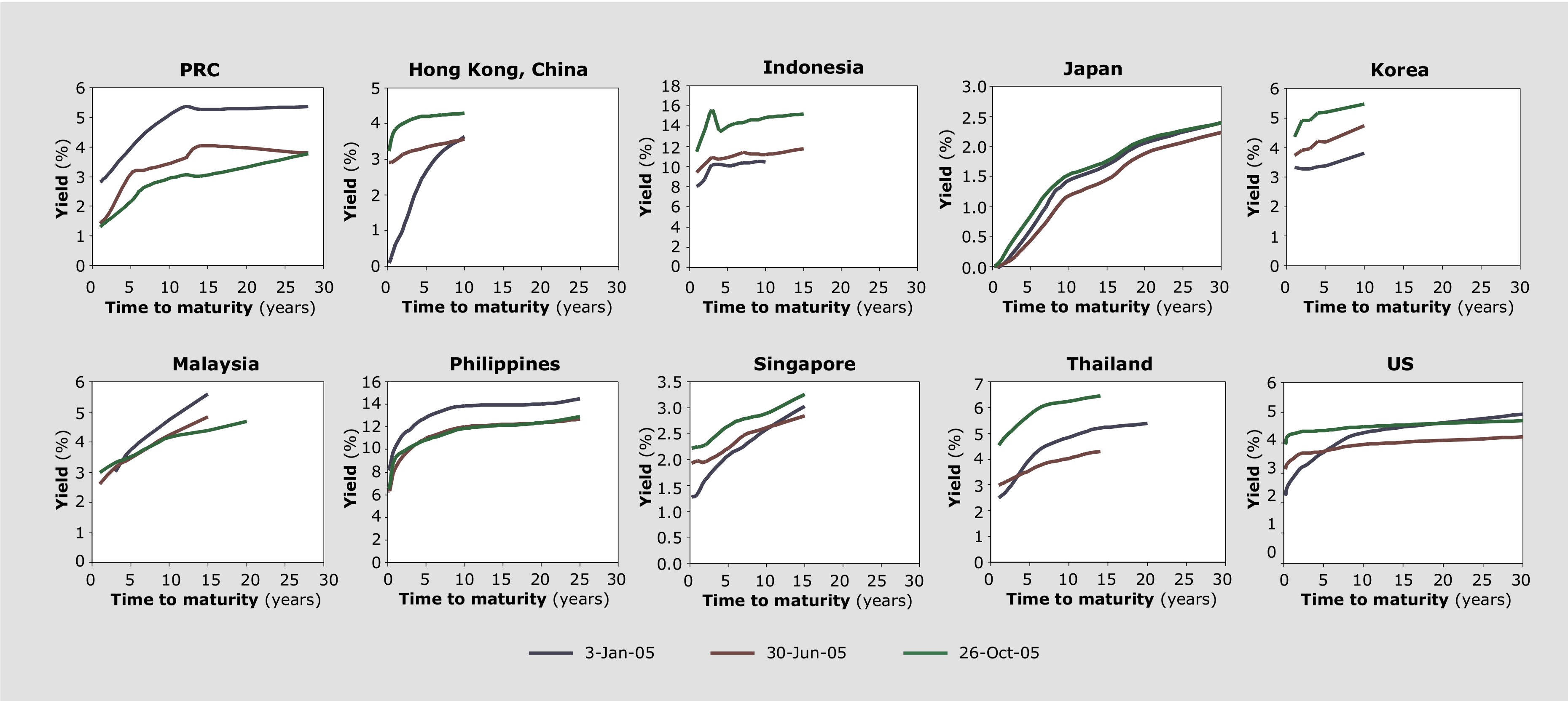
Strong economic data and persistently high oil prices (Brent crude hovering between USD55 and USD68 since June compared with USD40 in early January) have led to renewed concerns over inflationary pressures in the United States (US) economy during recent months, resulting in continued Federal Reserve (Fed) rate hikes and an increase in US Treasury yields across all maturities since mid-2005 (Figure 5). Also, portfolio shifts from equities to long-term bonds by institutional investors, and heavy purchases of US Treasuries by foreign governments (in particular from Asia), have continued to support the US government bond market. These structural factors partly explain the flattening of the US Treasury yield curve, with the 2–10 year spread declining from 120 basis points at the beginning of the year to 20 basis points as of end-October.

The picture for emerging East Asian local currency bond yields is more mixed. During the first 10 months of the year, yields increased in most markets across all maturities, partly due to increases in funding rates in response to the Fed rate hikes and partly due to inflationary expectations as a result of high oil prices. The exceptions were in PRC, Malaysia, and Philippines, where yield curves shifted downward. In almost all ASEAN+3 markets, yield curves have flattened, as shown by the declining 2–10 year bond spreads (Figure 6).

In the PRC and Malaysia, expectations of currency appreciation attracted speculative capital inflows, keeping domestic liquidity high and bond market demand strong. In Malaysia, short-term yields remain relatively unchanged while 10-year MYR bond yields have fallen 60 basis points, indicating stronger demand at the longer end of the bond market. Bond yields have further declined in the PRC and Malaysia since the revaluation of the two countries' currencies on 21 July, suggesting that markets are expecting further appreciation. Currency appreciations may have also somewhat dampened inflationary expectations.

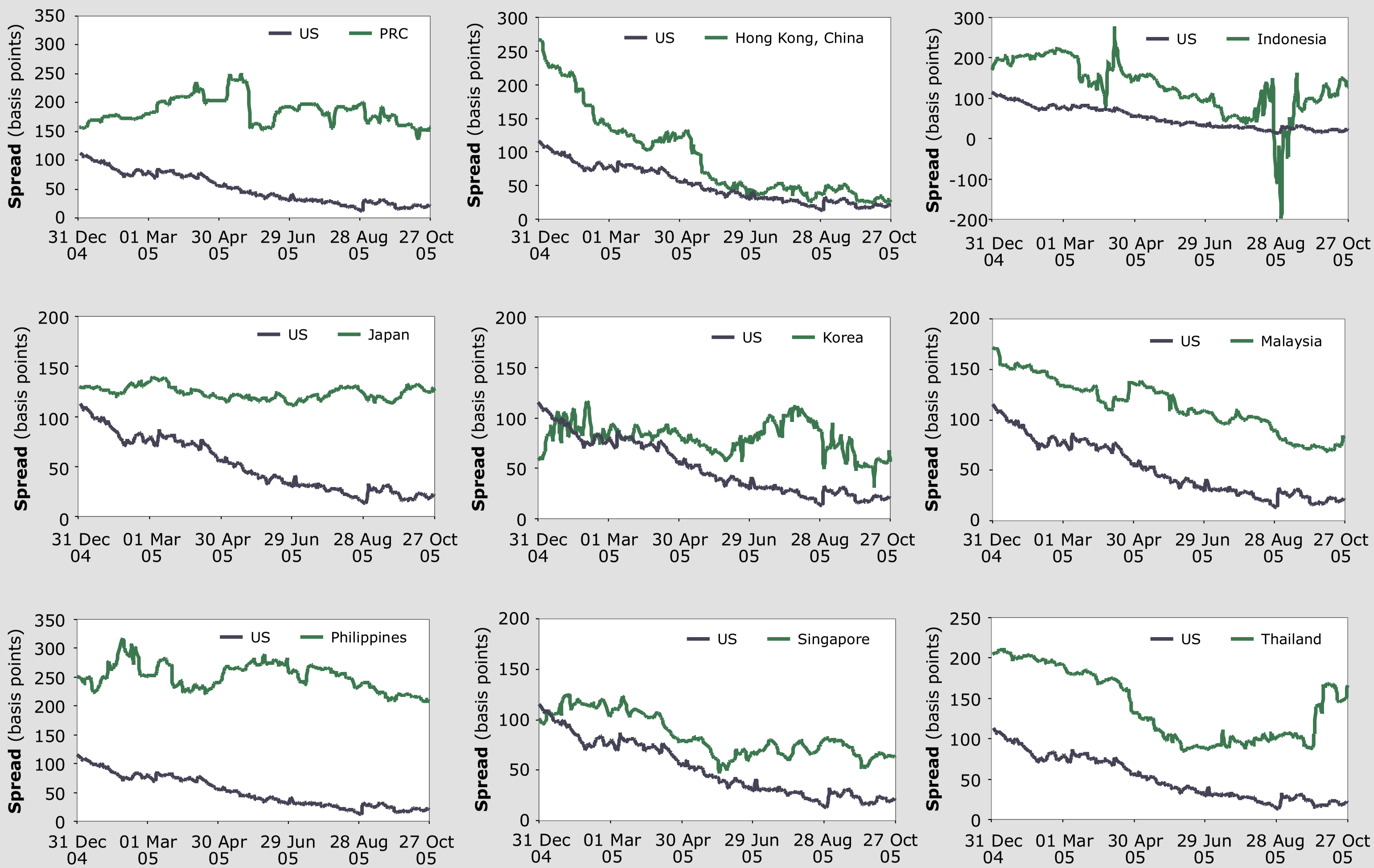
In the Philippines, local currency bond yields fell significantly in the first half of the year, primarily due to excess liquidity in the banking system caused by weak demand for private credit. However, concerns over the country's political situation have unnerved some investors in recent months, leading to a slight rise in short-term local currency bond rates of tenors less than 5 years.

Figure 5: **Benchmark Yield Curves—Local Currency Government Bonds**



Source: AsianBondsOnline.

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



Note: For Malaysia, the spread is for 3-year and 10-year bond yields.
Source: AsianBondsOnline and Bloomberg LP.

Bond yields in Indonesia rose more than 400 basis points across its curve, a result of selling pressures due to increasing volatility in the country's foreign exchange market, which in turn was caused by fiscal concerns, partly due to oil price subsidies. The government has reduced fuel subsidies, somewhat allaying investor concerns.

Where yields have risen, Thailand's overnight rates increased over 177 basis points since the beginning of the year, partly in response to rising inflationary pressures and movements in US rates. In Korea, funding rates have increased somewhat recently, while longer-dated bond yields have increased by more than 160 basis points during the first 10 months of the year. Korea's economy is performing better than expected despite high oil prices, and inflation is becoming a concern.

Because of rising yields, emerging East Asian local currency bond market returns are down from 2004.

According to the iBoxx ABF Index Family,[2] emerging East Asian local currency bond market returns are mixed (Table 2). In local currency terms, the best performing market in 2005 to 26 October was the Philippines (15.19%), followed by the PRC (12.00%) and Malaysia (5.07%). Indonesia recorded the worst return due to rising bond yields (-6.42%). Returns for Korea; Hong Kong, China; and Thailand were also negative (-1.11%, -2.96%, and -3.72%, respectively), while Singapore posted a mild positive return (0.16%).

Table 2: **iBoxx ABF Index Family Year-to-Date Returns (as of 26 October 2005)**

	iBoxx ABF Index Family			Reference Indexes		
		Year-to-Date Returns (%)				
Market	**Annual Modified Duration** (years)	**In Local Currency**	**In USD**	**Index**	**Average Duration** (years)	**Year-to-Date Returns** (%)
PRC	4.45	12.00	14.32	US Govt 3-10 years	4.81	0.000
Hong Kong, China	3.38	-2.96	-2.70	US Govt 1-10 years	3.32	0.424
Indonesia	3.29	-6.42	-13.12	US Govt 1-10 years	3.32	0.424
Korea	3.04	-1.11	-1.81	US Govt 1-10 years	3.32	0.424
Malaysia	3.80	5.07	5.72	US Govt 1-10 years	3.32	0.424
Philippines	3.11	15.19	17.32	US Govt 1-10 years	3.32	0.424
Singapore	4.83	0.16	-3.20	US Govt 3-10 years	4.81	0.000
Thailand	4.77	-3.72	-8.31	US Govt All > 1 year	5.15	1.002
Pan-Asian Index	3.86		0.26	US Govt 1-10 years	5.08	0.424

Notes:
1. Market bond indexes are from iBoxx ABF Index Family. USD returns are from the unhedged total return index.
2. Annual return is computed for each year using the natural logarithm of the year-to-date index value divided by the beginning year index value.
Source: AsianBondsOnline, Bloomberg/EFFAS for US Government Bond Indexes.

[2]Launched on 1 January 2005, the iBoxx ABF Index Family aims to provide a replicable index for the Pan-Asian bond market and eight constituent local currency bond markets. Daily updates are published in the Asia Bond Indicators section of the AsianBondsOnline website.

In USD terms, the Philippines was still the best performing market, with returns (to 26 October) at 17.32%, with 2.13 percentage points from currency appreciation. The PRC was the next best, returning 14.32%, of which 2.32 percentage points were due to revaluation of the RMB. In Malaysia, currency adjustments added an additional 0.65 percentage point to a year-to-date return of 5.72%. In other markets, weaker currencies reduced returns, by 6.70 percentage points in Indonesia, 4.59 percentage points in Thailand, 3.36 percentage points in Singapore, and 0.70 percentage point in Korea.

The return on the Pan-Asian Index (in USD terms) was 0.26% to 26 October. This is well below the 2004 figure of 11.8%, calculated from the composite emerging East Asian local currency bond index, as reported in *Asia Bond Monitor,* April 2005.[3] In comparison, the US Treasury index over the same period returned 0.42%.

Institutional and Regulatory Developments

In 2005, East Asian governments continue efforts to develop local currency bond markets.

In recent years, East Asian governments have implemented significant institutional and regulatory reforms to develop local currency bond markets. These efforts have continued this year and, in some countries, the pace has accelerated (Box 1).

- **Extending benchmark yield curves.** Following the issuance of 15-year government bonds in 2004, Malaysia extended its yield curve by issuing MYR1 billion 20-year Malaysia Government Securities (MGS) in July 2005. Indonesia issued 15-year bonds for the first time in June 2005, and Korea plans to issue long-term mortgage-backed securities (10-years or more) through the Korea Housing Finance Corporation (KHFC) to create a high quality mortgage benchmark.
- **Introducing new products.** Korea is in the process of introducing the STRIPS (Separate Trading of Registered Interest and Principal Securities) Program and Inflation-Linked Government Securities. The STRIPS Program will be introduced in 2006, and the Inflation-Linked Government Securities will be introduced according to the market situation. In Malaysia, new structured products were offered: including principal municipal Islamic bonds (MYR80 million) backed by property tax assessment collections of a local authority; and Islamic residential mortgage-backed securities (RMBS), issued by the National Mortgage Corporation, Cagamas (MYR2.05 billion). Malaysia also issued Islamic

[3] This index used slightly different weightings than iBoxx.

Box 1: **Bond Market Reforms in the People's Republic of China**

The People's Republic of China (PRC) has recently accelerated bond market reform, by improving access to markets for both issuers and investors, and streamlining trading infrastructure to improve liquidity. Early success can be seen in the rapid increase in average daily trading volumes in recent months. The reforms include the following:

Encouraging greater investor and issuer participation

- In November 2004, the People's Bank of China (PBC) issued new rules to allow qualified securities firms to raise funds in the interbank bond market from qualified institutional investors to meet short-term financing needs.
- In February 2005, PBC, State Development and Reform Commission (SDRC), and China Securities Regulatory Commission (CSRC) jointly released provisional administrative rules allowing qualified international development institutions to issue RMB bonds in the PRC. Also, PBC and CSRC jointly issued rules allowing commercial banks to incorporate Fund Management Companies. Twelve money market funds have been launched as of end-August 2005.
- In April 2005, the PBC issued rules for trading and circulating financial bonds on the interbank market, laying out requirements for bond issuance by policy banks, commercial banks, finance companies, and other financial institutions. These became effective on 1 June 2005.
- In May 2005, PBC issued rules allowing qualified domestic nonfinancial institutions to issue financial bills to qualified institutional investors on the interbank market.
- In June 2005, the State Council, PBC, and China Banking Regulatory Commission (CBRC) jointly issued rules permitting commercial banks to issue subordinated debt on the interbank market to recapitalize.
- In August 2005, PBC formally launched a pilot program to securitize mortgage lands and credit assets. Also, the China Insurance Regulatory Commission (CIRC) relaxed rules allowing insurance companies to invest up to 30% of their total assets in corporate bonds.
- In September 2005, the PRC increased the investment quota for Qualified Foreign Institutional (QFIIs) from USD4 billion to USD10 billion.
- And, in October 2005, the International Finance Corporation (IFC)—of the World Bank group—issued 10-year RMB1.13 billion Panda Bonds. The Asian Development Bank (ADB) also issued 10-year RMB1 billion Panda Bonds, proceeds to be used to fund private-sector development projects.

Improving transaction efficiency

- In November 2004, the government securities trading system and PBC's large-value payment system were interconnected, providing technical support for the delivery-versus-payment (DVP) settlement on the interbank bond market. On 9 November 2004, DVP settlement was adopted by PBC in open market operations for the first time.
- In the fourth quarter of 2004, a market-making system was established on the interbank bond market using a bilateral quotation system. In addition to 13 commercial banks, two securities firms were accepted as market makers.
- In May 2005, the PBC issued rules (effective 15 June) on forward bond transactions on the interbank market, launching PRC's first financial derivative instrument.
- In September 2005, CSRC announced it would accelerate introduction of futures and other derivative products to further develop the PRC market, providing hedging products to investors.

Treasury Bills and longer-term Islamic bonds to further diversify available Islamic instruments. In the PRC, the commercial mortgage backed securities (CMBS) market is about to begin, with bonds likely backed by real estate investment trusts (REITs).

- **Promoting retail investment.** In Thailand, the Bond Electronic Exchange (BEX) started trading government bonds in addition to corporate issues to stimulate retail investment. In Singapore, the government amended rules to promote fair dealing with investors by financial advisers. The stock exchange listings of Asian Bond Fund 2 (ABF2) bond funds in Hong Kong, China; Kuala Lumpur; and Singapore aim to increase retail and offshore participation in local currency bond markets. Exchange-traded bond funds allow retail investors easier access to markets with lower minimum investment requirements.

- **Attracting offshore investors.** Malaysia has aggressively promoted its Islamic capital market with plans to issue more Islamic banking licenses to foreign institutions. As part of this effort, the government has signed regulatory cooperation agreements with the Securities and Futures Commission of Hong Kong, China. Viet Nam recently ran road shows for its maiden 10-year USD500 million international bond issue (increased to USD750 million later due to strong demand). And Thailand is planning a series of road shows to give international investors a better understanding of the Thai capital market. In Korea, the government abolished a requirement that foreign investors register all trading activities with the Financial Supervisory Service and Financial Supervisory Commission. Foreign investors are now allowed to trade KRW bonds overseas in over-the-counter (OTC) markets. Korea now exempts domestic financial institutions from withholding taxes on capital gains for bonds.

- **Improving trading platforms and exchanges.** The Philippines launched its Fixed Income Exchange (FIE) in March 2005 to provide an electronic platform for trading, clearing, and settlement of bonds, along with depository, registry, and custody of fixed-income securities and derivatives. Thailand's new futures exchange will begin trading in November 2005. It will initially trade stock index futures, to be followed by interest rate futures and stock options.

- **Issuance by supranationals and foreign entities.** In Malaysia, the World Bank issued 5-year Islamic Bonds in May 2005 amounting to MYR760 million, the third MYR bond issuance by a supranational since 2004. Also in May 2005, the Asian Development Bank (ADB) issued 5-year bonds in Thailand amounting to THB4 billion, the first THB-denominated issuance by a foreign issuer. This was followed in September by the issuance of THB3 billion 5-year bonds by the Japan Bank for International Cooperation (JBIC). Thailand will allow other foreign entities (aside from supranationals) to issue THB-denominated bonds beginning 2006. In the PRC, the International Finance Corporation (IFC), part of the World Bank group, and ADB launched inaugural 10-year "Panda" bonds in early October, amounting to RMB1.13 billion and RMB1 billion, respectively. More recently, ADB issued its first local currency bonds in the Philippines amounting to PHP2.5 billion with a bullet maturity of five years and one day.

- **Other structural reforms.** The Thailand Securities Depository shortened its settlement cycle from three trading days to two in June 2005, to align itself with international standards and to improve efficiency. Viet Nam's first credit rating agency, the Vietnamnet Ratings

Centre, began operations in June 2005, initially focusing on developing a financial information database and offering financial consulting services to investors. The government is also planning to upgrade the Ho Chi Minh City Securities Trading Centre (HSTC) to promote relations with regional markets.

- **Regional Cooperation.** ABF2 began implementation in May 2005. Local currency exchange-traded bond funds (ETF) have been listed in Hong Kong, China; Kuala Lumpur; and Singapore. In July, the ABF Pan-Asian Bond Index Fund (PAIF) was listed and began trading on the HKEx. The PAIF is based on a composite of eight emerging East Asian markets. ABF2 bond funds are passively managed with their performance linked to returns of the iBoxx ABF Index Family (see footnote 2). The eight local currency bond indexes and aggregate USD-denominated Pan-Asian index will give investors a reliable benchmark to assess performance of local currency bond markets and individual bond funds.

Monitoring Financial Integration in East Asia

Rapid growth in intraregional trade, a proliferation of free-trade agreements, and various government initiatives aimed at strengthening monetary and financial cooperation in East Asia since the 1997–98 financial crisis have raised an important question: how closely are East Asian economies now integrated? It is now well-documented that real integration, through foreign trade and direct investment, is strong and growing stronger in East Asia. However, empirical evidence on the integration of financial markets remains sketchy.

Understanding the level of financial integration and monitoring its progress in East Asia is important for a number of reasons. Financial integration is considered an important way to accelerate regional economic growth, by removing friction and barriers to cross-border capital flows; promoting financial market development (leading to more efficient allocation of capital); and deepening integration in the real sector. The level of financial integration also determines the cross-border transmission of monetary policies, and hence, has important implications for macroeconomic management and coordination. Further, while deepening financial integration is generally beneficial, it may also have negative consequences, as shown by the experience of many East Asian economies during 1997–98, when the financial crisis brought regional contagion. It thus requires close monitoring.

To examine the level of financial integration in East Asia[4] and assess recent progress, this report looks at differentials and correlations in money market interest rates and bond yields, co-movements in stock market returns, intraregional cross-border portfolio capital flows, and institutional and regulatory barriers to cross-border investment (Box 2). Key findings are highlighted below.

Interest Rates and Bond Yields

Cross-market differentials in interest rates and bond yields remain significant in East Asia even after controlling for exchange rate movements, suggesting that the level of financial integration is still low.

Data analysis shows a high level of cross-market dispersion in interbank lending rates and benchmark bond yields[5] in East Asia. In September 2005, the average absolute cross-market differential[6] of the nine East Asian economies examined (excluding Viet Nam for which data were unavailable) was in the order of 300 basis points for overnight and 3-month interbank lending rates, and 380 basis points for 2-year and 10-year government bond yields (Figure 7). The 3-month interbank rate differential was highest for Indonesia at about 600 basis points, followed by Japan and Philippines at 400 basis points. For PRC; Hong Kong, China; Korea; Malaysia; and Singapore, this was at about 200-240 basis points, and for Thailand, it was at 180 basis points.

Differentials in interest rates and bond yields of one economy from another could partly reflect expectations of exchange rate movements. To control for premiums for exchange rate risks, uncovered interest rate differentials were calculated for 3-month interbank lending rates (Table 3). The average absolute uncovered interest rate differential stood at about 720 basis points in September 2005, more than twice as high as the average absolute cross-market interest rate differential.[7]

[4]In this section, East Asia covers PRC; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Philippines; Singapore; Thailand; and Viet Nam.
[5]Refers to nominal interest rates and bond yields here and in the following analysis unless otherwise noted.
[6]See Technical Appendix for the formula.
[7]This may suggest that the actual exchange rate movements used in calculating uncovered interest rate differentials are not good approximations to the expected exchange rate movements.

Box 2: **Measures of Financial Integration**

Three types of measures have often been used to gauge the level of financial integration: price-based measures, quantity-based measures, and institutional/regulatory measures.

Price-based measures rely on the notion that when financial markets are fully integrated, the law of one price should hold, that is, identical assets command the same return irrespective of the domicile of the issuer and of the asset holder. In the real world, financial markets can be segmented, and the law of one price may not hold. Capital controls and differential taxes prevent capital from freely flowing between countries, thus limiting the markets' ability to equalize asset prices or returns. Differences in accounting and auditing standards, disclosure practices, bankruptcy laws, and quality of judicial enforcement may induce investors to evaluate differently assets that are otherwise identical. Beyond these legal and regulatory barriers, economic barriers such as asymmetric information can also lead to investors valuing identical assets at home differently from abroad, creating a "home bias."

A key challenge in using price-based measures to study financial integration is the identification of assets that are identical and comparable across different markets. Given this, the focus is often on a specific asset, such as money-market instruments or fixed-income securities. But even an instrument with the same cash flows may not be identical across different markets due to differences in political risk.

If assets under investigation are identical, cross-market differentials in nominal interest rates or bond yields can be calculated. To control for the exchange rate factors, cross market rate or yield differentials are often adjusted by the expected exchange rate movements, known as uncovered interest rate differentials. A major difficulty in calculating uncovered interest rate differentials, however, is to estimate expected exchange rate movements. In practice, analysts often rely on the rational expectations hypothesis and use actual (or ex post) exchange rate movements as proxies of expected exchange rate movements. But the appropriateness of this has often been questioned, both theoretically and empirically.

Because of the problems with interest rate or bond yield differentials, alternative price-based measures have been used. One alternative is to look at co-movements in interest rates, bond yields, and stock returns. Co-movements can be measured by using simple correlation coefficients, or more sophisticated techniques such as vector autoregression and impulse response analysis. A higher level of co-movements indicates a higher level of integration. But co-movement analysis may not be able to answer the question of whether or not markets are fully integrated.

Given the weaknesses associated with price-based measures, many have also used quantity-based measures to study financial integration. It has been argued that although quantity-based measures have nothing to do with the law of one price, in a system with no barriers to cross-border flows, the domicile of asset issuers and holders should play a decreasing role over time. Flow measures, such as cross-border capital flows and mergers and acquisitions, or stock measures, such as cross-border holdings of debt and equity, may enable an assessment of whether such a process is taking place, and can therefore complement price-based measures.

While price- and quantity-based measures look at outcomes of financial integration, institutional and regulatory measures examine conditions for financial integration. The latter measures focus largely on legal and regulatory barriers to cross-border capital flows, development of financial market infrastructure, quality of corporate governance, accounting and auditing standards, and disclosure practices.

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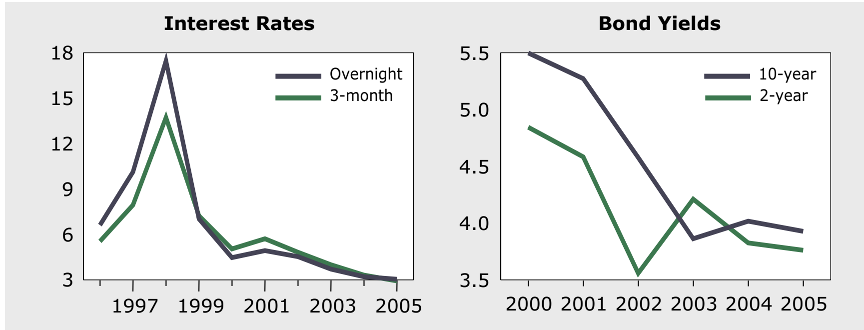
Klaus Adam, Tullio Jappelli, Amnamaria Menichini, Mario Padula, and Marco Pagano, "Analyse, Compare, and Apply Alternative Indicators and Monitoring Methodologies to Measure the Evolution of Capital Market Integration in the European Union", prepared for the EU Commission, the Center for Studies in Economics and Finance, University of Salerno, January 2002.

Lieven Baele, Annalisa Ferrando, Peter Hordahi, Elizaveta Krylova, and Monnet, "Measuring Financial Integration in the Euro Area", Occasional Paper Series No. 14, European Central Bank, April 2003.

Figure 7: **Average Absolute Cross-Market Differentials of Interest Rates and Bond Yields in East Asia** (in percentage points)



Note: Data for 2005 as of end-September.
Sources: Rates and yields from Bloomberg LP and Datastream.

Table 3: **Average Absolute Uncovered Interest Rate Differential for 3-Month Interbank Lending Rates**

Year	PRC	Hong Kong, China	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Thailand	Average
1996	18.47	13.96	20.51	12.12	17.08	12.33	12.93	12.22	15.51	15.01
1997	26.07	28.90	62.98	28.93	31.13	22.32	26.02	24.19	24.88	30.60
1998	10.46	11.62	30.00	25.09	16.91	10.47	12.85	10.59	11.68	15.52
1999	8.93	8.78	24.12	16.08	12.30	9.56	17.32	9.37	9.17	12.85
2000	10.60	9.14	18.80	8.75	11.28	11.08	14.29	9.31	8.86	11.34
2001	4.76	4.66	9.74	5.74	6.58	5.04	11.28	5.09	6.15	6.56
2002	4.95	4.88	7.41	10.86	5.80	4.89	11.12	6.06	6.16	6.90
2003	6.02	6.00	14.56	11.46	7.88	6.10	11.44	7.45	7.09	8.67
2004	5.05	5.22	15.72	5.41	13.14	4.98	7.47	5.62	4.84	7.50
2005	5.40	4.51	18.45	4.55	12.14	4.46	6.45	4.39	4.44	7.20

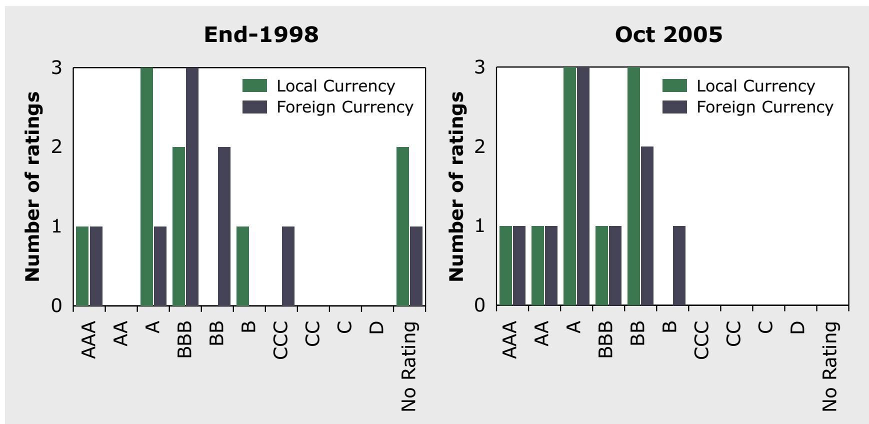
Notes:
1. Data for 2005 as of end-September.
2. Adjusted by annual exchange rate changes.
Sources: Rates from Bloomberg LP and Datastream.

But levels of cross-market differentials in interest rates and bond yields have been declining in recent years.

Cross-market differentials of money market interest rates of the nine East Asian economies increased significantly during the 1997–98 financial crisis. Since 1999, these differentials have been declining. The current level of the differentials is lower than that in 1996—by 350 basis points for the overnight interbank lending rates and 250 basis points for 3-month interbank lending rates. Declines in cross-market differentials are also observed in bond yields. The differential of both 2-year and 10-year bond yields declined from about 500 basis points at the end of 1999 to the order of about 380 basis points in September 2005. Uncovered interest rate differentials are also declining. After surging to over 3,000 basis points at the height of the 1997–98 financial crisis, they have now declined to 700 basis points, about half the 1996 level.

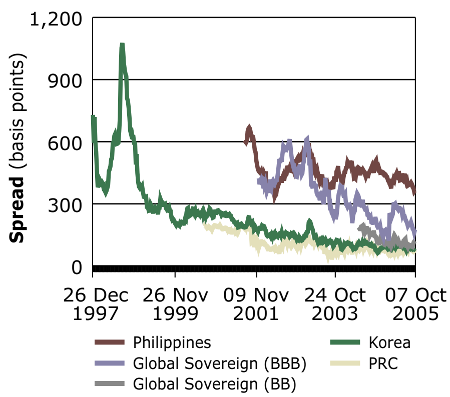
While reductions in cross-market differentials of interest rates and bond yields may suggest increasing financial integration in East Asia, several other factors could also have led to this outcome. First, the past few years have seen improvements in the level and declines in differentials of sovereign credit ratings among East Asian economies (Figure 8), which should have led to declines in both levels and differentials in country credit risk premiums (Figure 9). Second, inflation rates and inflation differentials have also declined in recent years (Figure 10). The standard deviation of inflation rates of the nine East Asian economies was 5.28% in 1995, 8.95% in 1999, and 3.07% in 2005 (as of end-October).

Figure 8: **Frequency Distribution of Sovereign Credit Ratings in East Asia**



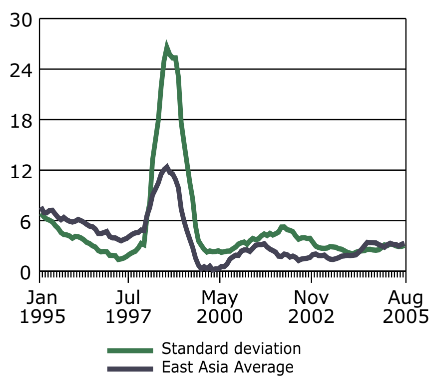
Source: Standard and Poor's.

Figure 9: **10-Year USD Sovereign Bond Spreads Against the US Treasuries**



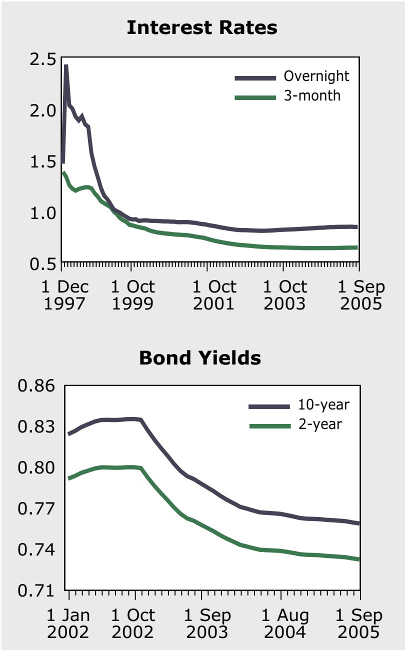
Note: Spreads are based on Bloomberg's Fair Market Curve Indexes (USD yields) against the 10-year US Treasury benchmark yield.
Source: Bloomberg LP.

Figure 10: **Average and Standard Deviation of Inflation Rates in East Asia** (y-o-y, %)



Note: Markets covered are PRC; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Philippines; Singapore; and Thailand.
Sources: Asia Regional Information Center (ARIC) and AsianBondsOnline.

Figure 11: **Average Absolute Distance of Beta Coefficients from Unity for Interest Rates and Bond Yields in East Asia**



Sources: Rates and yields are from Bloomberg LP and Datastream.

Recent years have also seen increased co-movements in interest rates and bond yields in East Asia, which may suggest increased financial integration.

The simple correlation coefficients of interest rates and bond yields of the nine East Asian markets show a low level of correlation and no sign of increasing (Table 4). However, recursive regression analysis (by regressing changes in interest rates and bond yields of one market against changes in interest rates and bond yields of another) suggests increased co-movements.[8] The estimated coefficient, beta, which takes the value of unity for full co-movements, suggests that co-movements were most pronounced for country pairs of PRC-Korea; Korea-Hong Kong, China; Thailand-Philippines; Thailand-Korea; Hong Kong, China-Malaysia; and Philippines-Hong Kong, China (Table 5). The average absolute distance of the beta coefficient from unity[9] for the eight East Asian markets examined, excluding Japan, declined from above one before 1999 to about 0.7 in 2005 for 3-month interbank lending rates (Figure 11). However, for 2-year and 10-year bond yields, while this measure also declined, the decline was much less pronounced.

Table 4: **Correlation Coefficients of Lending Rates and Bond Yields**

Correlation Coefficients of 3-Month Interbank Lending Rates, 2002–2005

	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG	USA
PRC	1.00	0.20	0.36	0.24	0.23	0.26	0.27	0.28	0.30	0.31
INO		1.00	-0.49	0.26	0.42	0.20	0.19	0.20	0.39	0.23
KOR			1.00	0.07	0.17	0.16	0.39	0.26	0.38	0.18
MAL				1.00	0.50	0.15	0.14	0.36	0.44	0.29
PHI					1.00	0.36	0.50	0.29	0.52	0.53
SIN						1.00	0.18	0.54	0.18	-0.09
THA							1.00	0.51	0.27	0.27
JPN								1.00	0.16	0.16
HKG									1.00	0.27
USA										1.00

Correlation Coefficients of 10-Year Bond Yields, 2002–2005

	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG	USA
PRC	1.00	-0.26	-0.62	0.36	-0.03	-0.02	0.41	0.29	-0.53	-0.08
INO		1.00	0.21	-0.05	-0.22	0.19	0.04	0.08	0.20	0.06
KOR			1.00	-0.12	0.17	0.28	0.33	0.05	0.39	0.64
MAL				1.00	0.24	0.47	0.07	0.38	-0.01	0.39
PHI					1.00	0.27	0.15	0.25	0.35	0.19
SIN						1.00	0.63	0.38	0.16	0.26
THA							1.00	0.17	0.36	0.42
JPN								1.00	0.15	0.54
HKG									1.00	0.19
USA										1.00

Sources: Rates and yields are from Bloomberg LP and Datastream.

Table 5: **Beta Coefficients Estimated from Recursive Regression: 3-Month Interbank Rates**

	1995-1996	1995-2005
β ≤ 0.0	13	0
0.0 < β ≤ 0.4	18	16
0.4 < β ≤ 0.8	4	14
0.8 < β ≤ 1.2	5	10
1.2 < β ≤ 1.6	3	7
1.6 < β ≤ 2.0	2	1
β > 2.0	11	8
Total	**56**	**56**

Sources: Rates are sourced from Bloomberg LP and Datastream.

[8] See Technical Appendix for methodological details.
[9] See Technical Appendix for the formula.

Stock Returns

Co-movements in stock returns suggest that East Asian equity markets are more integrated than money and bond markets.

Simple correlation analysis of stock returns shows a higher level of co-movements in East Asia's equity markets compared with money and bond markets (Table 6). During 2002–2005, 12 of 36 country pairs had a correlation coefficient as high as above 0.5. In markets where investment in equities is less restricted (such as Hong Kong, China; and Singapore) the correlation tends to be higher. On the other hand, there is little relationship between the PRC (where capital flows are more restricted) and other East Asian markets. Table 6 also shows that there is a high level of correlation in stock returns between the US and several East Asian markets.

Table 6: **Correlation Coefficients of Stock Returns**

1992-1995

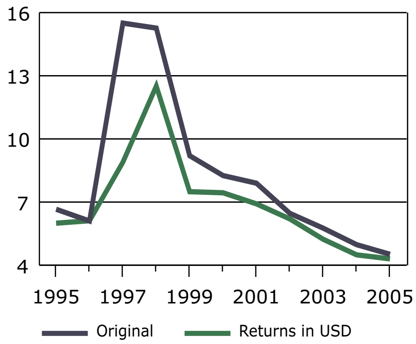
	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG	USA
PRC	1.000	0.039	0.047	0.134	-0.049	-0.059	-0.002	0.075	-0.064	0.229
INO		1.000	0.458	0.543	0.623	0.515	0.587	0.485	0.385	0.387
KOR			1.000	0.354	0.411	0.413	0.595	0.447	0.412	-0.094
MAL				1.000	0.614	0.617	0.568	0.226	0.577	0.212
PHI					1.000	0.721	0.700	0.338	0.569	0.181
SIN						1.000	0.644	0.388	0.805	0.397
THA							1.000	0.382	0.499	0.172
JPN								1.000	0.293	0.174
HKG									1.000	0.409
USA										1.000

2002-2005

	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG	USA
PRC	1.000	-0.122	0.018	0.070	-0.172	-0.117	-0.102	0.088	0.213	0.010
INO		1.000	0.420	0.312	0.572	0.510	0.460	0.341	0.317	0.272
KOR			1.000	0.313	0.506	0.536	0.567	0.559	0.572	0.695
MAL				1.000	0.209	0.417	0.298	0.141	0.399	0.381
PHI					1.000	0.525	0.642	0.334	0.258	0.187
SIN						1.000	0.588	0.399	0.576	0.628
THA							1.000	0.386	0.317	0.446
JPN								1.000	0.543	0.389
HKG									1.000	0.664
USA										1.000

Source: Index values are from Bloomberg LP.

Figure 12: **Cross-Market Stock Return Differentials in East Asia**
(in percentage points)



Source: Index values are from Bloomberg LP.

Co-movements in stock returns shown by simple correlation coefficients could have been caused by co-movements of each individual East Asian market with the global equity market. The correlation analysis of residuals calculated from pair-wide regressions between each of the East Asian markets and the US shows,[10] however, that even after eliminating the global factor, there is still a reasonably high level of co-movements among East Asian stock markets (Table 7). These findings appear to confirm the conventional wisdom that East Asian equity markets are more integrated than money and bond markets. Declining cross-market differentials in stock returns are also indicative of increasing integration in equity markets in East Asia (Figure 12).

Table 7: **Correlation Coefficients of Residuals of Stock Price Index**

1992-1995

	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG
PRC	1.000	0.144	-0.098	0.050	-0.032	0.229	-0.063	-0.124	0.055
INO		1.000	0.053	0.517	0.622	0.568	0.598	-0.024	0.728
KOR			1.000	0.146	0.016	0.198	0.117	0.141	0.184
MAL				1.000	0.685	0.773	0.680	-0.026	0.708
PHI					1.000	0.694	0.635	0.047	0.731
SIN						1.000	0.531	0.189	0.727
THA							1.000	-0.160	0.636
JPN								1.000	0.047
HKG									1.000

2002-2005

	PRC	INO	KOR	MAL	PHI	SIN	THA	JPN	HKG
PRC	1.000	-0.096	0.091	0.285	-0.241	-0.154	-0.045	0.020	0.212
INO		1.000	0.333	0.315	0.528	0.377	0.295	0.299	0.254
KOR			1.000	0.427	0.331	0.581	0.395	0.486	0.568
MAL				1.000	0.171	0.632	0.293	0.236	0.555
PHI					1.000	0.453	0.484	0.257	0.029
SIN						1.000	0.446	0.227	0.489
THA							1.000	0.353	0.384
JPN								1.000	0.429
HKG									1.000

Source: Index values are from Bloomberg LP.

[10] See Technical Appendix for methodological details.

Intraregional Cross-Border Capital Flows

East Asia's intraregional cross-border portfolio investment is still a small proportion of the region's total cross-border portfolio flows, but appears to be increasing in recent years.

East Asia is a major portfolio investor in the global financial market. According to the Coordinated Portfolio Investment Survey (CPIS) conducted by the International Monetary Fund (IMF),[11] total cross-border portfolio investment by East Asian economies increased from USD1.614 trillion (12.7% of the global total) in 2001 to USD2.227 trillion in 2003 (11.7% of the global total), with the investment highly skewed toward fixed-income and long-term debt instruments, accounting for over 70% of the total (Table 8).

The region's intraregional cross-border portfolio flows have also increased, from USD80.9 billion in 2001 to USD110.6 billion in 2003. But as a share of East Asia's total cross-border portfolio flows, intraregional flows remained more or less unchanged during the same period. This share (4.9%) is low

Table 8: **2003 Cross-Border Portfolio Flows in USD Billion** (percentage of total)

	Investment from									
Investment to	**NAFTA**		**EU15**		**East Asia**		**Rest of the World**		**Total Global**	
Total Portfolio Investment										
NAFTA	545	(15.8)	1,776	(18.6)	747	(33.5)	1,620	(43.4)	4,688	(24.7)
EU15	1,614	(46.7)	6,058	(63.5)	804	(36.1)	1,455	(39.0)	9,931	(52.4)
East Asia	476	(13.7)	415	(4.4)	110	(4.9)	165	(4.4)	1,166	(6.2)
Rest of the World	823	(23.8)	1,292	(13.5)	566	(25.5)	492	(13.2)	3,173	(16.7)
Total Global	3,458	(100.0)	9,541	(100.0)	2,227	(100.0)	3,732	(100.0)	18,958	(100.0)
Long-Term Debt Securities										
NAFTA	195	(21.4)	861	(15.3)	559	(34.1)	1,071	(45.8)	2,686	(25.5)
EU15	413	(45.4)	3,887	(69.0)	627	(38.2)	909	(38.9)	5,836	(55.5)
East Asia	54	(5.9)	107	(1.9)	45	(2.7)	79	(3.4)	285	(2.7)
Rest of the World	248	(27.3)	776	(13.8)	409	(24.9)	278	(11.9)	1,711	(16.3)
Total Global	910	(100.0)	5,631	(100.0)	1,640	(100.0)	2,337	(100.0)	10,518	(100.0)
Equity Securities										
NAFTA	312	(13.4)	800	(23.7)	165	(34.7)	217	(26.7)	1,494	(21.4)
EU15	1,042	(44.8)	1,806	(53.6)	132	(27.8)	357	(43.9)	3,337	(47.8)
East Asia	418	(18.0)	315	(9.3)	52	(10.9)	56	(6.9)	841	(12.0)
Rest of the World	555	(23.9)	450	(13.3)	126	(26.5)	184	(22.6)	1,315	(18.8)
Total Global	2,327	(100.0)	3,371	(100.0)	475	(100.0)	814	(100.0)	6,987	(100.0)

NAFTA = North American Free Trade Agreement
EU15 = Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Portugal, Sweden, Spain, and United Kingdom.
Note: In this table, East Asia includes PRC; Hong Kong, China; Indonesia; Japan; Korea; Malaysia; Philippines; Singapore; Thailand; and Viet Nam.
Source: International Monetary Fund, Coordinated Portfolio Investment Survey, December 2003.

[11] CPIS data exclude reserve asset holdings.

compared with the shares of intraregional cross-border portfolio flows in Europe (63.5%) and the North American Free Trade Agreement region (15.8%).

Across markets, Hong Kong, China at 17.2%; Singapore at 22.9%; and Malaysia at 47.2% invested a higher portion of their total cross-border portfolio assets in other East Asian markets in 2003. In contrast, Japan only invested 1.3% of its total cross-border portfolio flows in East Asian assets.

East Asian economies invest a higher proportion of their cross-border equity flows in East Asian markets than their cross-border fixed-income flows.

Between 2001 and 2003, East Asia's intraregional cross-border equity flows increased from USD34.7 billion to USD52.3 billion, and as a share of the region's total cross-border equity flows, they rose from 9.8% to about 11%. During the same period, East Asia's intraregional cross-border fixed-income flows increased from USD37.9 billion to USD44.6 billion, and as a share of the region's total cross-border fixed-income flows, they fell from 3.2% to 2.7%. That East Asian economies invest a higher proportion of their total cross-border equity flows in East Asian markets could partly be explained by the fact that the region's equity markets are more developed than local currency bond markets. Given the fact that the annual average growth of local currency bond markets in East Asia was more than 25% during the past eight years, low levels of intraregional cross-border fixed-income investment in East Asia also suggest that investors in local currency bond markets are predominantly locally domiciled.

Although East Asia's intraregional cross-border portfolio flows are small, a significant amount of USD- and EUR-denominated debt issued by East Asian issuers are bought by East Asian investors.

Analysis of 178 USD- and EUR-denominated prime bond issues by East Asian economies[12] suggest that, during August 2002–August 2005, 55.7% were bought by East Asian investors (Table 9).[13] In value terms, this was slightly lower, at 47%. The two figures are higher than the 46.3% and 43.9% reported in an earlier study.[14] It has been argued that excess

[12] Reported in *EuroWeek* and *FinanceAsia*.
[13] This is the percentage allocated to investors in primary offerings, excluding secondary market activity.
[14] Robert McCauley, San-Sau Fung, and Blaise Gadanesz. "Integrating the Finances of East Asia," Bank for International Settlements, Quarterly Review December 2002.

Table 9: **Debt Instruments Issued by East Asian Issuers and Bought by East Asian Investors, August 2002–August 2005**

	Sample of 178 bond issuances (USD million)	Sample of 73 bond issuances (USD million)
Total amount of issuance	84,280.4	28,227.3
Total East Asian Investors	39,437.8	17,295.5
Domicile Investors	no data	6,898.0
Pan-Asian Investors	no data	10,397.5

Note: The samples cover bond issuances from PRC; Hong Kong, China; Indonesia; Korea; Malaysia; Philippines; Singapore; and Thailand.
Sources: *EuroWeek* and *FinanceAsia*.

savings in Asian economies and the lack of local currency credit-enhanced products lead to Asian investors buying paper issued by Asian-based issuers in international bond markets.[15] In some way this could also be taken as an indicator of East Asian investors' "home-bias," as they derive a level of comfort with familiar Asian names, although the currency denomination is USD- or EUR-based. The analysis also indicates that Asian investors' share is larger for smaller and less-well known issues and sub-sovereign offerings. This seems to suggest that while large issues are placed outside the region, smaller issues that are more difficult to place internationally find a receptive investor base in Asia.

Of the 178 USD- and EUR-denominated prime bond issues, 73 provide more detailed information on investor domiciles, distinguishing between domicile investors (investors from the same country as the issuer) and Pan-Asian investors (investors from other East Asian markets). According to this sub-sample, domicile investors accounted for, on average, 37% of total allocations to Asian investors, and Pan-Asian investors accounted for the remaining 63%. Therefore, even excluding those bought by investors of the same domicile as issuers, the amount of East Asian internationally-issued debt instruments bought by East Asian investors is still significant.

Compared with levels of intraregional portfolio investment, East Asian investors' participation in the region's syndicated loan market is more significant.

According to Dealogic Loanware,[16] 63% of syndicated credit facilities signed by East Asian borrowers[17] were arranged by East Asian and Japanese banks during 1999–2002, with US banks arranging 12% and European banks 23%. Between 2002 and 2005 (as of May), this percentage increased

[15] This is also known as the "Asian bid." A criticism to taking this as evidence of financial integration is that it relies on data from a market outside East Asia to draw conclusions on the level of financial integration in East Asia.
[16] An international vender of financial market data.
[17] For the purpose of this analysis, East Asia also includes Taipei,China.

to 68%, with US banks accounting for 10% and European banks 20% (Table 10). In addition to dominance in arranging, East Asian banks also provided a substantial share of the funds for syndications. During 2002–2005 (as of May), East Asian banks provided 74% of funds for East Asian borrowers. Netting out funds provided by banks of the same nationality as borrowers, the amount of funds provided by East Asian banks to East Asian borrowers was 44%, representing a significant share of the total syndicated loan capital for the sample.

Table 10: **Bank Nationality Analysis for Loan Syndications in East Asia** (%)

	1999-2002[1]		2002-2005[3]	
Region	**Providers[2]**	**Mandated Arrangers**	**Providers**	**Mandated Arrangers**
Americas		12	5	10
Europe		23	19	20
East Asia[4]	40-80	63	74	68
Others		2	2	1

[1] Findings from Robert McCauley (see footnote 14).
[2] McCauley provided a country by country breakdown in percentage terms only. A blank means no data provided.
[3] Sourced from Dealogic Loanware database; 2005 is partial data up to May.
[4] Includes PRC; Hong Kong, China; Indonesia; Japan; Korea; Macau, China; Malaysia; Philippines; Singapore; Taipei,China; and Thailand.

Institutional and Regulatory Environment

Key findings from studying both price-based and quantity-based measures of financial integration in East Asia can be summarized as follows.

- There appears to be some progress toward financial integration among East Asian economies in recent years, as evidenced by (i) declining cross-market differentials of interest rates and bond yields, (ii) increasing co-movements of money and bond markets, (iii) growing intraregional cross-border portfolio investment, and (iv) East Asian investors' significant purchases of USD- and EUR-denominated debt instruments issued by East Asian issuers and East Asian banks' participation in the region's syndicated loan markets.
- East Asian equity markets are more integrated than money and bond markets, as shown by a higher level of co-movements in stock returns than money market interest rates and bond yields, and a higher proportion of the region's total cross-border equity capital invested intraregionally, compared with fixed-income investment.
- Despite these developments, the overall level of East Asia's financial integration remains low, as suggested by significant cross-market differentials in interest rates and bond yields, after adjusting for exchange rate movements, and by relatively small intraregional cross-border capital flows.

The low level of financial integration in East Asia is partly a result of institutional and regulatory barriers to cross-border capital flows.

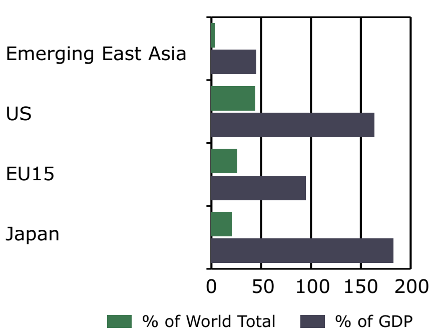
East Asia has made significant progress in liberalizing the financial sector and opening capital accounts in the past decade. According to the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions 2004, in many countries, capital account regulations have become less restrictive to cross-border flows. Domestic regulations for most parts of the financial system broadly allow international participation, although caps in some cases limit foreign entry. Regulations limiting residents from investing or raising funds abroad have been substantially relaxed. However, there are significant cross-country differences (Table 11).

Among the 10 East Asian economies examined, Japan; Singapore; and Hong Kong, China are the most open markets with no or minimal restrictions on cross-border investment either by residents or nonresidents. Korea has also increasingly opened its markets to cross-border investment, although repatriation of capital and profits requires the use of authorized foreign exchange banks. Restrictions on residents investing abroad are also low. In other East Asian economies, however, various restrictions remain for cross-border capital flows, particularly on resident investments abroad. In the PRC, portfolio inflows are also controlled, and only Qualified Foreign Institutional Investors (QFIIs) are allowed to invest in A-shares and stock exchange-traded debt securities in domestic markets.

The relative underdevelopment of some of the region's financial markets also hinders financial integration.

Emerging East Asian financial markets have advanced significantly in recent years. But together these markets, especially bond markets, remain underdeveloped in many economies. And there are considerable variations in development across the region.

Figure 13: **Size of Local Currency Bond Markets in 2004 as Percentage of World Total and GDP**



Sources: Bank for International Settlements; Hong Kong Monetary Authority; Monetary Authority of Singapore; Ministry of Finance, Viet Nam.

Despite encouraging growth, local currency bond markets in emerging East Asia remain relatively small. Total local currency bonds outstanding worldwide stood at USD44 trillion at the end of 2004, with the US accounting for 44%, the EU15 for 26%, and Japan for 20% (Figure 13). The share for emerging East Asia was only 3%, less than half of its 8% combined share of global GDP. In 2004, total local currency bonds outstanding as a percentage of GDP was 183% in Japan and 164% in the US, but it was only 44% for emerging East Asia. In the same year, local currency corporate bonds outstanding as a percentage of GDP was 43% in Japan and 116% in the US, while it was only 24% for emerging East Asia.

Table 11: **Cross-Border Portofolio Investment Regulations in East Asia**

	PRC	Hong Kong, China	Indonesia	Japan	Korea
Capital Inflow					
Money Market Instruments	Nonresidents are not allowed to invest in money market instruments.	There are no specific restrictions on portfolio investments, and foreign invsetors may place funds directly in money market instruments.	Foreign investors are allowed to purchase money market instruments locally.	Nonresidents are free to purchase money market securities.	Domestic money markets are open to foreign nationals subject to registration, with exemptions given if they reside or work in Korea for more than six months.
Bond Market Instruments	Qualified Foreign Institutional Investors (QFIIs) are allowed to invest in listed bonds subject to quotas. As of September 2005, the total aggregate quota (covering both bond and equity investments) authorized for all QFIIs is USD10 billion.	Nonresidents are free to purchase debt instruments.	Foreign investor participation in the local bond market is subject to regulatory approval. Nonresidents may not purchase more than 1% of an investment fund.	Nonresidents are free to purchase debt securities. Purchase of inflation-indexed government bonds by nonresident investors must be reported.	Domestic bond markets are open to foreign nationals subject to registration, with exemptions given if they reside or work in Korea for more than six months.
Equity Instruments	QFIIs are allowed to invest in A-shares subject to quotas. No single QFII may hold more than 10% of a listed company. As of September 2005, the total aggregate quota (covering both equity and bond investments) authorized for all QFIIs is USD10 billion.	Nonresidents are free to purchase equity securities. Investment in banks above set limits require regulatory approval.	Foreign investors are allowed to purchase shares without limitations except for joint securities companies that are finance companies as well. Nonresidents may not purchase more than 1% of any investment fund.	Nonresidents are free to purchase equity securities.	Domestic equity markets are open to foreign nationals subject to registration, with exemptions given if they reside or work in Korea for more than six months. Investment in banks by nonresidents exceeding 10% of stocks requires regulatory approval.
Capital Outflow					
Resident Investors	• Generally, residents are not allowed to invest abroad. Authorized banks may purchase foreign bonds using their own foreign currency funds. Purchase of foreign exchange for this purpose is not allowed. • Overseas listed companies may repurchase their own shares listed abroad subject to approval.	• Residents are generally free to invest abroad with limits for institutional investors. • Investments in banks abroad by authorized institutions above set limits require regulatory approval.	• Investments abroad by residents are generally restricted. Insurance and reinsurance companies are not allowed to invest abroad except for private placements onverseas insurance businesses. • Resident banks are not allowed to invest in IDR securities issued by nonresidents.	• Residents are generally free to invest abroad. In a limited number of industries, investments require prior notice. • There are limits for some institutional investors purchasing foreign-denominated assets.	• Residents can generally invest abroad. Purchase of non-marketable bonds are subject to regulatory declaration. Regulatory approval is required for purchases of short-term securities abroad denominated in KRW. • No limit on the amount that corporations can invest abroad.
Nonresident Investors	• Closed-end QFIIs must keep their investment in the PRC for three years; principal may be remitted in installments of not more than 20% of the total within 1-month or more intervals. • Other QFIIs must keep their investment in PRC for one year; principal may be remitted back in installments of not more than 20% of the total 3-month intervals. • All remittances abroad must be done through the firm's foreign exchange account upon approval. Funds are convertible at the exchange rate at the time of repatriation.	No restrictions on repatriation of capital or profits.	No restrictions apply on repatriation of capital, remittance of dividends, profits, royalties, and fees. All payments must meet reporting requirements.	No restrictions on repatriation of capital or profits.	No restrictions on repatriation of capital or profits. All remittances abroad must be in foreign currency other than restricted currencies.

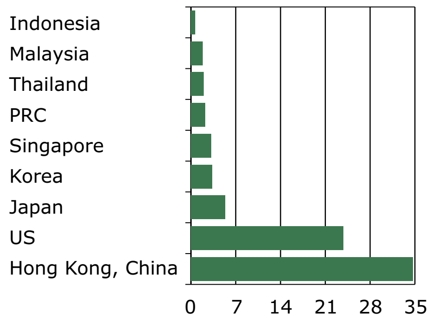
Continued next page

Table 11 (*Cont'd*)

	Malaysia	**Philippines**	**Singapore**	**Thailand**	**Viet Nam**
Capital Inflow					
Money Market Instruments	No restrictions.	There are no restrictions on the purchase of money market instruments. Registration is required if the foreign exchange needed to service the capital repatriation of dividends, profits, and earnings is sourced from local banks.	No restrictions.	No restrictions.	Nonresidents are allowed to purchase money market instruments locally.
Bond Market Instruments	Nonresidents are allowed to purchase debt securities.	There are no restrictions on the purchase of bonds. Registration is required if the foreign exchange needed to service the capital repatriation of dividends, profits, and earnings is sourced from local banks.	No restrictions.	There are no restrictions on foreign investors investing in Thai debt securities.	No restrictions on foreign investors holding bonds.
Equity Instruments	Nonresidents are allowed to purchase equities. Investment in banks by nonresidents is generally limited to 30%.	Foreign investors are allowed to participate in the local stock market. Registration is required if the foreign exchange needed to service the capital repatriation of dividends, profits, and earnings is sourced from local banks.	No restrictions.	Equity investments by foreign participants are subject to various limits.	Foreign investors are allowed to hold up to 49% of a company's current shares.
Capital Outflow					
Resident Investors	• Residents without domestic credit facilities are allowed to invest any amount abroad. For residents with domestic credit facilities, converting MYR to foreign currency to invest abroad is subject to certain limits. • Mutual funds, authorized dealers and merchant banks, insurance companies and Islamic (*takaful*) insurance operators are subject to limits. • Securities investments exceeding the equivalent of MYR50,000 require prior regulatory registration.	• Resident's investments abroad in excess of USD6 million annually requires prior regulatory approval. Registration is required if the foreign exchange used for the investments will be purchased from the domestic banking system. For smaller investments, investor must submit to the foreign exchange selling bank supporting documents to show the nature and place of investment. • For institutional investors, investments above USD6 million require prior regulatory approval; investments below this are subject to regulatory documentary requirements.	No restrictions on investments by residents abroad.	• Investment abroad by residents requires regulatory approval. Commercial banks are allowed to hold shares in an amount not exceeding 10% of the total shares sold and 20% of their capital fund.	• Residents are not allowed to invest in shares and bonds abroad. • Institutional investors are allowed to invest in securities locally issued by nonresidents but not allowed to invest in those held abroad.
Nonresident Investors	No restrictions on repatriation of capital or profits. All remittances abroad must be in foreign currency other than restricted currencies. Foreign exchange controls exist in the swap and forward exchange markets.	Repatriation of capital gains, profits, or dividends is allowed without regulatory approval, as long as proof of registration for the original investment is available, or its registration document is presented. Regulatory approval and registration are required if the foreign exchange for the investment will be purchased from the domestic banking system.	No restrictions on repatriation of capital or profits. SGD proceeds must be converted to foreign currency before remittance abroad. Nonresidents can issue equity shares or bonds with proceeds to be used offshore, converted to foreign currency before remittance abroad.	Repatriation of portfolio investments are allowed upon submission of required documentation.	Foreign investors are required to open a VND-denominated securities trading account and a securities custody account with a foreign custody agent. They may only transfer investment capital abroad a year after the securities trading account was opened.

Sources: International Monetary Fund Annual Report on Exchange Arrangements and Exchange Restrictions 2004, Economist Intelligence Unit Country Reports, AsianBondsOnline.

Figure 14: **Annual Turnover Ratios of Local Currency Government Bonds in 2004**



Sources: Based on data compiled from various national sources by AsianBondsOnline. The US turnover ratio is computed using data from The Bond Market Association.

Many emerging East Asian bond markets are underdeveloped not only because of their small size, but also due to low liquidity, with the exception of Hong Kong, China. In 2004, the annual turnover ratio for local currency government bonds ranged from 0.7 for Indonesia to 3.3 in Korea, compared with about 24 for US Treasuries (Figure 14). Market liquidity is even lower for corporate bonds, with annual turnover ratio in 2003 below 0.5 for PRC, Indonesia, and Thailand, and a little over 1.0 for Korea and Malaysia. Low market liquidity is also reflected in large bid-ask spreads in emerging East Asian bond markets compared with developed markets.

The small size and low liquidity of emerging East Asian local currency bond markets are due to several structural weaknesses, which, to some extent, also reflect the stage of economic development of many economies in the region. These include, among others, limited variety of fixed-income securities (restricting investor choice); a narrow investor base (reducing market liquidity); lack of derivative markets (making risk hedging difficult and price discovery inefficient) (Table 12); weak creditor rights (leading to poor investor protection); and poor disclosure practices (reducing market transparency).[17] All of these hinder financial integration, as they limit investor choice, increase transaction costs, and lead to high perceived risks.

Continued policy and institutional reform is the key to accelerating financial integration in East Asia.

Given the significant benefits that financial integration can bring, it is in every economy's interest to promote integration of its financial system within the region and with the rest of the world. Continued policy and institutional reform is the key to accelerating East Asian financial integration. East Asian governments should continue efforts aimed at capital market development and financial liberalization, with a well-sequenced program supported by a strong institutional and regulatory framework.

In the area of bond market development, reform and policy initiatives that have been implemented are improving basic market infrastructure (including benchmark yield curves, credit rating agencies, trading platforms, clearing and settlement systems, and the regulatory environment), widening the issuer and investor base, developing hedging products and derivatives markets, and improving transaction and general data reporting. Governments should continue efforts to create an environment conducive to long-term development and viability of bond markets in the region.

[17] For more detailed discussions, see *Asia Bond Monitor*, November 2004 and April 2005.

Table 12: **Derivatives Markets**

Instruments	Australia	PRC	Hong Kong, China	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Thailand	US	Viet Nam
Exchange-traded derivatives												
Government bond futures	active	not available	active	not available	active	active	active	not available	limited	not available	active	not available
Interest rate futures	active	limited	active	not available	active	active	active	not available	active	not available	active	not available
Interest rate/bond options	active	not available	not available	not available	active	active	not available	not available	limited	not available	active	not available
OTC derivatives												
Interest rate derivatives[1]												
Interest rate swaps	active	active	active	active	active	active	active	limited	active	active	active	limited
Interest rate caps/collars	active	not available	not available	not available	active	active	limited	not available	active	limited	active	not available
Cross currency swaps	active	limited	active	limited	active	active	active	limited	active	active	active	not available
Forward rate agreements	active	not available	active	limited	active	active	active	limited	active	active	active	not available
Basis swaps	active	not available	not available	not available	limited	limited	not available	not available	limited	not available	active	not available
Credit derivatives[1]												
Credit default swaps	active	not available	active	not available	limited	limited	not available	not available	active	not available	active	not available
Total return swaps	active	not available	not available	not available	limited	limited	not available	not available	active	not available	active	not available
Credit swap options	active	not available	not available	not available	limited	limited	not available	not available	active	not available	active	not available

[1] In local currency.
Source: AsianBondsOnline.

Regional cooperation has an important role in facilitating financial integration in East Asia.

East Asian governments have taken significant steps in strengthening monetary and financial cooperation since the 1997-98 financial crisis. Under the ASEAN+3 Finance Ministers's Process, cooperation is being pursued in a number of areas, including economic review and policy dialogue, establishment of regional crisis prevention and management mechanisms under the Chiang Mai Initiative, and the Asian Bond Markets Initiative (ABMI). In various ways, these efforts will play an important role in strengthening financial integration in East Asia and, at the same time, improve the region's capacity for preventing future financial crises.

The ASEAN+3 ABMI, launched in 2003, aims to address many of the problems associated with the region's local currency bond markets, with an ultimate objective of creating a well-integrated regional bond market. Several working groups established under the ABMI are exploring ways and means to (i) promote asset securitization in order to increase the supply of new products and instruments; (ii) enhance credit quality of local currency bonds through setting up credit guarantee and investment mechanisms; (iii) improve clearing and settlement systems to reduce settlement risks and promote cross-border transactions; (iv) develop domestic credit rating agencies and promote information dissemination; (v) eliminate legal and regulatory impediments to cross-border investment in bond markets; and (vi) using international best practices, harmonize bond market rules and regulations across the region. Many of these initiatives have in fact become part of the reform agendas of ASEAN+3 members. While some have already been implemented, efforts are needed to ensure that this process continues in a timely fashion.

In addition, there are other regional initiatives also working to develop Asian bond markets. The Asia Cooperation Dialogue has a mandate to improve public awareness of the various initiatives. The Asia-Pacific Economic Cooperation (APEC) Regional Bond Market Development Initiative focuses on the development of regional markets and securitization and credit guarantee mechanisms. And the Executives' Meeting of East Asia Pacific Central Banks (EMEAP) Asian Bond Fund Initiative focuses on the demand side of regional bond markets. It has launched the Asia Bond Fund, with ABF1 investing in USD bonds issued by sovereign and quasi-sovereign issuers in EMEAP countries (except Australia, Japan, and New Zealand) and ABF2 investing in local currency bonds. Regional cooperation is needed to maintain the momentum of these initatives.

Technical Appendix

1. Average absolute cross-market differential (AAD):

$$AAD = \frac{1}{n(n-1)} \sum_{i \neq j=1}^{n} \sum_{i=1}^{n} \left| r_{it} - r_{jt} \right|$$

where r_{kt} $(k = i, j)$ is the interest rate of individual market k at time t, and n is the total number of markets.

2. Average absolute uncovered interest rate differential (AAUIP):

$$AAUIP = \frac{1}{n(n-1)} \sum_{i \neq j=1}^{n} \sum_{i=1}^{n} \left| r_{it} - r_{jt} + (\Delta e_{it+1} - \Delta e_{jt+1}) \right|$$

where r_{kt} $(k = i, j)$ is the interest rate of market k at time t, n is the total number of markets, and Δe_{kt+1} $(k = i, j)$ is the expected rate of currency appreciation against the US dollar of market k from t to $t+1$.

3. Recursive regression:

For each pair of markets, j and i, run the following regression repeatedly, for *p* = 1 to *q*, each keeping the beginning sample point fixed and extending the ending sample point forward by one observation until the last sample point (when *p = q),*

$$r_{jt} = \alpha_{ji}^{p} + \beta_{ji}^{p} r_{it} + u_{ji,t}^{p}$$

where r_{kt} $(k = i, j)$ is the interest rate of market k at time t, α_{ji}^{p} and β_{ji}^{p} are coefficients of the p^{th} recursive regression for the market pair j and i, and $u_{ji,t}^{p}$ is the disturbance term of the p^{th} recursive regression for the market pair j and i.

4. Average distance of beta coefficients from unity (AD^{p}):

1st step: calculate the average distance of β_{ji}^{p} (estimated from the above recursive regression) from unity for each market *j* for each period *p,* AD_{j}^{p}

$$AD_{j}^{p} = \frac{1}{n-1} \sum_{j \neq i=1}^{n} \left| \beta_{ji}^{p} - 1 \right|$$

2st step: calculate the average distance of the beta coefficient from unity for each period *p,* AD^{p},

$$AD^{p} = \frac{1}{n} \sum_{j=1}^{n} AD_{j}^{p}$$

5. Correlation analysis of residuals for stock returns estimated from regression of each East Asian market against the US market:

1st step: Regress each East Asian market against the US market,

$$\log\left(\frac{r_{j,t}}{r_{j,t-1}}\right) = \alpha_{j} + \beta_{j} \log\left(\frac{r_{us,t}}{r_{us,t-1}}\right) + u_{jt}, \; for\ each\ j = 1, \ldots, n$$

where $r_{j,t}$ is the stock index for East Asian market j at time t, $r_{us,t}$ is the US market stock index at time t, n is the total number of East Asian markets, and u_{jt} is the disturbance term.

2st step: Compute the simple correlation coefficient for each pair of East Asian markets from the residuals estimated from the above regression.

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 64 members—46 from the region. In 2004, it approved loans and technical assistance totaling $5.3 billion and $196.6 million, respectively.

Asian Development Bank
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines
www.adb.org
Publication Stock No. 110405

Printed in the Philippines