

## II. THE EVOLUTION OF ASIAN FINANCIAL LINKAGES: KEY DETERMINANTS AND THE ROLE OF POLICY

As highlighted in Chapter 1, global economic prospects have improved somewhat in the first quarter of 2012, and acute tensions in global financial markets have eased. Still, downside risks related to a possible further deterioration across international capital markets remain a concern for the Asia and Pacific region, as developments in major global financial centers tend to have large effects on Asian financial markets. In particular, equity returns in Asian economies seem generally to move in tandem with those in systemic economies (Figure 2.1).<sup>1</sup>

This chapter focuses on the following questions: How has the sensitivity of Asian financial markets to systemic economies varied across economies and over time? How important are real and financial linkages with systemic economies in explaining Asian financial market fluctuations? To what extent can macroeconomic policies help mitigate financial market spillovers?

The following main conclusions of this chapter are based on a working paper by IMF staff:<sup>2</sup>

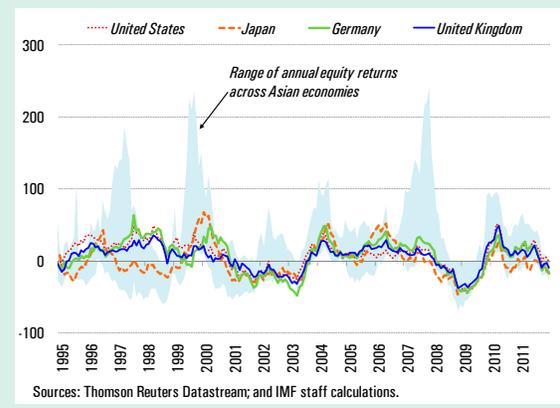
- First, in line with Asia’s growing role in the global economy—including through deeper financial integration—regional financial markets have become more sensitive to systemic economies.
- Second, Asian financial sensitivities to systemic economies exhibit cyclical fluctuations which correspond to tranquil and turbulent periods across international capital markets. These financial sensitivities reached historically high levels during the latest global financial crisis.

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<sup>1</sup> The set of systemic economies includes France, Germany, Japan, the United Kingdom, and the United States. The sample of Asian economies in this chapter excludes low-income countries due to data constraints.

<sup>2</sup> Elekdag, Rungcharoenkitkul, and Wu (forthcoming).

**Figure 2.1. Equity Returns: Selected Systemic Economies and Asia**  
(In percent over 12 months)



- Third, macroeconomic policies—including those designed to lower government debt and increase international reserves (up to a limit)—can reduce Asia’s sensitivity to financial spillovers from systemic economies even after global factors and other economy-specific characteristics are accounted for. While macroeconomic policies can limit financial sensitivities during both tranquil and turbulent periods, they cannot completely insulate Asian financial markets against major global financial shocks.

### A. How Sensitive Are Asian Financial Markets to Market Movements in Systemic Economies?

To answer this question, we estimate the financial sensitivities of Asian economies (“betas”), which capture the effects of movements in systemic economies on Asian equity markets, an important source of external finance for Asian firms.<sup>3</sup> These estimates are based on a two-stage model. In the first

<sup>3</sup> Related studies focusing on financial spillovers from systemic economies include Balakrishnan and others (2009), Bayoumi and Bui (2011), IMF (2009), and IMF (2011d).

stage, the Capital Asset Pricing Model (CAPM) is used to estimate sensitivities of Asian monthly equity returns to those in systemic economies, using the following specification:

$$r_{it} = \alpha_i + \beta_{it}R_t + \gamma_i \text{controls}_t + \varepsilon_{it}$$

where  $r_{it}$  and  $R_t$  denote the monthly equity returns in country  $i$  and systemic economies, respectively, and  $\beta_{it}$  is the financial sensitivity measure.  $\text{controls}_t$  includes global factors such as commodity prices, global growth, international interest rates and the Chicago Board Options Exchange Market Volatility Index (VIX), as a measure of global risk aversion.

In the second stage, these country betas are allowed to depend on observed explanatory variables:

$$\beta_{it} = b_0 + b_1 X_{it} + b_2 Z_t$$

where  $X_{it}$  includes country-specific variables such as macroeconomic policies and bilateral linkages to systemic economies via trade, FDI, and banking exposure, while  $Z_t$  includes common global factors such as the VIX.<sup>4</sup>

Two complementary approaches are used to estimate this general model. The first builds on the work of Forbes and Chinn (2004), in which average betas across different periods of time are first estimated by using a CAPM for 12 Asian economies, and then related to global and country-specific variables via cross-sectional regressions. The second approach follows Bekaert and others (2011) and estimates monthly betas for 40 economies in a panel regression covering 1991–2011, jointly accounting for their dependence on the global and country-specific variables.

The analysis shows that Asian financial markets' sensitivity to systemic economies has followed a steady upward trend over the last two decades (Figure 2.2), which likely reflects Asia's increasing financial integration with the world. This trend, however, has

<sup>4</sup> The model focuses on the effect of shocks to systemic economies on Asian equity markets, rather than on estimating simultaneous equations between all economies. Feedback effects are harder to verify empirically, given limited time series data on bilateral linkages and other asset prices and the predominance of systemic financial markets.

been associated with strong cyclical fluctuations, linked to developments across international capital markets.<sup>5</sup> In particular, the betas spike in all Asian economies during episodes of global financial turbulence, including the bursting of the technology bubble (and the associated NASDAQ crash) in 2001 and, more recently, the Lehman Brothers bankruptcy and the turmoil in the euro area.<sup>6</sup> For all Asian economies, the financial betas reached unprecedented levels during 2008–11 (Figure 2.3).

Even if generally synchronized, individual Asian financial markets tend to react differently to shocks in systemic economies (Figure 2.3). In general, ASEAN and East Asia (which include Singapore and Hong Kong SAR, respectively) appear to have the largest financial betas. In the case of the ASEAN economies, the panel regressions generate an estimated beta of about 0.75, on average, over the sample periods. This estimate suggests that a 10 percent increase in the U.S. stock market is associated with a 7½ percent increase across the ASEAN stock markets. At the other end of the spectrum, economies that pursued a more gradual pace of international capital market integration, such as China, generally had lower financial sensitivities to systemic economies.

## B. Can Macroeconomic Policies Reduce Financial Sensitivities in Asia?

Macroeconomic policies play a notable role in determining Asia's financial betas, after controlling for bilateral linkages to systemic economies and other economy-specific characteristics. Cross-section regression analysis, shown in Table 2.1, suggests that bilateral trade, FDI, and banking exposures to systemic economies help explain the diversity of financial betas

<sup>5</sup> Movements in financial betas over the business cycle are not necessarily disruptive, as they may reflect international risk sharing through financial markets. Rungcharoenkitkul (2011) evaluates the tradeoffs between the benefits (risk sharing) and the costs (negative spillovers) of financial integration.

<sup>6</sup> The upward trend in betas existed even before the onset of the Lehman crisis in 2008, at least for East Asia excluding China and ASEAN. Therefore a pickup in betas over time is likely secular, and it is not driven by the global financial crisis.

across Asia. Even after taking into consideration the importance of economy-specific factors that are difficult to account for explicitly (including structural and institutional difference across economies), the regressions indicate that higher bilateral trade, FDI, and banking exposures to systemic economies are positively correlated with higher financial betas. Macroeconomic policies also matter. Specifically, the empirical results indicate that a lower government debt-to-GDP ratio and a higher stock of international reserves are associated with lower financial betas. For example, a 10 percentage-point increase in the reserves-to-GDP ratio is characterized by financial betas that are lower by 0.03–0.04, which is also corroborated by the results using panel econometrics. However, the panel regression also suggests that the marginal benefit of holding reserves may diminish after a certain threshold.<sup>7</sup>

The role of bilateral linkages and macroeconomic policies has changed over time. Over the first half of the sample period (1992–2001), bilateral FDI and banking linkages to systemic economies become at least twice as influential. At the same time, although debt is less prominent, measures of macroeconomic policies such as the stock of reserves—but up to a limit—become more important. In the second half of the sample period (2002–11), while the role of the bilateral linkages diminishes, the empirical results still suggest that sound policies are correlated with lower financial betas.

To understand the latter result, we split the second sample further into two subsamples (2002–07 and 2008–11). After accounting for macroeconomic policy measures and other economy-specific characteristics, panel regressions suggest that the global financial shock explains nearly 90 percent of the pickup in financial betas across Asia from 2002–07 to 2008–11 (Figure 2.4). The occurrence of the global financial crisis is the main reason why the empirical relationships between financial betas and the fundamentals of Asian economies weaken during the last decade. While macroeconomic policies still appear to be useful in

<sup>7</sup> This result is based on using the logarithm of reserves in the panel regression. Laudes, Salman, and Chivakul (2010) also find that the mitigating effects of reserve holdings during the recent financial crisis are subject to diminishing returns.

Figure 2.2. Asian Financial Betas and Global Financial Shocks<sup>1</sup>

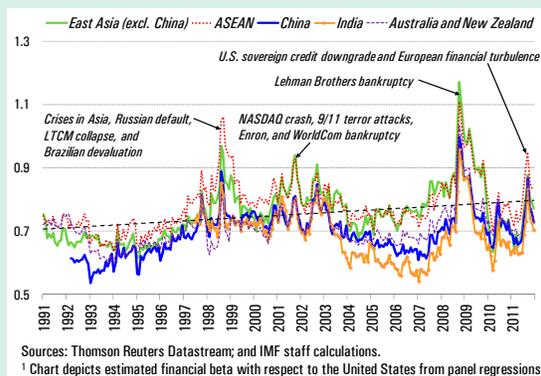


Figure 2.3. Financial Betas across Asian Economies<sup>1</sup>

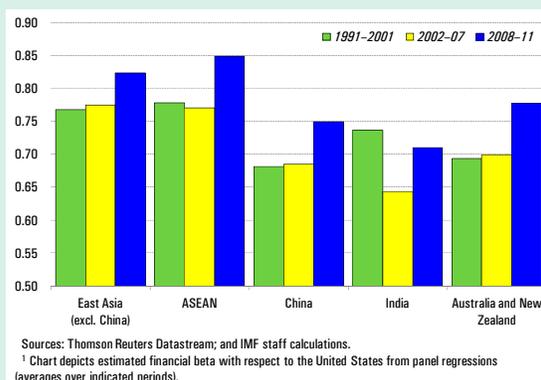
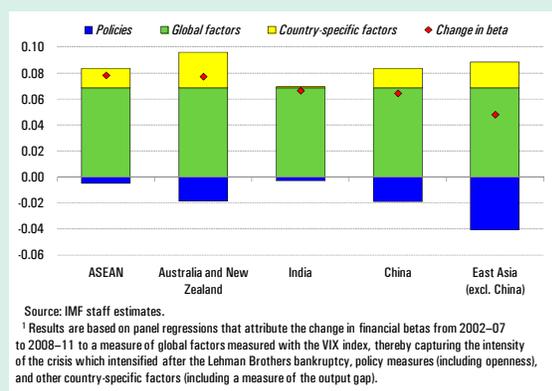


Table 2.1. Determinants of Asian Financial Betas<sup>1,2</sup>

Dependent variable	Betas Full sample	Betas Full sample	Betas Full sample	Betas 1992–2001	Betas 2002–2011	Betas 2002–2007	Betas 2008–2011
Trade <sup>3</sup>	0.0116 <i>8.2%</i>	0.0116 <i>8.2%</i>	0.0116 <i>8.2%</i>	0.0024 <i>79.1%</i>	0.0044 <i>68.1%</i>	0.0260 <i>12.1%</i>	-0.0050 <i>78.2%</i>
FDI <sup>3</sup>	0.6240 <i>3.7%</i>	0.6240 <i>3.7%</i>	0.6240 <i>3.7%</i>	1.8940 <i>0.4%</i>	0.9099 <i>69.9%</i>	-0.2540 <i>31.9%</i>	0.0288 <i>71.6%</i>
Bank <sup>3</sup>	0.0060 <i>0.2%</i>	0.0060 <i>0.2%</i>	0.0060 <i>0.2%</i>	0.0103 <i>2.2%</i>	-0.0009 <i>37.5%</i>	0.0009 <i>48.5%</i>	-0.0034 <i>0.6%</i>
Debt <sup>3</sup>	0.0009 <i>0.3%</i>	0.0011 <i>0.1%</i>	0.0011 <i>0.1%</i>	0.0004 <i>28.6%</i>	0.0030 <i>0.0%</i>	0.0052 <i>0.0%</i>	-0.0003 <i>57.7%</i>
Reserves <sup>4</sup>	-0.0033 <i>0.4%</i>	-0.0042 <i>0.0%</i>	-0.0093 <i>0.2%</i>	-0.0040 <i>2.4%</i>	-0.0088 <i>0.2%</i>	-0.0088 <i>0.8%</i>	0.0004 <i>79.1%</i>
Financial openness <sup>5</sup>	0.0181 <i>2.2%</i>	0.0586 <i>0.0%</i>	0.0253 <i>2.4%</i>	0.0429 <i>0.8%</i>	0.0110 <i>21.5%</i>		
Exchange rate regime <sup>6</sup>			-0.0118 <i>0.2%</i>	-0.0257 <i>0.6%</i>	-0.0215 <i>5.5%</i>	-0.0146 <i>13.4%</i>	-0.0377 <i>12.5%</i>
Constant	-0.0937 <i>11.5%</i>	0.0732 <i>0.9%</i>	0.1210 <i>0.0%</i>	0.1930 <i>0.0%</i>	0.1830 <i>0.0%</i>	0.1040 <i>3.8%</i>	0.3270 <i>0.2%</i>
Observations	60	60	60	60	60	60	60
R-squared	12.4%	12.4%	12.4%	15.5%	2.6%	6.7%	3.3%

Source: IMF staff estimates.  
<sup>1</sup> Country fixed effects included, but not reported, in regressions.  
<sup>2</sup> Robust *p*-values (accounting for clustering with respect to Asian economies) are italicized.  
<sup>3</sup> Trade, FDI, bank, and (government) debt refer to bilateral linkages to systemic economies (in percent of GDP).  
<sup>4</sup> Reserves (international) scaled by M2.  
<sup>5</sup> Financial openness measured using Chinn and Ito (2008) metric.  
<sup>6</sup> Exchange rate regime classification based on Reinhart and Rogoff (2004).

Figure 2.4. Asia: Changes in Betas from 2002–07 to 2008–11<sup>1</sup>



lowering financial betas during this period, most of the variation across Asian financial betas during the crisis years is accounted for by global factors, with a relatively more limited role for economy-specific characteristics.

Overall, the analysis suggests that sound macroeconomic policies help lower Asia’s financial betas during both tranquil and turbulent periods, but they cannot completely insulate Asian financial markets against major global financial shocks. To be sure, these policies may limit the impact of major downside risks on the real economy (Balakrishnan and others, 2009). But, given how the extent of spillovers can become more widespread with major global shocks, the response to these shocks may require a more comprehensive mix of policies, including the financial measures mentioned in Chapter 1 and adopted in Asia in response to the global financial crisis.