The Role of Financial Market Development on Financial Contagion: Evidence from Four Asian Economies

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What is this paper about?

- This study examines the role of financial sector development in cushioning the extent of financial contagion since the 2008 Global Financial Crisis.


- Empirical results suggest that financial market development has had some significant impact on the management of financial contagion for these Asian economies.

    - Impact on equity contagion is relatively stronger compared to currency contagion.

- This study considers a more wholistic approach to the concept of financial market development; attempts to capture size, breadth and composition of financial system.

Post Asian Financial Crisis (AFC) reforms were designed to improve economic and financial resilience

- The AFC in 1997 had highlighted economic and financial weaknesses in the countries at the epicentre of the crisis (Thailand, Indonesia, Malaysia and Korea).
    - Domestic investments were mostly funded through short-term foreign borrowings.
    - Prudential regulation and supervision failed to keep up with financial liberalisation.

- Financial and economic reforms following the AFC (1998-2007):
    - Structural reforms in the financial and corporate sectors.
    - Economic diversification.
    - Fiscal policies and current account strengthening.

- Reforms were accompanied by carefully sequenced financial market development to:
    - Enable more efficient financial intermediation.
    - Facilitate risk management through funding diversification.
    - Increase investment opportunities.

- Supporting role played by market development in the process of economic development.

All four economies have since exhibited deeper financial markets

Size of Bond Market (Local Currency)

% GDP

Legend: 2000, 2015
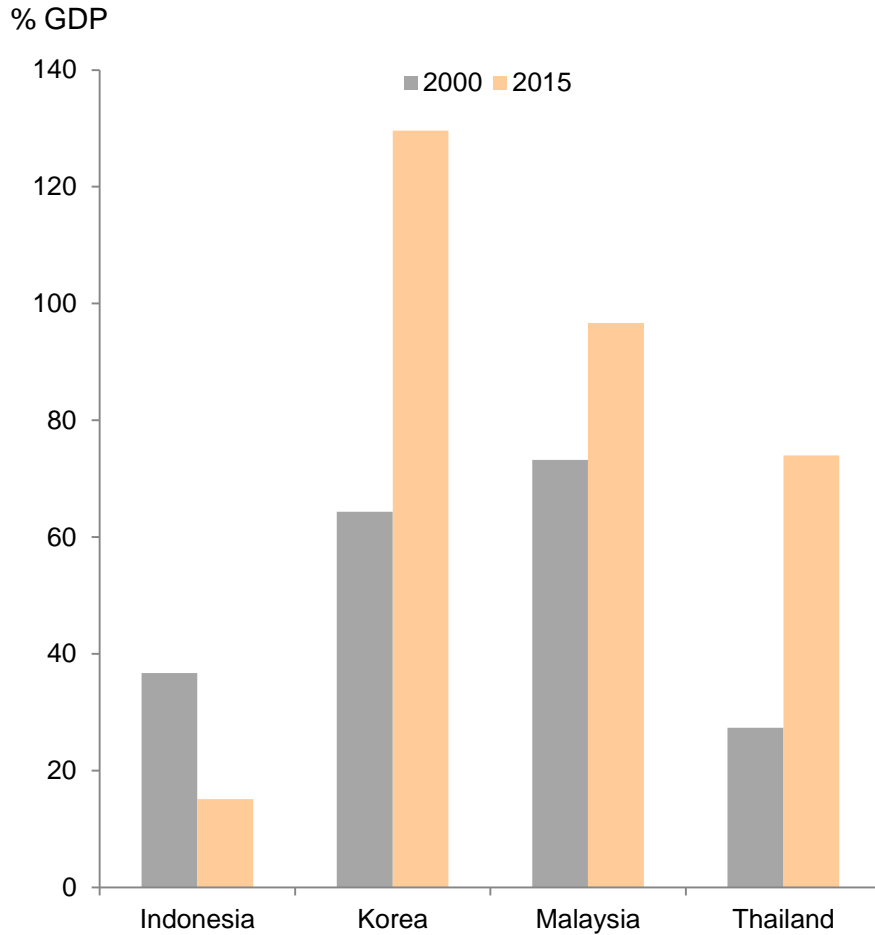
Source: Asian Development Bank, Asian Bonds Online

Market Capitalisation

% GDP

Legend: 2000, 2015

Source: Bloomberg

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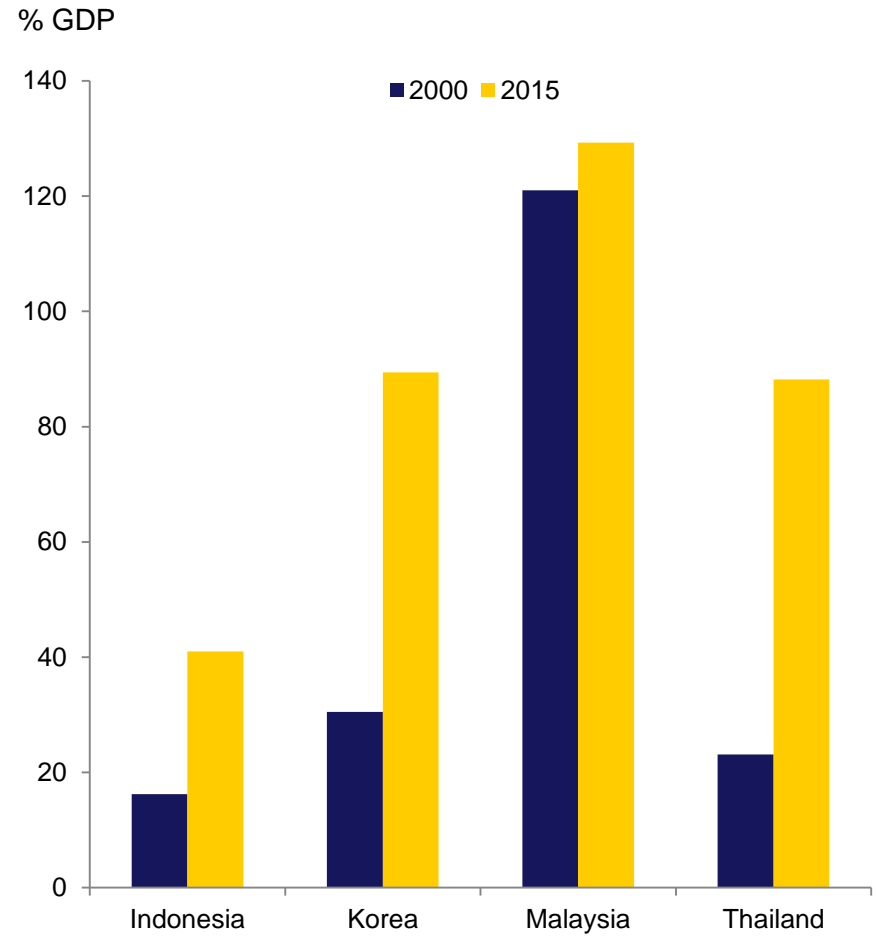
Trade-off between the benefits of financial development and spillovers from the global financial cycle

- 2008: Portfolio linkages led to financial spillovers and negative business cycle transmissions.
- Quick turnaround of Asian economies suggest improved abilities to withstand shocks.

Exchange Rates

YoY, %

Equity Indices

YoY, %

Real GDP

YoY, %
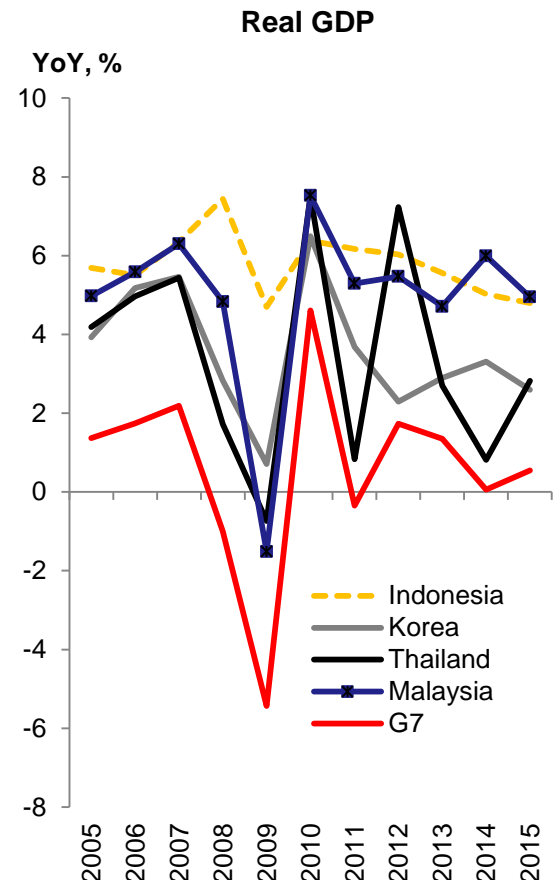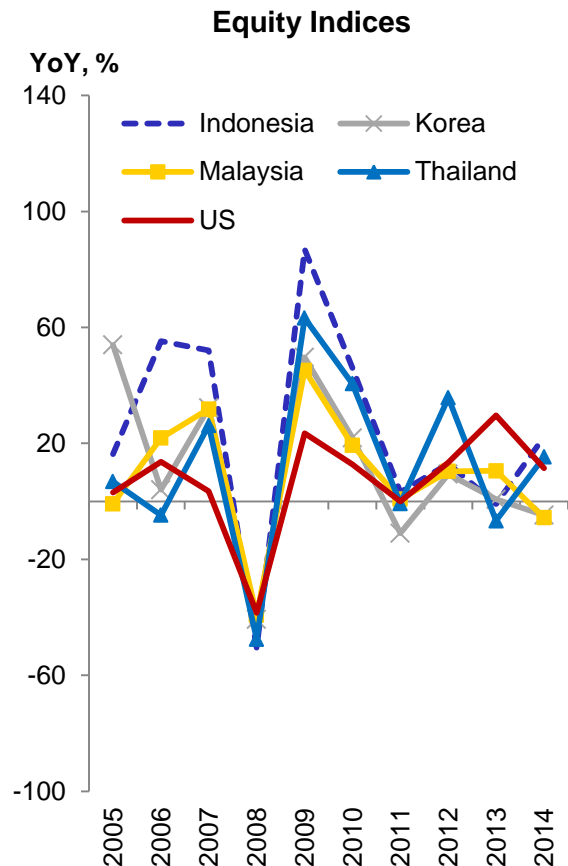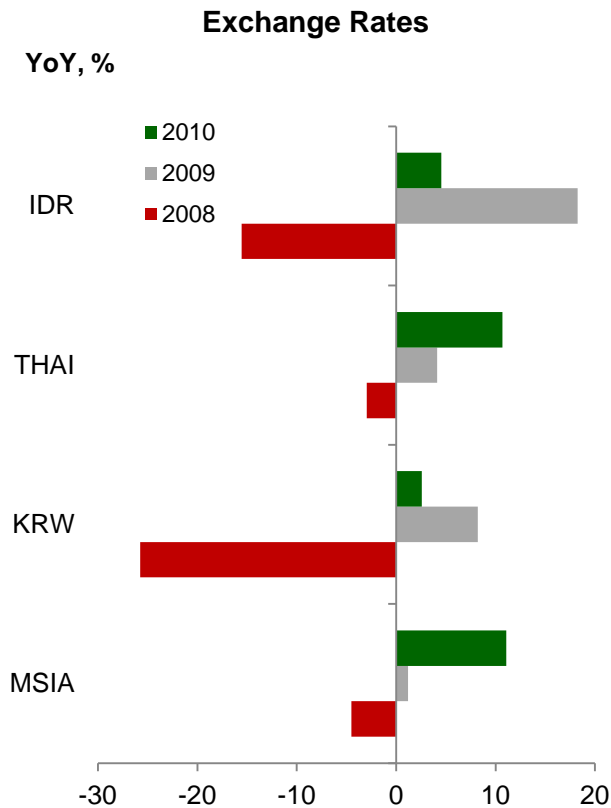
* IDR: Indonesian Rupiah, THB: Thai Baht; KRW: Korean Won; MYR: Malaysian Ringgit

Source: Bloomberg

Source: Bloomberg

Source: IMF WEO

Research objective: Has financial market development made Asian economies more resilient in dealing with financial contagion?

Greater financial sector integration could mean that financial contagion in the face of global and regional shocks are inevitable.

Key questions:

1. Has financial sector development helped Asian economies cushion the extent of financial contagion since the 2008 Global Financial Crisis?

2. Are there differences in the ability of current Asian financial systems to withstand global and regional shocks?

This study takes a more wholistic approach to the concept of financial market development and how it affects financial contagion

Most studies on financial contagion have focused on:

- The impact of financial integration/openness on contagion (Kodres and Pritsker, 2001), (Devereux and Yetman, 2010).

- The transmission of financial contagion to the macroeconomy (Ozkan and Unsal, 2012).

- Identifying channels of financial contagion (Hermann and Mihaljek, 2010), (Tressel, 2010).

Concept of financial market development is based on framework by (Chami, Fullenkamp and Sharma, 2009):

- Relies upon existence and actions of participants whose presence is essential for the efficient functioning of markets.

- Participants include liquidity providers, regulators, both non-resident and resident financial institutions.

3-step empirical strategy in assessing role of market development on financial contagion

Step	Purpose	Method	Results
1	To identify common global and regional financial shocks across the Asian markets being studied.	SVAR	Yes
2	Determining the presence of financial contagion during the identified financial shocks.	Chow test	Yes
3	To estimate the impact of various aspects of financial market development during financial contagion.	OLS	Some impact

*Data coverage in this study ranges from January 2005 to July 2015.

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Step ① SVAR analysis to identify common financial shocks

- To ensure comparable effects across the Asian financial markets being studied.

Shock	Proxy Variable
2008 collapse of Lehman Brothers	VIX index
Implementation and scaleback of QE	US 5 year sovereign yield
Twin deficit concerns (Indonesia, 2013)	5 year Indonesian sovereign yield

Global { 2008 collapse of Lehman Brothers, Implementation and scaleback of QE

Regional { Twin deficit concerns (Indonesia, 2013)

- Impact of shocks are analysed on 3 main market indicators from January 2005 to July 2015:
    - Domestic stock market indices
    - Exchange rates*
    - Sovereign yields

- Impulse response functions are generated to reflect direction, magnitude and lagged impacts.

- Only shocks with distinguishable and comparable effects will be examined for the rest of the study.

*Throughout this study, exchange rate data is quoted as local currency per USD. Therefore, an increase in the exchange rate reflects a depreciation in the currency and vice versa.

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Step ①: SVAR estimates suggest that Asian stock markets and currencies experienced common financial shocks

Table 1a: Stock Market Impulse Response Summary

Impulse/Shock	Stock Market SVAR			
	Korea	Malaysia	Indonesia	Thailand
Lehman Brothers Collapse	–	–	–	–
QE1	+	+	+	+
QE Tantrum	–	–	–	–
QE Scaleback (not significant)	–	–	–	–
Twin Deficit in Indonesia (not significant)	+	–	-	NE*

Notes:

'+' denotes an increase in stock indices, while '-' refers to a decline in stock indices

*NE indicates no discernable impact from shock to exchange rates.

Table 1b: Exchange Rate Impulse Response Summary

Impulse/Shock	Exchange Rate SVAR			
	Korea	Malaysia	Indonesia	Thailand
Lehman Brothers Collapse	–	–	–	–
QE1	+	+	+	–
QE Tantrum	–	–	+	NE*
QE Scaleback	–	–	–	–
Twin Deficit in Indonesia	+	+	+	–

Notes:

'+' denotes a currency appreciation while '-' refers to a currency depreciation

*NE indicates no discernable impact from shock to exchange rates

*SVAR on sovereign yields suggests that most of the financial shocks tested did not have much visible impact to Asian sovereign markets.

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Step ② : Determining the presence of financial contagion

> Technical definition of contagion by Dornbusch, Park and Claessens (2000)
>
> *'A significant increase in cross-market linkages after a shock to an individual or group of countries, as measured by the degree of co-movement in asset prices and financial flows across markets, relative to tranquil times.'*

- Dungey et al (2005)'s Chow test

$$\left(\frac{\Delta Z_{2,t}}{\sigma_{x,2}}\right) = \beta_1 \left(\frac{\Delta Z_{1,t}}{\sigma_{x,1}}\right) + \gamma_1 \left(\frac{\Delta Z_{1,t}}{\sigma_{x,1}}\right) d_t + \eta_t$$

  - Testing for contagion originating from Country 1 to Country 2.
  - To identify structural break in the regression slope, γ_1.
  - Asset returns during both crisis and tranquil times are scaled by their respective pre-crisis standard deviations.
  - $Z_{2,t}$ refers to series of asset returns for receiving country during both crisis and tranquil periods, while $Z_{1,t}$ is the asset returns from the shock originating country.
  - Second term of the regression is interacted with a time dummy variable to control for crisis.
  - One-sided t-test on γ_1 to determine whether the time dummy contributes any additional relationship between the shock variable and domestic indicator of financial contagion.

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Step 2 : Evidence of stock market contagion during Lehman collapse and QE1; mixed results for currency contagion

Table 2a: Significance of γ_1 for the Presence of Stock Market Contagion

	Stock			
	Malaysia	Indonesia	Thailand	Korea
Lehman	Yes**	Yes**	Yes***	Yes***
QE1	Yes***	Yes***	Yes***	Yes***
QE Tantrum	No	No	No	Yes**

Notes:
'Yes' indicates the presence of financial contagion and 'No' otherwise
*denotes significance of 10% for the presence of financial contagion
**denotes significance of 5% for the presence of financial contagion
***denotes significance of 1% for the presence of financial contagion

Table 2b: Significance of γ_1 for the Presence of Currency Contagion

	Currency			
	Malaysia	Indonesia	Thailand	Korea
Lehman	Yes***	No	Yes***	Yes**
QE1	No	Yes***	No	Yes***
QE Tantrum	Yes***	Yes***	No	Yes**
QE Scaleback	No	No	Yes***	No
Twin Deficit	Yes***	No	Yes***	Yes***

Notes:
'Yes' indicates the presence of financial contagion and 'No' otherwise
*denotes significance of 10% for the presence of financial contagion
**denotes significance of 5% for the presence of financial contagion
***denotes significance of 1% for the presence of financial contagion

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Step ③ : Estimating the impact of various aspects of financial market development during financial contagion

- Equation for each country, and each type of contagion indicator:

$$\Delta Contagion_{x,t} =$$

$$\Delta \text{ Financial Market Indicators}_{x,t} * d_{y,t} + \Delta \text{ Financial Market Indicators}_{x,t} +$$

$$\Delta Ln \text{ US stock index}_t + \Delta Ln \frac{Yen}{Dollar}_t$$

- Two types of $\Delta Contagion_{x,t}$:
  - Changes in stock market index
  - Changes in nominal exchange rate

- Financial market indicators based on IMF's 'Financial Sector Assessment: A Handbook' 2005.
  - Variables should capture size, breadth and composition of the financial system.

Indicator of FM Development	Intuition
International reserves (%M2)	Adequacy of FX reserves to mitigate excessive volatility in the domestic currency
Bank deposits (%GDP)	Size of banking system
External debt (%GDP)	Degree of financial openness
Monthly traded volume, turnover or new issuances in the stock market	Liquidity of stock market
Outstanding bonds (%GDP)	Liquidity of bond market

Step ③ : Size of banking system matters in offsetting equity contagion

- No offsetting effects from higher capital market liquidity.
- Mixed effect from greater financial openness.

Contagion indicator: Equity; Shock: Lehman Collapse

Country	Aspect of Market Dev.	Impact	
Malaysia	Bank deposits	-0.003	↓
	External debt	0.001	↑
	Stock market liquidity	0.002	↑
	Bond market liquidity	0.003	↑
Indonesia	Bank deposits	-0.010	↓
	External debt	-2.189	↓
	Stock market liquidity	0.008	↑
	Bond market liquidity	0.008	↑
Thailand	Reserves	0.061	↑
	Bank deposits	-0.002	↓
	External debt	-5.843	↓
Korea	-	-	

Contagion indicator: Equity; Shock: QE

Country	Aspect of Market Dev.	Impact	
Malaysia	Reserves	-0.039	↓
	Bank deposits	-0.002	↓
	External debt	0.0003	↑
	Stock market liquidity	0.002	↑
	Bond market liquidity	0.002	↑
Indonesia	Reserves	-0.026	↓
	Stock market liquidity	0.009	↑
Thailand	Reserves	0.047	↑
	Bond market liquidity	0.001	↑
Korea	Reserves	-0.050	↓
	External debt	1.759	↑
	Bond market	0.003	↑

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Step ③ : Degree of financial openness facilitated currency contagion

- Limited role of reserves and capital market liquidity in offsetting currency contagion.

Contagion indicator: Nominal ER; Shock: Lehman Collapse

Country	Aspect of Market Dev.	Impact
Malaysia	External debt	0.0001 ↑
	Bond market liquidity	0.0005 ↑
Indonesia	External debt	1.824 ↑
Thailand	External debt	0.617 ↑
Korea	Reserves	-0.030 ↓
	External debt	0.951 ↑
	Bond market liquidity	0.001 ↑

Contagion indicator: Nominal ER;   Shock: QE

Country	Aspect of Market Dev.	Impact
Malaysia	Bank deposits	-0.001 ↓
	External debt	-0.002 ↓
	Stock market liquidity	0.001 ↑
Indonesia	Bank deposits	0.002 ↑
	External debt	1.364 ↑
	Bond market liquidity	-0.006 ↓
Thailand	Reserves	-0.012 ↓
	Bank deposits	-0.0004 ↓
	External debt	0.552 ↑
	Bond market liquidity	0.002 ↑
Korea	Reserves	-0.034 ↓
	Bank deposits	-0.001 ↓
	External debt	1.202 ↑
	Bond market liquidity	0.001 ↑

Step ③ : Limited offsetting impact from market development on currency contagion during a regional shock

Contagion indicator: Nominal ER;
Shock: Twin Deficit in Indonesia

Country	Aspect of Market Dev.	Impact
Malaysia	Bank deposits	-0.0002 ↓
	External debt	-0.003 ↓
	Bond market liquidity	-0.002 ↓
Indonesia	Bank deposits	-0.001 ↓
	External debt	1.917 ↑
Thailand	Bank deposits	0.0003 ↑
	External debt	0.942 ↑
	Stock market liquidity	0.003 ↑
Korea	Reserves	0.022 ↑

- Financial openness contributed to further depreciation in the rupiah and baht, but had an offsetting impact for the ringgit.

- Limited impact from capital market liquidity.

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Step ③ : Stronger regional shock simulations show that current market development likely to have stronger offsetting impact on contagion

- Dependent variables are replaced with data from 1990 to 2000.
- Most notable aspects are financial openness and level of reserves. Impact from capital market liquidity remains small.

Equity Shocks of Similar AFC Magnitude

Country	Aspect of Market Dev.	Impact
Malaysia	Reserves	-0.104 ↓
	Bank deposits	-0.005 ↓
	Bond market liquidity	-0.004 ↓
Indonesia	Bank deposits	-0.027 ↓
	External debt	-23.293 ↓
Thailand	Reserves	-0.201 ↓
	External debt	12.246 ↑
	Stock market liquidity	-0.050 ↑
Korea	Reserves	0.557 ↑
	External debt	-13.495 ↓
	Stock market liquidity	-0.041 ↓
	Bond market liquidity	0.039 ↑

Currency Shocks of Similar AFC Magnitude

Country	Aspect of Market Dev.	Impact
Malaysia	External debt	0.001 ↑
	Stock market liquidity	-0.001 ↓
Indonesia	Bank deposits	-0.051 ↓
	External debt	-45.126 ↓
	Stock market liquidity	0.034 ↑
	Bond market liquidity	0.379 ↑
Thailand	Stock market liquidity	-0.002 ↓
Korea	Reserves	-0.328 ↓
	Bank deposits	0.009 ↑
	External debt	5.973 ↑
	Bond market liquidity	0.013 ↑

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Empirical results suggest that market development has had some impact on the management of financial contagion

Type of contagion	Key findings
Equity contagion	• Contagion arising from global shocks have mostly been offset by stronger levels of banking system deposits. • Greater capital market liquidity, however, could intensify changes in stock prices via momentum trading.
Currency contagion	• Various aspects of market development do not seem to overwhelmingly offset contagion. • To a certain extent, reserves do work to offset such contagion. • Higher levels of external debt, however, raise the risk of aggravating contagion. • Impact from stronger capital market liquidity and banking system deposits appear mixed.
Regional shocks	• Financial market development, in this context, has on average stronger offsetting effects on stock market contagion compared to the currency market. • Not surprising, as ER regimes have evolved to become more flexible.

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Policy discussion

- Despite progress in financial market development, there remains room for improvement.

- Re-looking at structure of capital markets; should we expect the offsetting impact to be stronger?
  - Disproportionate concentration of either domestic or foreign ownership of financial assets.

- Implications from a more cautious approach to market development:
  - Creation of financial assets that could facilitate potentially destabilizing speculative activity in offshore markets.
  - Strong presence of institutional investors may not necessarily contribute to market vibrance during 'normal' times.

- Further advancements to study:
  - Consider other aspects of market development e.g. derivatives market, role of central bank liquidity management etc
  - Other country specific details

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