

Bond Market Development in Emerging East Asia

Thematic Issues in Emerging East Asia

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Thematic Topics

- I. Do Local Currency Bond Markets Enhance Financial Stability? Some Empirical Evidence
- II. Infrastructure Bond Markets Development in Asia: Challenges and Solutions
- III. AsianBondsOnline Bond Market Liquidity Survey 2016
- IV. Determinants of Sovereign Bond Yields in Emerging Asia

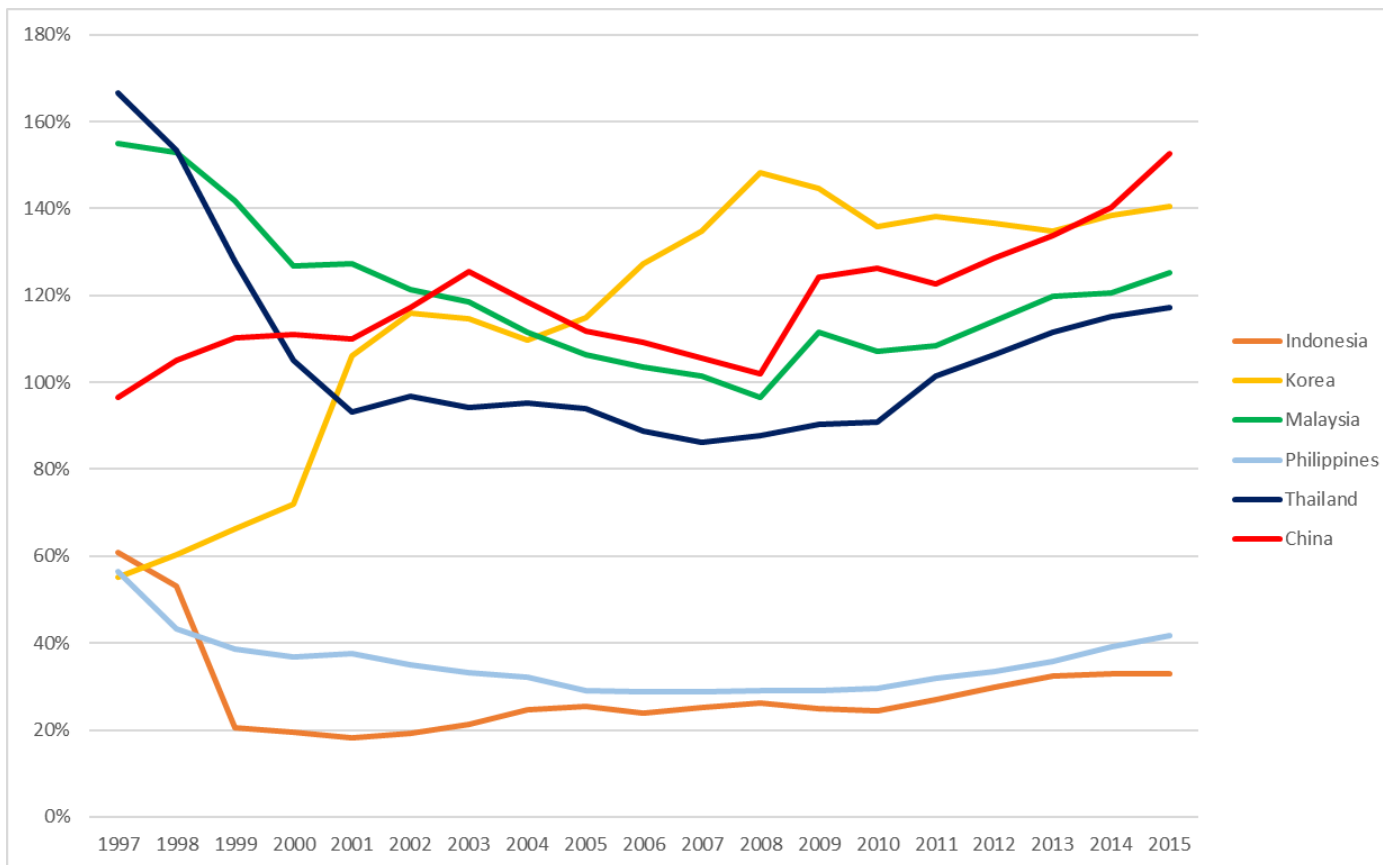
Do Local Currency Bond Markets Enhance Financial Stability? Some Empirical Evidence

Motivation

- The currency and maturity “double” mismatch was widely viewed as a contributing factor behind the devastating Asian financial crisis of 1997-1998.
- The painful experience of the Asian crisis highlighted the need for the region’s bank-centered financial systems to develop LCBMs as a spare tire which would enhance resilience in the event of shocks.
- In light of the region’s heavy reliance on bank finance, Asian countries have prioritized the development of local currency bond markets (LCBMs) as a major policy objective.
 - LCBMs can contribute to larger role for capital markets and a more balanced financial system.

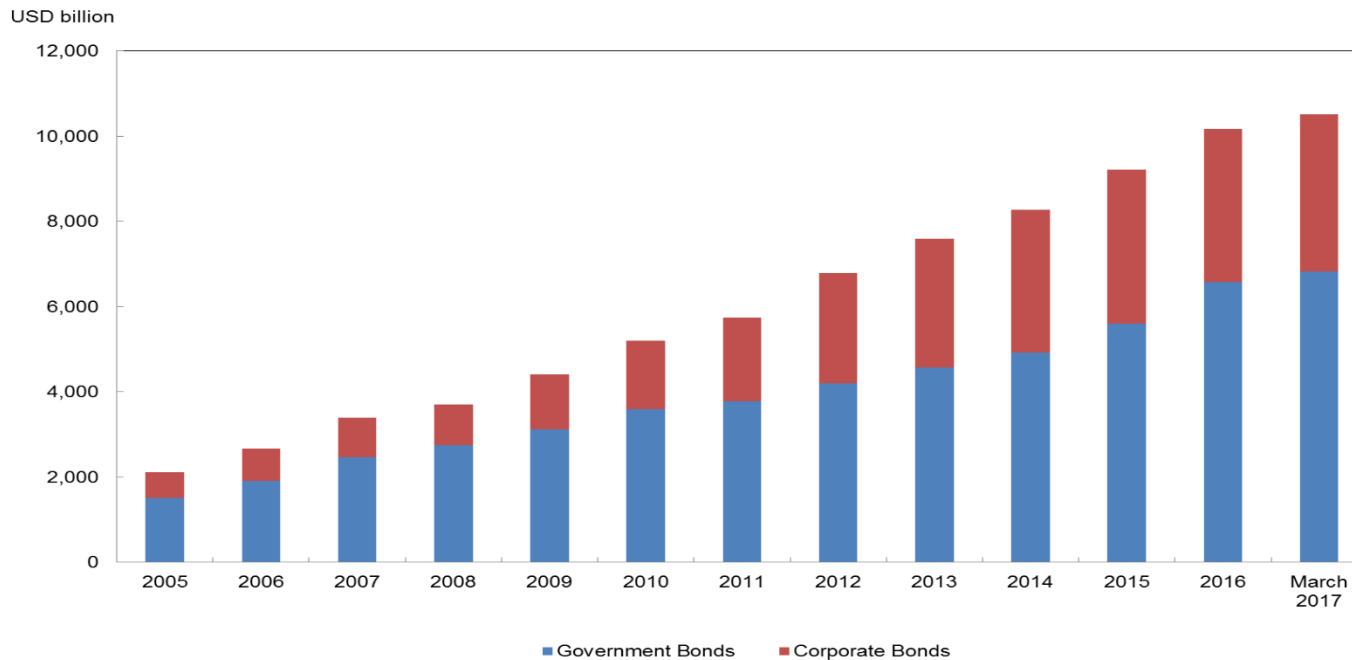
The Size of Bank Loans in Percentage of GDP for Asian Countries

- Bank Loans are prevalent financing sources in Emerging Asia
- Relative size of bank loans in percentage of GDP in Asian countries has grown slowly since 1998.



LCY Bond Markets Continue to Grow

Size of Emerging East Asia's LCY Bond Market expanded to USD10.5 trillion at the end of March

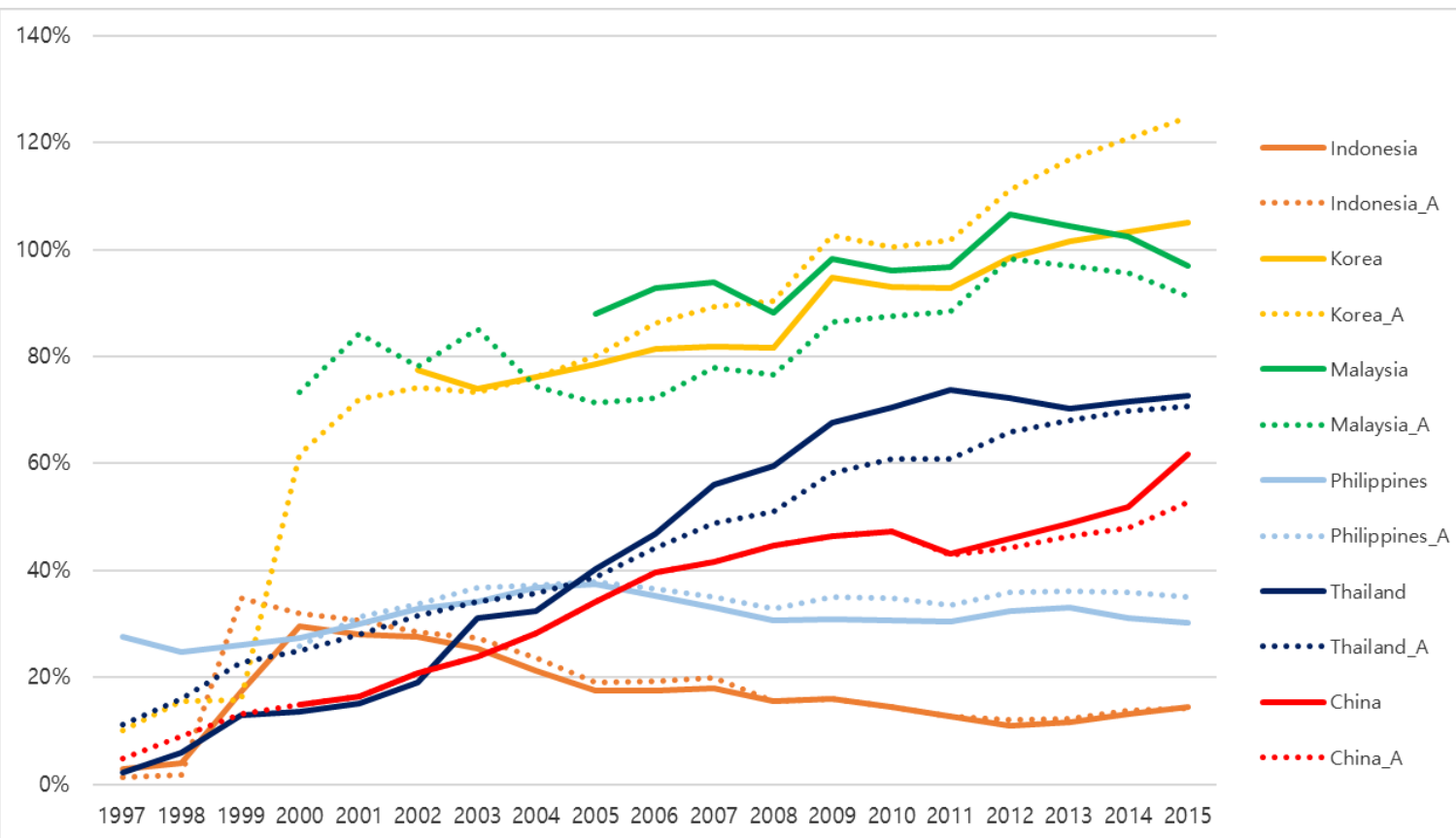


Note: Emerging East Asia comprises the People's Republic of China; Hong Kong, China; Indonesia; the Republic of Korea; Malaysia; the Philippines; Singapore; Thailand; and Viet Nam.

Source: AsianBondsOnline.

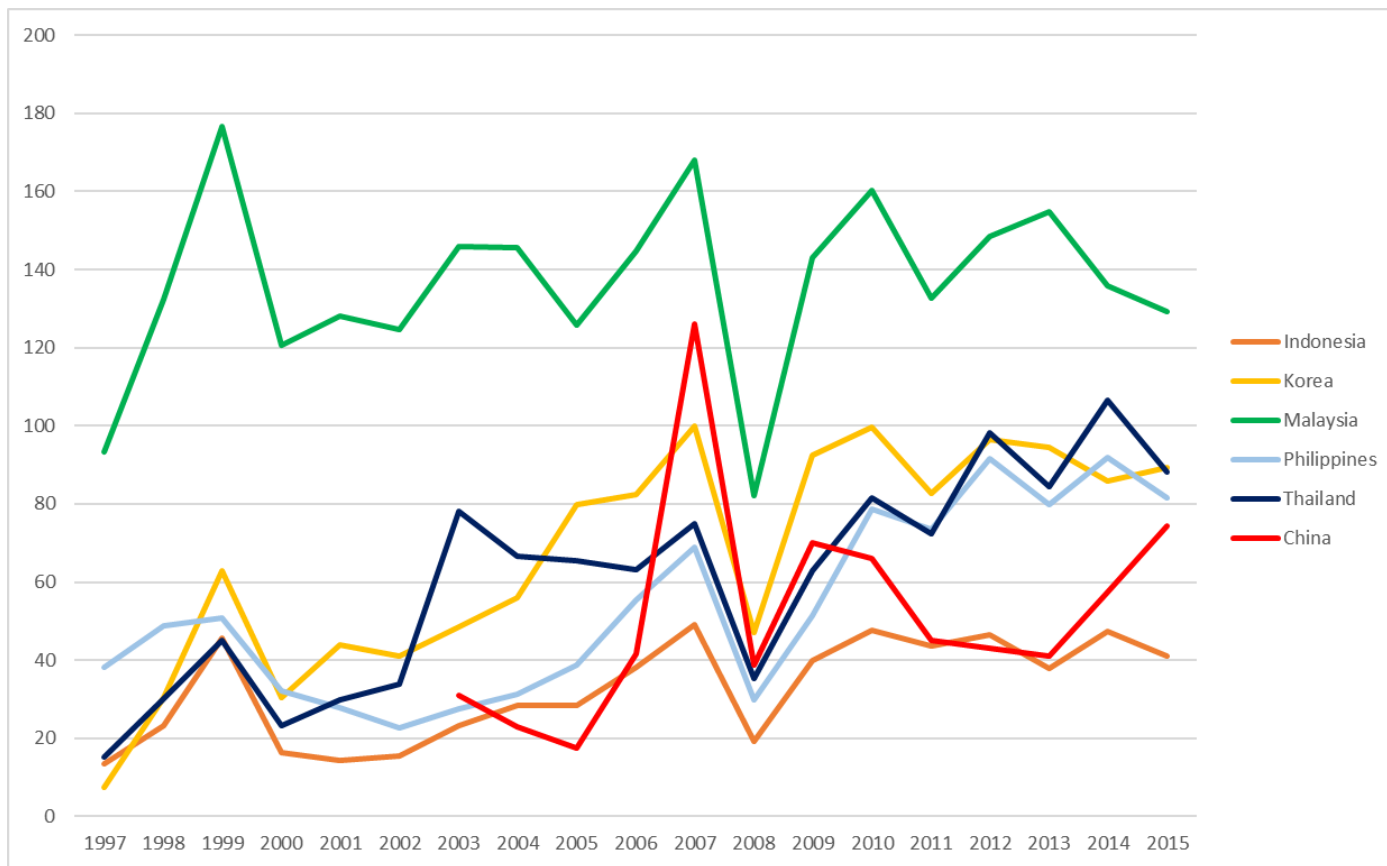
The Size of Local Currency Bond Markets in Percentage of GDP for Asian Countries

- Since the Asian financial crisis of 1997-1998, the size of LCBMs increased substantially in Korea, Thailand and China.
- The growth of LCBMs in other Asian countries is not as dramatic.



The Size of Stock Market Capitalization in Percentage of GDP for Asian Countries

- size of stock market capitalization, as percentage of GDP has been increasing in most Asian countries.
- However, the region's stock markets grew more slowly than the region's LCBMs.



What we know from the literature

- Some benefits of LCBM development in developing economies.
 - Caballero et al. (2008) argued that the chronic excess demand for U.S. assets which contributed to global imbalances is due to financial underdevelopment in emerging markets.
 - Prasad (2011) argues that a more developed financial system which effectively channels funds into productive uses and enables better risk-sharing would promote **growth** in Asia by encouraging more entrepreneurial activity.
 - IMF (2016) emphasizes the increasingly important role of LCBMs as a source of **long-term funding for long-term investments** such as infrastructure and housing.

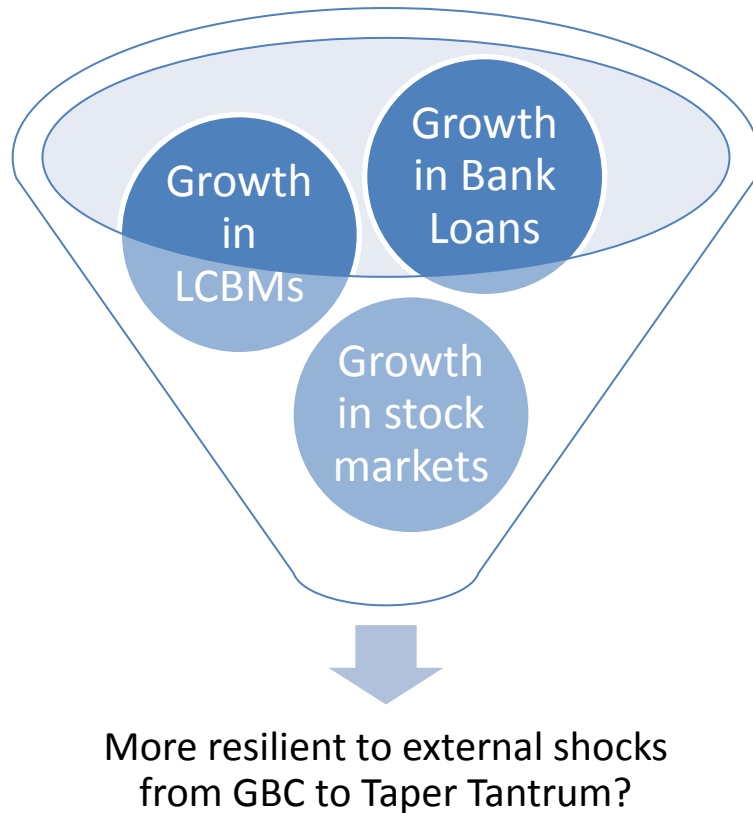
Research Questions

- Do LCBMs really enhance financial stability in developing economies by mitigating currency and maturity mismatches?
 - We analyze and compare the financial vulnerability of developing countries during two episodes of financial stress – global financial crisis & taper tantrum.
 - We examine if countries which experienced greater expansion of their LCBMs between the two episodes experienced a greater reduction of financial vulnerability.

Findings

- We find that countries which experienced greater expansion of their LCBMs experienced a greater reduction of exchange rate depreciation, indicating a stabilizing role of LCBMs.
- Our evidence indicates that a gradual expansion of bank loans may also contribute to financial stability.
- On the other hand, we do not find any evidence of a stabilizing effect of stock market development.

Empirical Framework



- Which types of financial development will reduce the vulnerability of financial markets in developing countries to external shocks (Global Financial Crisis 2008 vs Taper Tantrum 2013)
- **Currency depreciation** as the measure of financial vulnerability (Eichengreen and Gupta, 2013; Park, Ramayandi and Shin, 2016).

Growth in Local Currency Bond Markets and change in Exchange Rate Depreciation During two Crisis Periods

VARIABLES	Difference of Percent Change in Nominal Exchange Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Difference of Increase in Current Account Deficit(% of GDP)	0.005**			0.025***				0.035**	0.042**
	[0.002]			[0.005]				[0.013]	[0.013]
Difference of Average Annual Percent Change in Real Exchange Rate	0.007			0.009**				0.007	0.007
	[0.005]			[0.003]				[0.007]	[0.008]
Difference of Increase in Credit to GDP Ratio	0.001				0.007***			-0.002	-0.005
	[0.002]				[0.002]			[0.004]	[0.004]
Difference of Log of portfolio liability	-0.011				0.005				-0.075
	[0.030]				[0.141]				[0.112]
Difference of Reserves/M2	-0.221					-0.219**		-0.400**	-0.343*
	[0.167]					[0.094]		[0.163]	[0.180]
Difference of Inflation(CPI)	-0.000					0.034***		0.033**	0.053**
	[0.005]					[0.010]		[0.012]	[0.017]
Difference of Exchange Rate Regime (Annual fine classification of Reinhart and Rogoff)	-0.011						-0.001		0.030**
	[0.013]						[0.009]		[0.009]
Difference of Total Capital Inflows	0.002						0.003	0.001	0.001
	[0.003]						[0.002]	[0.001]	[0.002]
Difference of Size of local currency		-0.684*	-0.725*	-0.547*	-0.216	-0.578	-0.728*	-0.818*	-1.267**
		[0.369]	[0.385]	[0.278]	[0.215]	[0.402]	[0.400]	[0.387]	[0.452]
Asia			0.104	-0.061	0.046	0.155**	0.095	-0.076	-0.149**
			[0.070]	[0.049]	[0.036]	[0.072]	[0.087]	[0.062]	[0.050]
Observations	54	23	23	21	21	20	22	19	18
R-squared	0.260	0.133	0.242	0.625	0.621	0.412	0.251	0.832	0.890

Growth in **Bank Loans** and change in Exchange Rate Depreciation During two Crisis Periods

VARIABLES	Difference of Percent Change in Nominal Exchange Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Difference of Increase in Current Account Deficit (% of GDP)	0.002			0.004**				0.001	0.00212
	[0.002]			[0.002]				[0.002]	(0.00179)
Difference of Average Annual Percent Change in Real Exchange Rate	0.001			0.002					0.00250
	[0.003]			[0.003]					(0.00345)
Difference of Increase in Credit to GDP Ratio	0.002				0.004***			0.004***	0.00345**
	[0.001]				[0.001]			[0.001]	(0.00169)
Difference of Log of portfolio liability	-0.013				0.009				0.00461
	[0.034]				[0.038]				(0.0333)
Difference of Reserves/M2	-0.045					-0.049			-0.0823
	[0.126]					[0.115]			(0.114)
Difference of Inflation(CPI)	-0.000					0.001			-0.00200
	[0.004]					[0.005]			(0.00427)
Difference of Exchange Rate Regime (Annual fine classification of Reinhart and Rogoff)	-0.004						-0.004		-0.00974
	[0.008]						[0.005]		(0.00806)
Difference of Total Capital Inflows	0.002						0.004		0.00299
	[0.004]						[0.004]		(0.00307)
Difference of Bank Loans (% of GDP)		-0.000	-0.000	-0.001	-0.004**	-0.001	-0.001	-0.004**	0.00447**
		[0.001]	[0.001]	[0.001]	[0.002]	[0.001]	[0.001]	[0.002]	(0.00184)
Asia			0.052	0.061	0.056	0.060	0.052	0.053	0.0845
			[0.062]	[0.060]	[0.060]	[0.065]	[0.073]	[0.061]	(0.0777)
Observations	54	63	63	58	61	59	61	61	54
R-squared	0.122	0.000	0.016	0.083	0.186	0.025	0.043	0.187	0.216

Growth in **Stock Market Capitalization** and change in Exchange Rate Depreciation During two Crisis Periods

VARIABLES	Difference of Percent Change in Nominal Exchange Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Difference of Increase in Current Account Deficit (% of GDP)	0.005*			0.006*				0.005*	0.0114**
	[0.002]			[0.003]				[0.002]	(0.00421)
Difference of Average Annual Percent Change in Real Exchange Rate	0.007			0.008**				0.004	0.00200
	[0.005]			[0.004]				[0.004]	(0.00555)
Difference of Increase in Credit to GDP Ratio	0.002				0.004**			0.003	0.00340
	[0.002]				[0.002]			[0.002]	(0.00257)
Difference of Log of portfolio liability	-0.011				-0.022				-0.0495**
	[0.031]				[0.048]				(0.0220)
Difference of Reserves/M2	-0.216					-0.198			-0.517**
	[0.166]					[0.140]			(0.211)
Difference of Inflation(CPI)	-0.000					-0.005			-0.00942
	[0.005]					[0.007]			(0.0110)
Difference of Exchange Rate Regime (Annual fine classification of Reinhart and Rogoff)	-0.011						0.010		0.00362
	[0.012]						[0.013]		(0.01000)
Difference of Total Capital Inflows	0.003						0.003		-0.000127
	[0.004]						[0.004]		(0.00211)
Difference of Market Capitalization of Domestic Companies (% of GDP)		-0.001	-0.001	-0.001*	-0.001	-0.001	-0.001	-0.001	-0.000876
		[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	[0.001]	(0.000809)
Asia			0.076	0.059	0.028	0.084	0.075	0.034	0.00543
			[0.070]	[0.061]	[0.059]	[0.074]	[0.101]	[0.060]	(0.0958)
Observations	54	27	27	25	27	27	25	25	23
R-squared	0.262	0.027	0.085	0.295	0.303	0.155	0.127	0.362	0.601

Conclusion

- Developing LCBMs of varying maturities can mitigate the double mismatch problem.
- We find that *developing economies which experienced greater expansion of their LCBMs between the two episodes experienced a greater reduction of exchange rate depreciation, i.e. financially more resilient.*
- This provides some empirical support for the notion that *LCBMs protect the financial systems of developing countries from destabilizing external shocks.*

Infrastructure Bond Markets Development in Asia: Challenges and Solutions

Infrastructure Investment Needs in Asia

- Between 2010 and 2020, Asia's overall national infrastructure investment needs are estimated to be **\$8 trillion**
- Among the overall investment needs, 68% is for new capacity, while 32% is for maintaining and replacing existing infrastructure
- Asia accounts for about 40% of global infrastructure investment demand.

Challenges in Infrastructure Finance

- Commercial banks are the major resources of private debt for infrastructure financing during 1999-2009
- Pose a double-mismatch risk
 - Maturity mismatch : long-term assets vs short-term liabilities
 - Currency mismatch: local currency income flows vs foreign currency repayments
- Given the prominent role of infrastructure development in growth, flexible financing arrangements are called

Infrastructure Bonds

- Bonds issued to finance infrastructure projects of public interest such as railways, toll roads, and airports, among others. Principal and interest payments are based on the expected future cash flows from a specific project rather than the issuer's credibility
- Asia's relatively high economic growth rates and the region's huge infrastructure demand have led to renewed focus on infrastructure bond financing in the region.
- To develop a local currency market for infrastructure bonds
 - facilitates long-term financing of infrastructure projects from investors with a better maturity match, e.g. pension funds and insurance companies with long-term liabilities.
 - reduces currency mismatch

Evolving Landscape for Infrastructure Finance

Mounting fiscal burdens

Decreases in bank lending (Basel III capital requirements)

Huge infrastructure investment demand

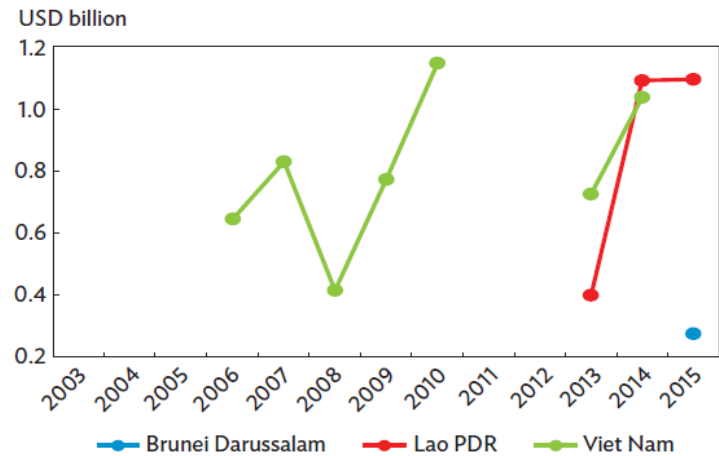
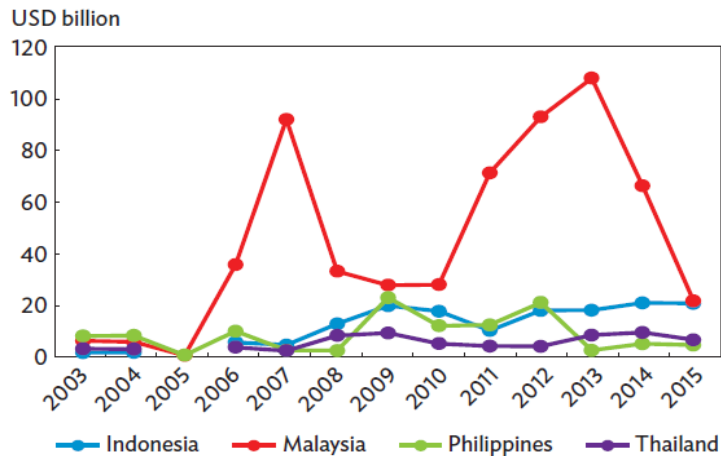
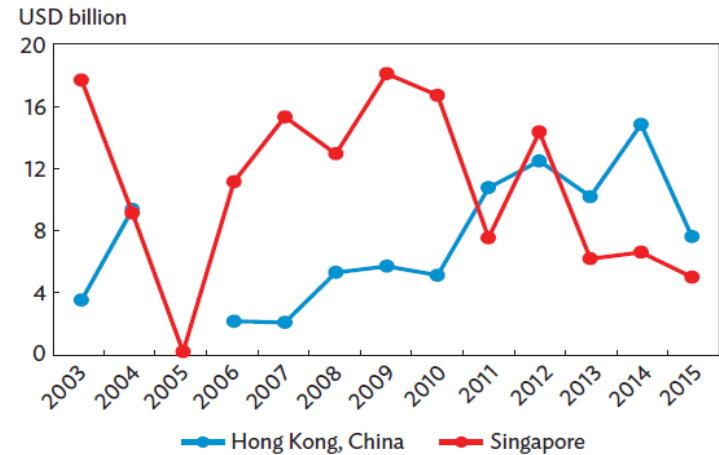
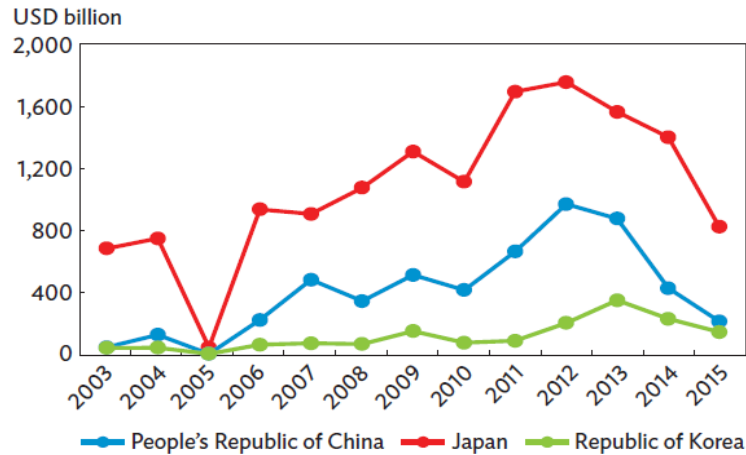
Emergence of more institutional investors



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Infrastructure Bonds in Asia

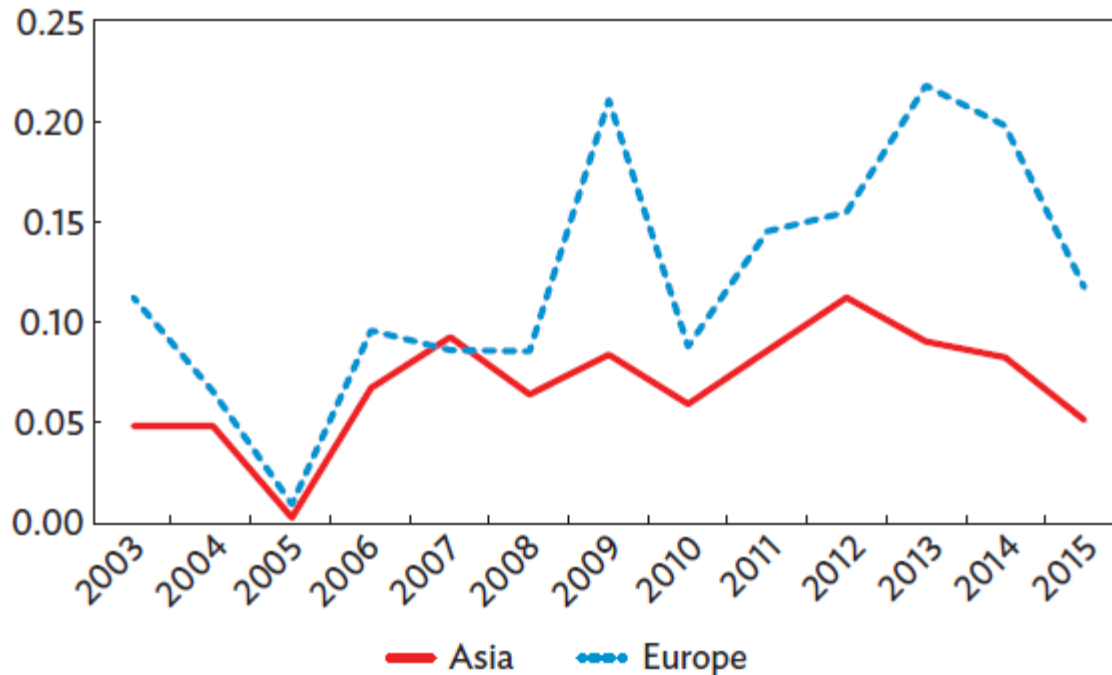
Figure 31: Infrastructure Bond Issuance in Selected Asian Economies



Lao PDR = Lao People's Democratic Republic, USD = United States dollar.
Sources: Bloomberg LP, Dealogic, and World Bank.

Infrastructure Bonds in Asia and Europe

Figure 30: Infrastructure Bonds Outstanding as Share of Gross Domestic Product (%)



Note: Simple average values for the gross domestic product of all economies in each region are used.

Sources: Bloomberg LP, Dealogic, and World Bank.

Europe has a large infrastructure bond market than Asia.

Research Questions

- What are the determinants of bond market development in the region?
 - This attempts to identify factors that facilitate local currency bond financing for infrastructure projects.
- What are the fundamental challenges to the development of infrastructure bond markets in Asia
 - apply lessons learned from Europe where infrastructure bonds are more commonly used

What makes Asia and Europe different?

Asia: smaller bond market & less favorable institutional environment

	Asia			Europe		
	Mean	Standard Deviation	OBS	Mean	Standard Deviation	OBS
Bonds outstanding to GDP (%)	6.845	8.75	143	11.730	21.33	221
ln(GDP)	26.487	1.84	143	26.857	1.33	221
ln(GDP per capita)	9.567	0.97	143	10.608	0.27	221
General government budget balance (% of GDP)	-0.963	3.74	143	-2.756	4.10	221
Inflation (GDP deflator, %)	3.888	4.71	143	1.656	1.43	221
Volatility of the FX rate	1.271	0.70	117	0.724	0.50	221
Domestic credit provided by banks (% of GDP)	94.188	48.03	138	118.837	43.48	221
Average institutional factors	48.031	24.28	143	78.289	12.13	221
Property rights index	48.636	28.10	143	81.425	13.43	221
Corruption index	46.577	24.54	143	75.095	15.62	221
Investment freedom index	48.881	22.90	143	78.348	12.23	221

Determinants of Infrastructure Bond Markets Development

Macroeconomic Factors

- **Economic Size (GDP) (+)**
- **Economic Development (GDP per capita) (+)**
- **Fiscal balance (-)**
- **Inflation (-)**

Financial Factors

- **Banking Sector (bank credit/GDP) (+)**
- **FX volatility (+)**

Institutional Factors

- **Property right (+)**
- **Corruption (+)**
- **Investment Freedom(+)**

Determinants of Infrastructure Bond Market Development (1)

OLS Fixed Effect	Macroeconomic Factors I	Macroeconomic Factors II	Macroeconomic Stability	Financial Market	Institutional Factors	Model I	Model II
Constant	-162.544 ***	-49.554 **	1.475	-4.066 *	-6.648 **	-222.449 ***	-53.696
Europe	0.268	-4.609	7.617 ***	7.892 ***	-12.902	-3.060	-6.922
ln(GDP)	6.372 ***					8.215 ***	
ln(GDP per capita)		5.758 **					4.745
Central government budget balance	-0.509 ***	-0.588 ***				-0.495 ***	-0.505 ***
Inflation (GDP deflator)			-0.503 *			-0.015	-0.175
Volatility of the FX rate			1.679 *			1.143	0.916
Domestic credit provided by banks				0.054 **		-0.005	0.029
Average institutional factors					0.346 **	0.174	0.180
Global financial crisis dummy	-2.743	-2.120	-3.257	-2.898	-2.641	-3.816	-2.766
Economy dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.525	0.516	0.501	0.509	0.508	0.520	0.510
Observations	364	364	338	359	364		

Determinants of Infrastructure Bond Market Development (2)

System GMM	Macroeconomic Factors I	Macroeconomic Factors II	Macroeconomic Stability	Financial Market	Institutional Factors	Model I	Model II
Constant	4.716	-23.290 *	3.955 ***	2.981 **	-0.985	10.465	-63.240
Outstanding bonds to GDP (lag 1)	0.701***	0.674***	0.697***	0.699***	0.691***	0.681***	0.645***
Europe	1.458	-1.439	0.545	1.733	-0.512	-1.255	-1.580
ln(GDP)	-0.096					-0.326	
ln(GDP per capita)		2.660*					7.539
Central government budget balance	-0.043	-0.184				-0.220**	-0.244**
Inflation (GDP deflator)			-0.053			0.048	0.231
Volatility of the FX rate			-0.999			-1.073	-0.610
Domestic credit provided by banks				-0.008		-0.015	-0.018
Average institutional factors					0.068	0.067	-0.118
Global financial crisis dummy	-1.597	-1.483	-0.996	-1.656	-1.647	-0.774	-1.607
AR(1) test p-value	0.251	0.253	0.253	0.250	0.250	0.251	0.244
AR(2) test p-value	0.335	0.338	0.338	0.333	0.333	0.338	0.333
Hansen test p-value	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Chi ² statistics	6955.473	7212.594	6612.181	8388.037	8890.922	15885.781	14093.171
Observations	336	336	312	331	336	312	312

Determinants of Infrastructure Bond Market Development (3)

GLS Fixed effect	Macroeconomic Factors I	Macroeconomic Factors II	Macroeconomic Stability	Financial Market	Institutional Factors	Model I	Model II
Constant	-65.448 ***	-26.895 **	1.656 **	-1.872 **	-2.631 **	-72.741 ** *	-15.468
Europe	5.335 ***	1.589	7.168 ***	8.089 ***	-0.590	3.179	1.591
ln(GDP)	2.529 ***					2.697 ***	
ln(GDP per capita)		3.054 **					1.270
Central government budget balance	-0.535 ***	-0.518 ***				-0.553 ***	-0.546 ***
Inflation (GDP deflator)			-0.190 **			0.068	0.080
Volatility of the FX rate			0.451			0.113	0.028
Domestic provided credit by banks				0.026 ***		0.013	0.023 ***
Average institutional factors					0.145 **	0.044	0.064
Global financial crisis dummy	-0.522	-0.023	-0.555	-0.273	-0.427	-0.821	-0.272
Economy dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chi ² statistics	598.136	698.422	455.945	726.517	749.829	495.496	579.735
Observations	364	364	338	359	364	338	338

The Impact of Project Bond Initiative (PBI, EU 2013)

	Base Model	Model I	Model II
Constant	0.162	-246.287 ***	-95.986 **
Europe	6.962 ***	-7.273	-14.118
Europe & After 2013	5.686	10.520 **	9.648 **
After 2013	1.343	-4.375 **	-2.569
ln(GDP)		9.077 ***	
ln(GDP) per capita			9.341 **
Central government budget balance		-0.558 ***	-0.615 ***
Inflation (GDP deflator)		0.116	0.017
Volatility of the FX rate		0.779	0.371
Domestic credit provided by banks		0.003	0.032
Average institutional factors		0.206	0.157
Global financial crisis dummy	-1.580	-3.178	-1.762
Country dummy	Yes	Yes	Yes
R-squared	0.523	0.537	0.527
Observations	364	338	338

***PBI facilitates the development of infrastructure bonds market by
Mitigating inherent risks of underlying projects.***

Conclusion

- **Economy size** is a critical determinants of infrastructure bond market development.
 - Consistent with the literature, an economy's size is positively associated with infrastructure bond market development.
 - *Small and fragmented economies of Asia* face difficulties in developing deep and liquid bond markets due to the shortfall in efficient scale. (Eichengreen and Luengnaruemitchai, 2004)
- Bond market standardization and harmonization through the ASEAN+3 Bond Market Forum (ABMF) can facilitate the integration of individual Asian bond markets to obtain the minimum efficient scale needed to enhance the liquidity and depth of an integrated regional bond market.
- Since PBI has contributed significantly to infrastructure bond markets development in Europe.
 - Considering the relatively lower credit ratings of infrastructure bonds in Asia, ASEAN+3 economies could take policy measures to facilitate the issuance of infrastructure bonds and *strengthen the role* of the CGIF in providing guarantees for infrastructure bonds

AsianBondsOnline Bond Market Liquidity Survey 2016

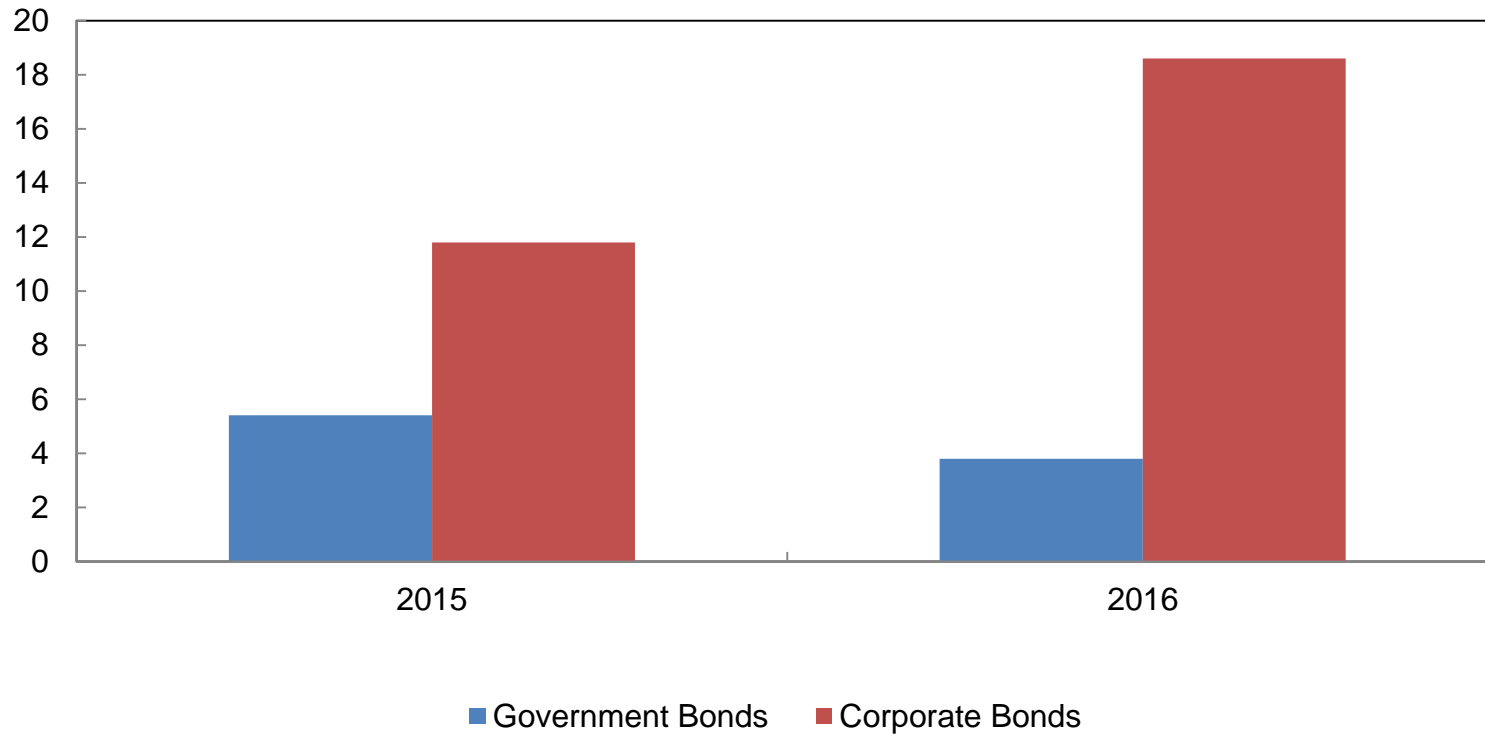
AsianBondsOnline Liquidity Survey

- AsianBondsOnline undertakes a survey annually to assess liquidity conditions in emerging East Asian LCY bond market
- The survey aims to provide market participants and policy makers with a comprehensive perspective on the state of liquidity in individual markets in the region
- Participants to the survey included fixed income traders and dealers, brokers, portfolio and asset managers, bond market researchers and strategists, bond pricing associations, and regulatory agencies
- The 2016 survey was conducted in late September and early October when market conditions were still stable.
- Survey results are presented in the November issue of the Asia Bond Monitor (ABM)—a quarterly ADB publication.

Bid-ask spreads for LCY government bonds fall, higher for corporate bonds between 2015 and 2016

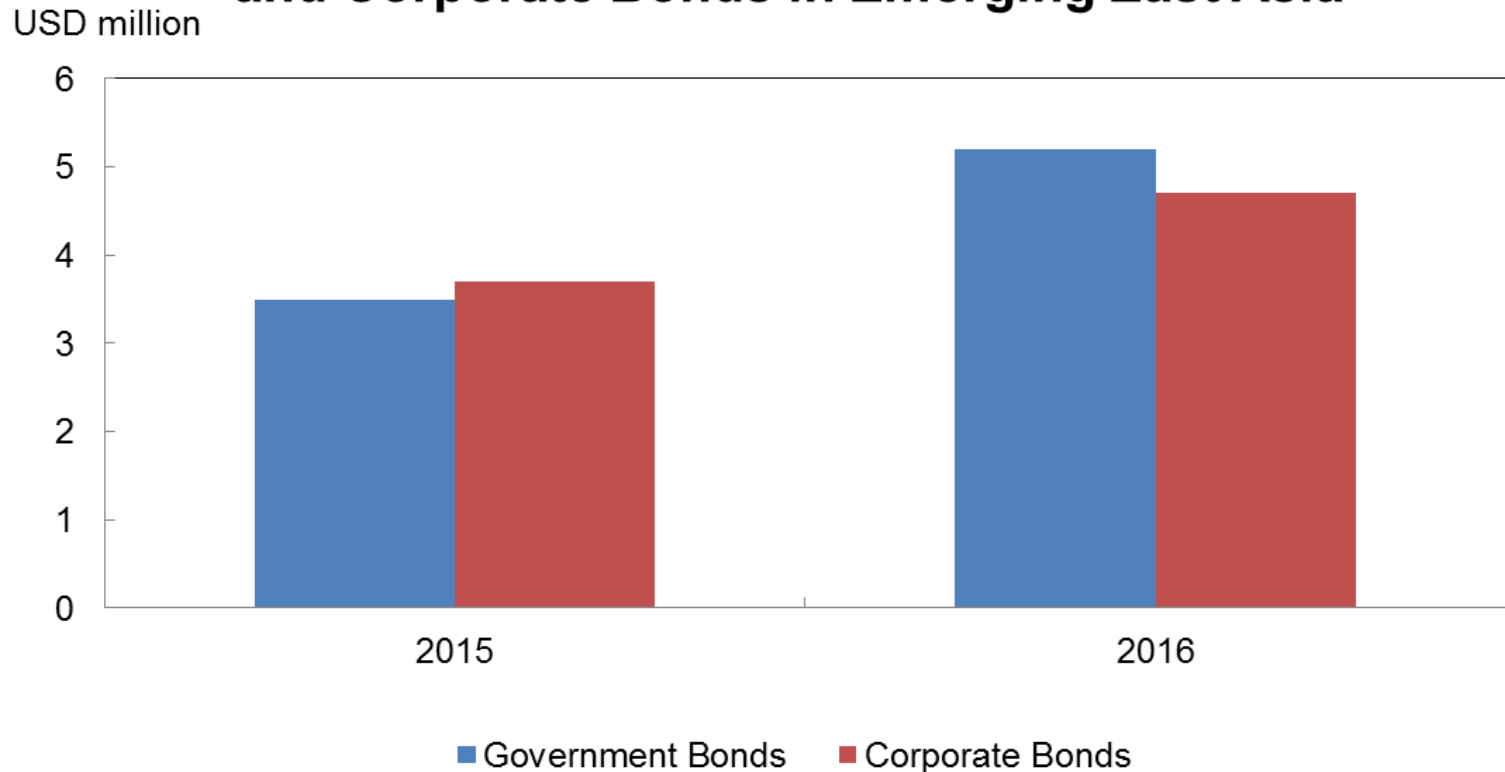
Average Bid-Ask Spread for LCY Government and Corporate Bonds in Emerging East Asia

basis points



Bond transaction size rose for both LCY government bonds and corporate bonds between 2015 and 2016

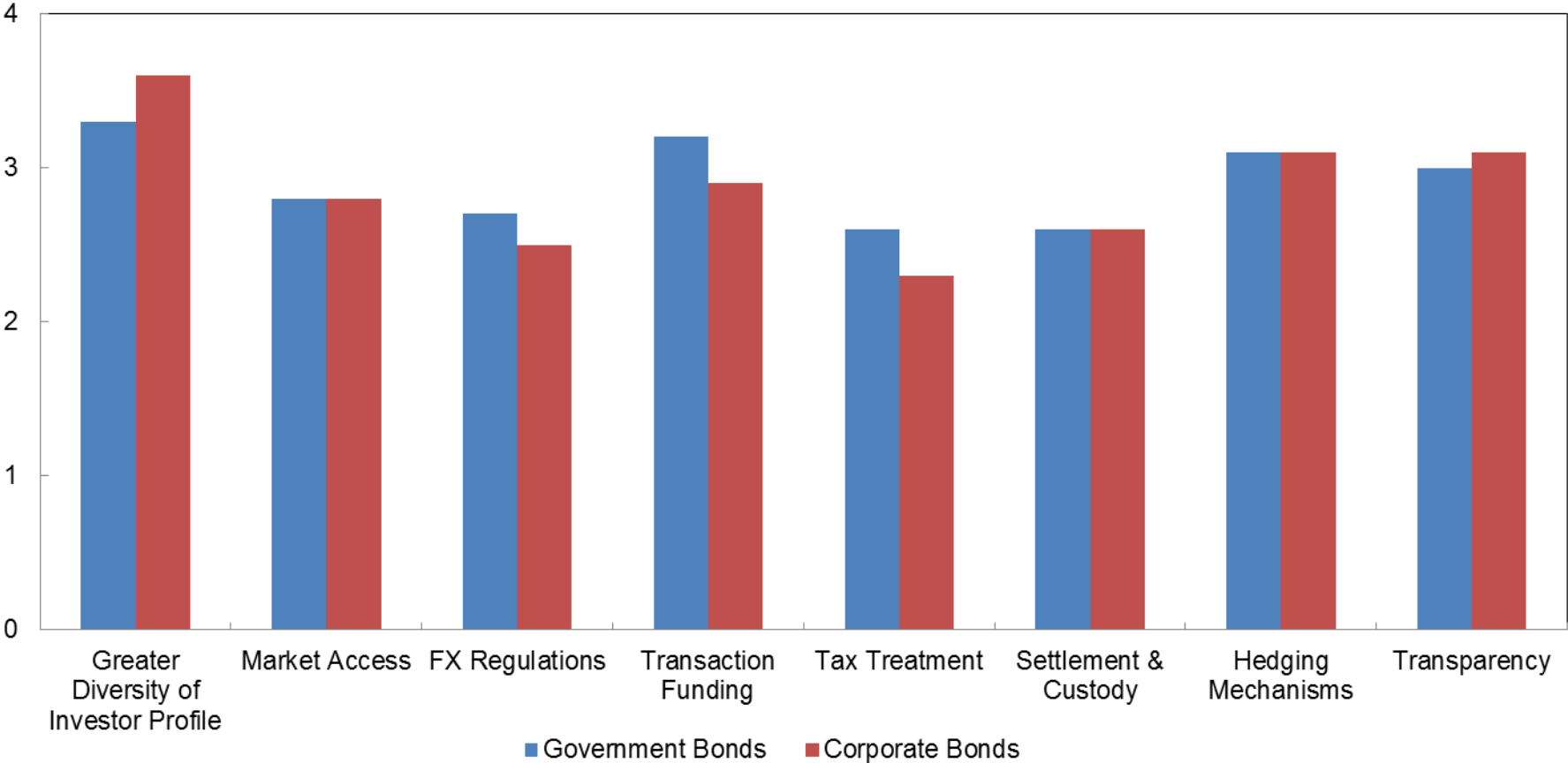
Average Transaction Size of LCY Government and Corporate Bonds in Emerging East Asia



Source: AsianBondsOnline

Greater investor diversity most important structural indicator in improving bond market liquidity in 2016

Qualitative Indicators



Source: AsianBondsOnline

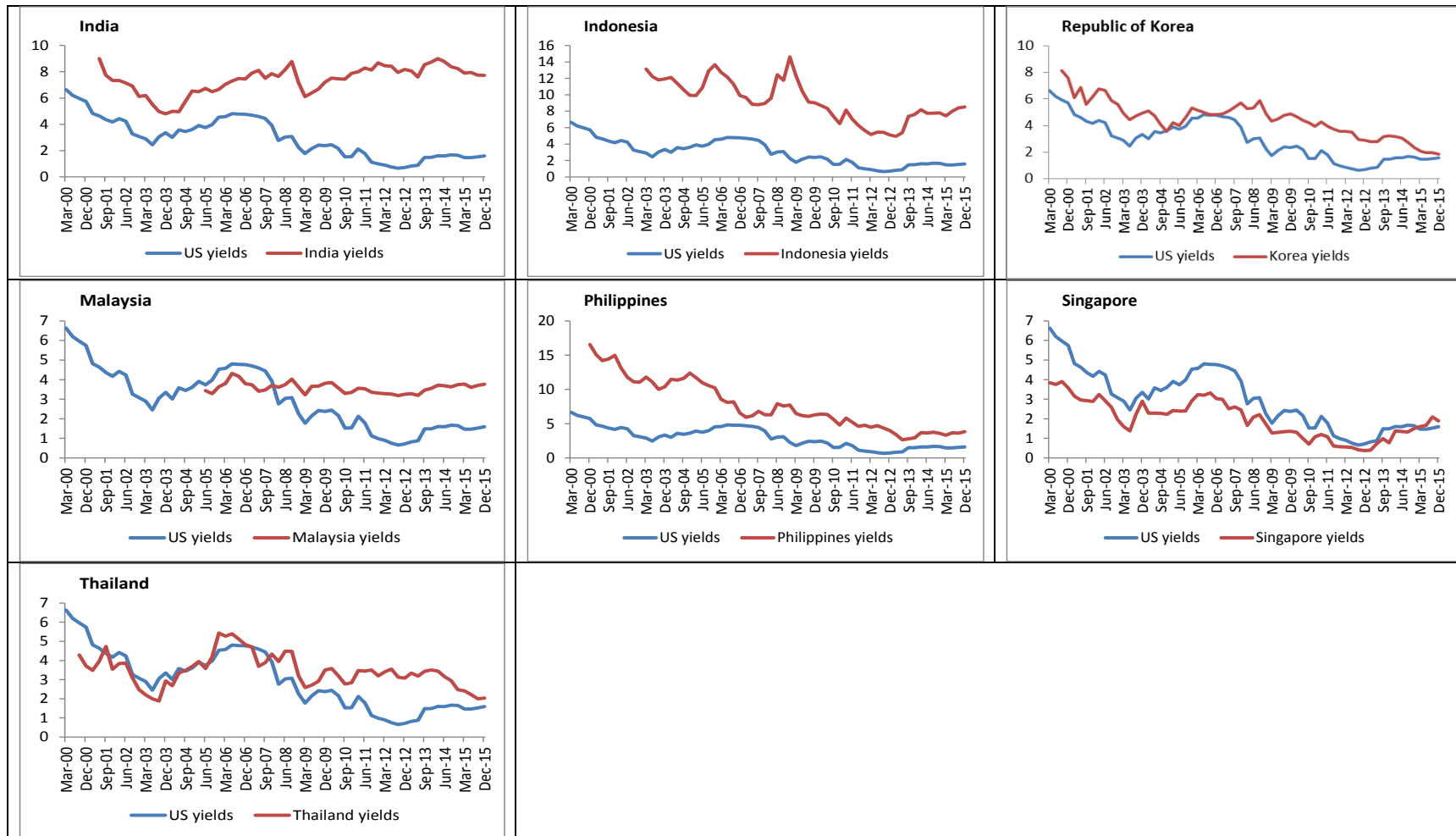


Key Findings

- Overall liquidity conditions for emerging East Asia's LCY bond market improved based on the results of the 2016 bond market liquidity survey due largely to protracted moves by the Federal Reserve in raising interest rates.
- The region's average bid–ask spread for on-the-run government instruments narrowed to 3.8 bps in 2016 from 5.4 bps in 2015, indicating a decline in the cost of doing a trade.
- The average accepted bond transaction size for on-the-run government securities in emerging East Asia rose to USD5.2 million in this year's survey, which means that markets are able to transact in larger volume trades.
- Government bond market remains more liquid compared with corporate bond market

Determinants of Sovereign Bond Yields in Emerging Asia

Sovereign bond yield movements vary across emerging Asian markets, indicating economy-specific macroeconomic conditions influencing yield patterns



Source: ADB, Asia Bond Monitor, June 2016

asianbondsonline.adb.org



Related Literature and Significance of Study

- Bond yields in emerging Asia are driven by both domestic fundamentals and global factors.
- Literature suggests economic growth, inflation, short-term interest rates, fiscal health, and other domestic factors, as well as global factors, affect bond yields.
- A better understanding of the domestic factors that affect the cost of borrowing can help economies manage such factors more effectively.
- A better understanding of the impact of global factors can help economies prepare for and adjust to global shocks.

Data and Empirical Model

- Quarterly data: Q1 2000 – Q4 2015
- 9 emerging Asian economies: India, Indonesia, the Republic of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, and Thailand
- A yield-macro model is used to explain the yields of 5-year government bonds with four domestic variables (inflation, short-term interest rate, GDP growth, and government debt growth) and one global variable (5-year US Treasury bond yield).

Empirical Results

- Inflation has a positive impact on emerging Asian sovereign bond yields.
 - Higher inflation erodes real returns, thereby pushing bond yields up.
 - CPI inflation has a bigger impact on bond yields in Malaysia and Thailand; PPI inflation more influential for bond yields in India and the Republic of Korea.
- Other main drivers of emerging Asian bond yields are short-term interest rates and US Treasury bond yields.
- GDP growth and government debt growth affect yields, but indirectly through inflation.

Policy Implications

- Low inflation and macroeconomic stability are both important for the development of local-currency bond markets in emerging Asia.
- Monetary and government policies that affect inflation and hence bond yields will be felt through the CPI channel in some countries while through the PPI channel in the other countries in the region.

Thank you.