

This chapter shows that emerging market equity prices are influenced by both global and domestic factors, and therefore global developments constitute a significant channel for spillovers when the international economic environment changes. This can, in turn, affect domestic consumption and investment. Strengthening their resilience to equity price declines remains an important goal for emerging market countries.

After months of relative resilience, emerging market (EM) equities have now experienced the effects of the financial turmoil that began in advanced economies in the summer of 2007. This chapter examines whether increasing financial integration has potentially raised EMs' vulnerability to external global shocks, focusing on the channel of equity markets. This question remains relevant because many EM economies have experienced a long run-up in equity prices, despite the partial reversal of recent months. Moreover, EM resilience will likely continue to be tested if the global financial turmoil remains protracted and the global economic slowdown continues.

The chapter addresses three key questions:

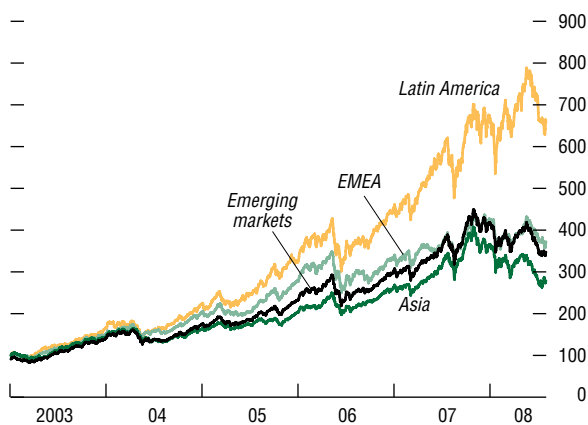
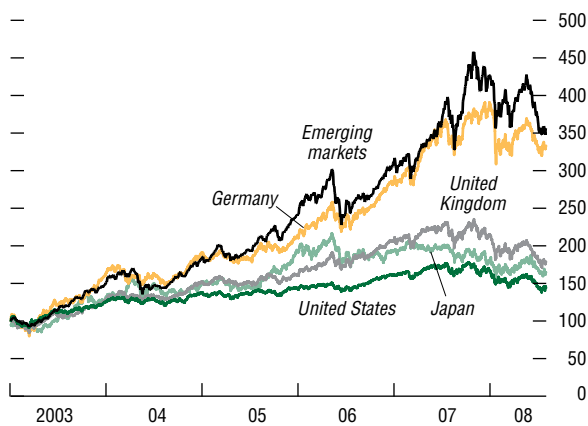
- *How vulnerable are EMs to changing external conditions?* In tackling this question, the chapter explores the external and domestic determinants of EM equity market valuations and analyzes whether the external determinants are economically important. It finds that, although closer links with foreign markets are important drivers of equity prices, to date, the more open EM economies or those with higher levels of foreign investor participation have not been affected disproportionately by the global financial turbulence.

Note: This chapter was written by a team led by L. Effie Psalida and comprising Heiko Hesse and Tao Sun. Oksana Khadarina provided research support.

- *How extensive are macro-financial linkages?* The chapter considers whether wealth effects are important and whether they make EM consumption and investment growth vulnerable to equity market declines. It finds the effect on private consumption and investment to be statistically significant but small. Moreover, wealth effects tend to play out gradually as opposed to financial-to-financial spillover channels.
- *What can EM countries do to minimize their vulnerability to spillovers?* The chapter stresses the importance of building and sustaining resilient capital markets, particularly equity markets. This can be achieved not only by fostering deeper capital markets, but by introducing legal, regulatory, and accounting reforms that conform to international best practice and developing a well-functioning securities market with supporting infrastructure.

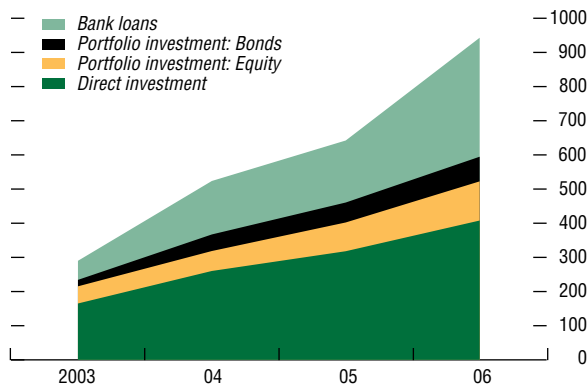
The chapter first traces developments in the equity prices of EMs during the long run-up and correction, and compares this cycle to the previous peak and trough for a selected number of countries, for which the experiences from the two cycles have been quite different. An overall increase in equity market correlations across countries is evident. The chapter then develops an empirical framework for assessing what drives EM equity prices, and finds that domestic/fundamental factors, such as growth and exchange rate expectations, and global/external conditions, such as excess liquidity and credit

Figure 4.1. Selected Equity Market Indices
(January 1, 2003 = 100; in U.S. dollars)



Sources: Bloomberg L.P.; and Datastream.
Note: EMEA = Emerging Europe, Middle East, and Africa.

Figure 4.2. Emerging Market Economies: Composition of Capital Inflows
(In billions of U.S. dollars)



Source: IMF, International Financial Statistics database.

and market risk premia, both play a role. The chapter then provides additional results showing potential spillovers to EM equities and discusses their effects on consumption and investment. It finishes with a summary of the key results, draws some policy conclusions, and points to measures that can help make equity markets more resilient when equity prices decline.

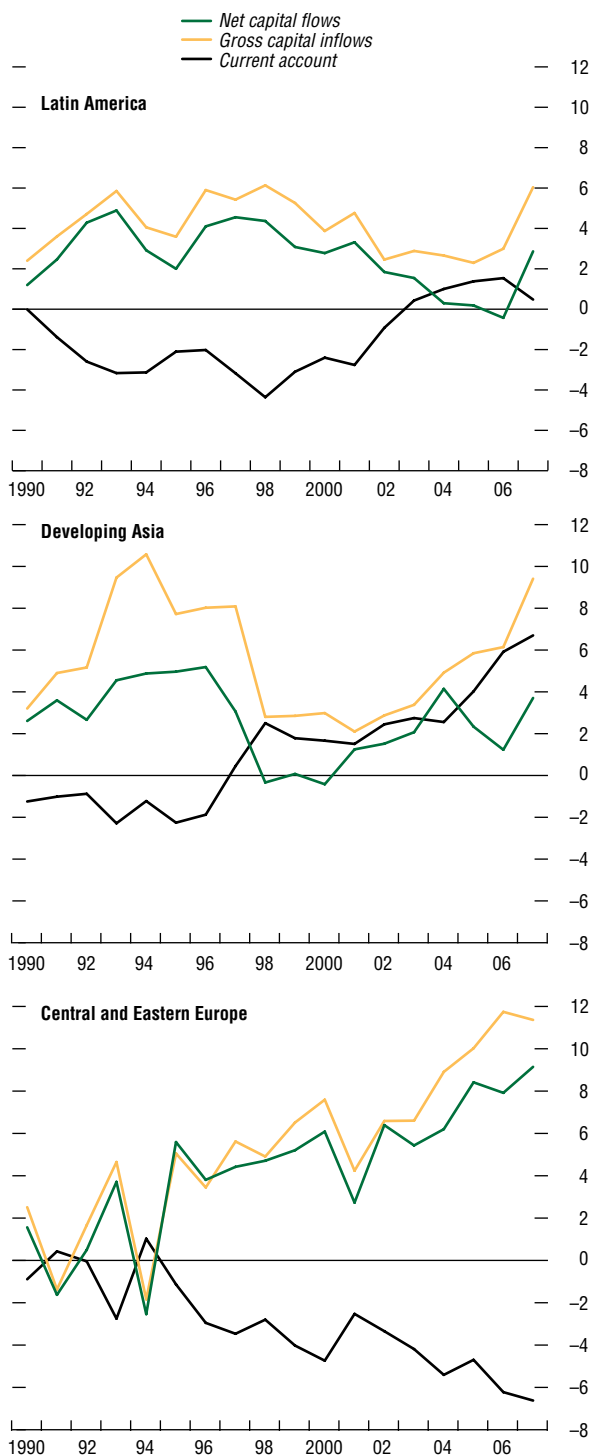
Performance of Emerging Market Equity Markets

After a period of lackluster growth, EM equity market prices rose significantly beginning in 2003 (Figure 4.1). This development was associated with a concomitant rise of EM capital inflows (Figure 4.2), which in net terms often masked the high level of gross capital inflows because of the growing role of EM cross-border outward investments (Figure 4.3).

In a number of the more mature emerging markets, the stock market capitalization-to-GDP ratio is now approaching that of advanced economies, although it is not certain that the ratio is sustainable in all cases (Figure 4.4). It is noteworthy that in many EM economies, total equity market returns have increased at a much faster pace than in advanced economies (Figure 4.5), although, on the whole, the price-earning ratios are comparable (Figure 4.6).

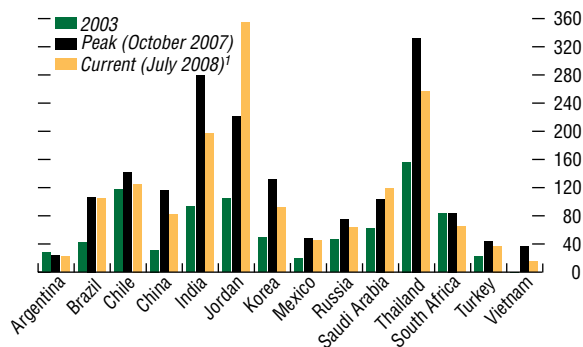
Foreign holdings of EM equity have increased overall since 2003, although not necessarily as a proportion of the total value of equities in all cases (Figure 4.7). In addition to push factors in this period, such as abundant global liquidity and a search for yield, growing nonresident holdings can be, at least partially, attributed to the diversification of the international investor base (IMF, 2007a) and the opening up and maturation of emerging financial markets (IMF, 2007b, Chapter 3). Although in principle a higher proportion of foreign equity holdings can increase the sensitivity of EM equity prices to changes in the global environment, the presence of foreign investors does not seem to be associated with larger equity losses since the October 2007 peak (Figure 4.8).

Figure 4.3. Current Account Balances and Capital Flows from a Global Perspective
(In percent of GDP)



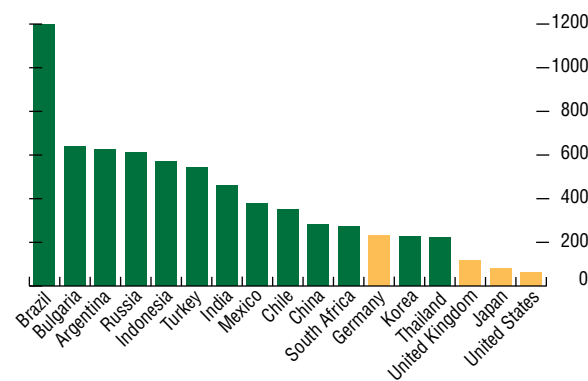
Source: IMF, World Economic Outlook database.

Figure 4.4. Stock Market Capitalization
(In percent of GDP)



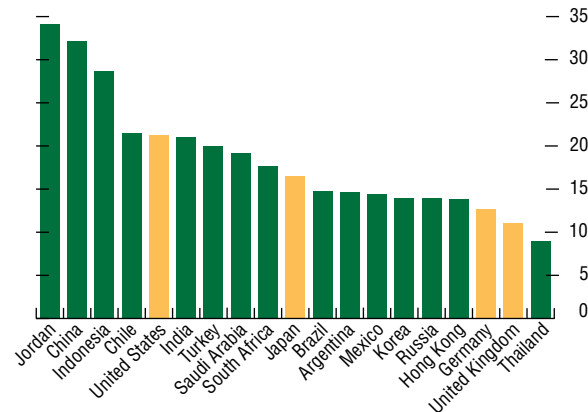
Sources: World Federation of Exchanges; Bloomberg L.P.; and IMF, World Economic Outlook database.
¹In percent of GDP for 2007.

Figure 4.5. Total Equity Market Returns
(January 2003–July 2008; percent change)



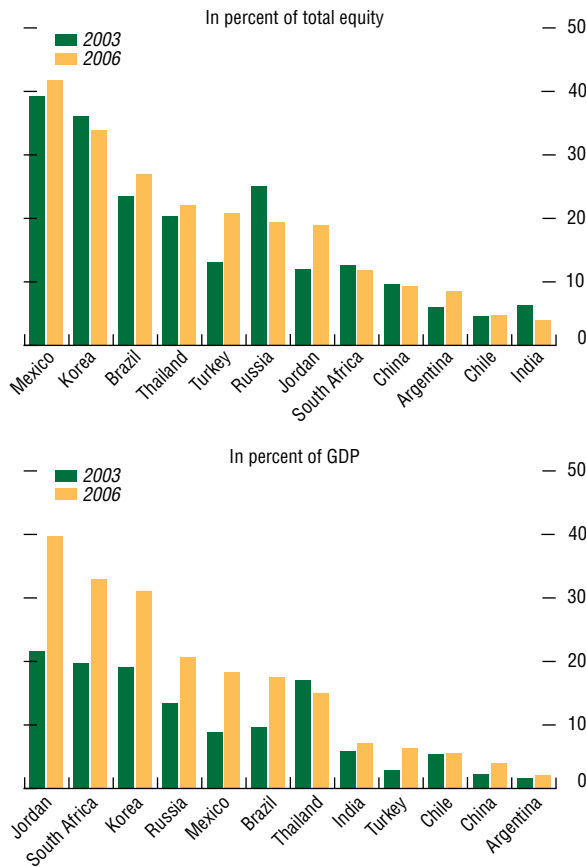
Sources: S&P Emerging Markets Database; and Datastream.

Figure 4.6. Price/Earnings Ratios, July 31, 2008



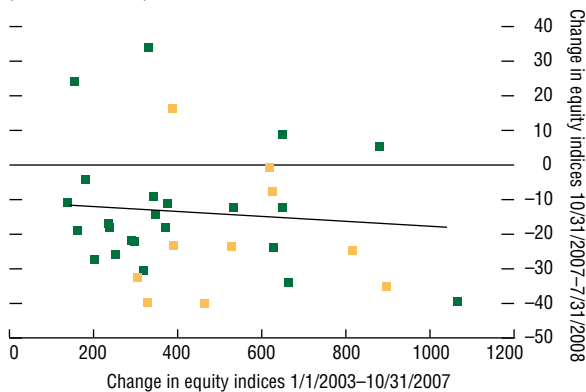
Sources: S&P Emerging Markets Database; Datastream; and Bloomberg L.P.

Figure 4.7. Total Foreign Holdings of Equity



Sources: IMF, Balance of Payments and World Economic Outlook databases.
 Note: For China, data refer to 2004 and 2006.

Figure 4.8. Emerging Markets Equity Indices and Foreign Investor Presence
 (Percent change)



Sources: IMF, World Economic Outlook and International Financial Statistics databases.
 Note: Green squares indicate countries with foreign holdings of equities exceeding 5 percent of GDP.

Table 4.1 compares the current partial reversal of equity prices to the previous equity cycle for eight EM economies that had experienced high price rises and subsequent abrupt declines in the context of more generalized crises in the 1990s. These eight EM countries and events are also compared to four previous stock market events in advanced economies as well as their price decline through end-August 2008. A few observations are noteworthy. Unlike the previous large and, in many cases, disorderly corrections, which emanated from generalized crises in EM countries, downward equity price adjustments to date have been shallower when compared to the high levels reached at the peak of the cycle. Clearly, however, the downward phase may not be over. Current equity price corrections in advanced economies are also shallower and more gradual than past events, and, in some cases, they follow a more modest stock market rise than in the past—for example, when compared to Japan’s bubble of the late 1980s and the dot-com bubble in the United States. During the upturn of the current cycle, stock market increases in advanced economies have also been modest relative to increases in EMs.

The fact that corrections to date have been only partial and more differentiated across EM countries points to a number of contrasts when compared to the previous cycle, including stronger and more differentiated country-specific fundamentals and deeper financial markets in EM economies, a substantial growth of “South-South” investment flows, and significant petrodollar recycling.

Cross-Country Equity Price Correlations

In principle more financial integration can increase EM equity price sensitivity to global events. Indeed, stock market correlations of EM economies with the United States have increased in recent years, and a simple pair-wise analysis indicates that on average the correlation between equity prices in a number of EMs’ main stock index and equity prices in the S&P 500 increased from 0.17 during the period January

Table 4.1. Emerging Equity Market Peaks and Troughs: Current and Previous Episodes

		Current Episode (October 2007–August 2008)							
		Equity Price Index (percent change)		Equity Market Capitalization/GDP			Price/Earnings		
		Rise to peak	Peak to current	At peak	At current	Difference	At peak	At current	Difference
Emerging markets									
Argentina		1,006	-14	24	20	4	15.8	13.5	2.4
Brazil		1,364	-14	107	93	14	16.7	7.6	9.1
Hong Kong SAR		226	-31	1,435	946	489	22.9	13.3	9.6
Indonesia		882	-18	47	43	4	30.2	27.1	3.2
Korea		590	-40	129	78	52	17.6	9.5	8.1
Mexico		417	-15	42	37	5	19.8	11.6	8.2
South Africa		467	-26	333	245	87	19.7	17.7	2.0
Thailand		402	-26	84	65	19	12.2	9.1	3.0
<i>Memorandum item:</i>									
Advanced economies									
Germany		339	-19	64	50	14	13.9	13.3	0.6
Japan		111	-18	111	92	19	21.4	16.0	5.4
United Kingdom		162	-27	152	111	42	13.1	12.2	0.9
United States		84	-17	152	127	25	18.3	24.7	-6.5
		Past Episode							
		Equity Price Index (percent change)		Equity Market Capitalization/GDP			Price/Earnings		
Peak to trough		Rise to peak	Peak to trough	At peak	At trough	Difference	At peak	At trough	Difference
Emerging markets									
Argentina	Feb. 2000–June 2002	86	-85	23	13	10	43.6	-10.2	53.8
Brazil	July 1997–Jan. 1999	134	-69	74	35	39	18.6	8.4	10.2
Hong Kong SAR	July 1997–Aug. 1998	99	-60	337	152	186	19.7	9.0	10.7
Indonesia	Jan. 1997–Sep. 1998	134	-92	42	10	32	24.0	-23.6	47.6
Korea	Apr. 1996–Aug. 1998	100	-83	37	14	23	16.5	-13.7	30.2
Mexico ¹	Nov. 1994–Feb. 1995	71	-64	28	25	3	17.9	16.4	1.6
South Africa	Jan. 1996–Aug. 1998	188	-64	214	106	109	20.3	7.8	12.6
Thailand	May 1996–Aug. 1998	174	-93	80	16	65	21.7	-1.9	23.6
<i>Memorandum item:</i>									
Advanced economies									
Germany	Feb. 2000–Sep. 2002	74	-63	81	31	51	24.7	9.6	15.1
Japan ²	Dec. 1989–July 1992	928	-52	140	55	85
United Kingdom	Dec. 1999–Mar. 2003	122	-47	200	88	112	28.6	16.5	12.1
United States	Aug. 2000–Sep. 2002	235	-46	180	98	82	28.7	31.4	-2.7

Sources: Datastream; S&P Emerging Markets Database; World Federation of Exchanges; and IMF, World Economic Outlook database.

Note: All peaks/troughs refer to equity price peaks prior to the onset of financial crisis and the last troughs associated with the crisis. Difference denotes subtraction. For the past episode, "rise to peak" describes index price appreciation experienced since the previous trough, while "peak to trough" measures price declines from the peak to the following trough. In the current episode, we take end-October 2007 (when the equity prices in the U.S. and many EM economies reached peaks) as the peak time. "Peak to current" in the current episode demonstrates price performance for equity indices from the market peak to end-August 2008.

¹For peak in 1994, stock market capitalization refers to December 1994.

²Equity market capitalization of TOPIX stock index.

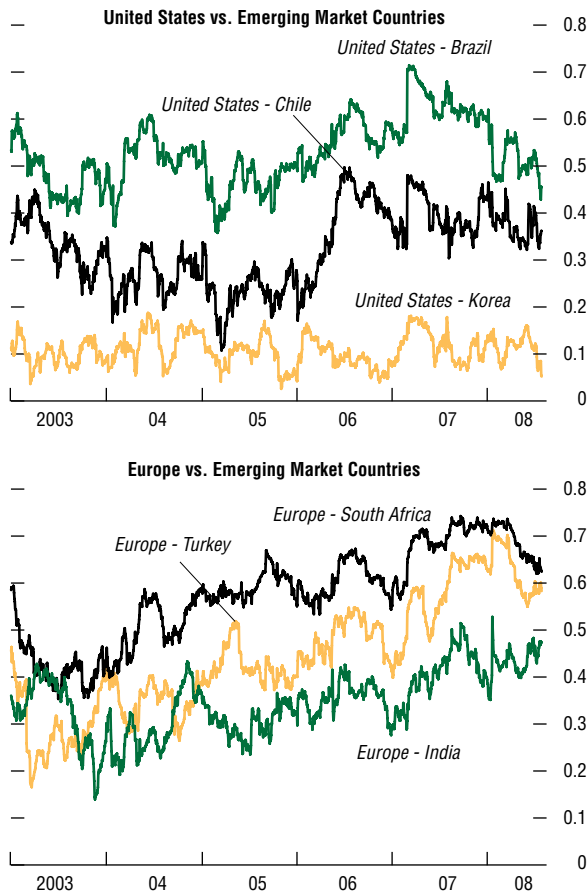
1998–December 2002 to 0.91 during the period January 2003–May 2008.¹

¹Correlations are known for being biased estimates of potential linkages as they are overestimated in times of high volatility and underestimated in tranquil times.

A more robust test, which allows for analyzing the co-movement of the stock markets by

Appropriate corrections, however, require assumptions about the reason for the bias.

Figure 4.9. Implied Correlations from Dynamic Conditional Correlation GARCH Specification



Sources: Datastream; S&P Emerging Markets Database; and IMF staff estimates.
 Note: GARCH = Generalized Autoregressive Conditional Heteroskedasticity.

inferring their correlation changes over time, also indicates varied but overall increasing correlation levels during the past five years.² Specifically, Latin American equity price indices are generally highly correlated with U.S. equities, peaking during the February 2007 short-lived turbulence (Figure 4.9).³ Correlations between mature European bourses, proxied by the Euronext 300 index, Emerging Europe, Middle East, and Africa (EMEA), and Asia have increased, albeit from a relatively low level. Similarly, correlations between EM equity markets have risen both within and across geographic regions (Figure 4.10).

Determinants of Emerging Market Equity Prices

To examine whether EMs are more susceptible to the global distress, we examine first what drives equity prices. There is an extensive literature on the driving forces of equity prices ranging from the Gordon (1962) model, which uses the expected real dividend growth and real discount rates as primary determinants, to more elaborate analyses by Campbell Harvey and Geert Bekaert, which include liquidity and risk premia measures.⁴ Expectations about the future path of dividend growth and discount rates can be influenced by global financial conditions such as the abundant liquidity experienced

²The Dynamic Conditional Correlation (DCC) Generalized Autoregressive Conditional Heteroskedasticity (GARCH) specification by Engle (2002) is used, estimated in a three-stage procedure. First, univariate GARCH models are fitted for each of the variables in the specification. Second, the intercept parameters are obtained from the transformed variables, and, finally, the coefficients governing the dynamics of the conditional correlations are estimated. See also Frank, González-Hermosillo, and Hesse (2008) for an application to the 2007 subprime crisis.

³In comparison, correlations between the United States and mature Europe and those between the United States and Japan have remained high and low, respectively, and generally stable throughout the five-year period.

⁴For more information on the work of Campbell Harvey and Geert Bekaert, see their respective websites at www.duke.edu/~charvey/curvit.htm and www.gsb.columbia.edu/faculty/gbekaert/.

during the run-up to the 1997–98 turbulence and 2003–07 asset price increases (IMF, 2000, 2007c) or irrational exuberance (Shiller, 2000, pp. xxi, 296), in addition to domestic micro and macro determinants. Empirical studies on the topic have been quite diverse in terms of model specification that embeds different hypotheses or explanations. However, despite the broad field of study in this area, the approaches focus primarily on two sets of factors as determinants of equity prices: domestic/fundamental and global/financial (IMF, 1998, 2000).

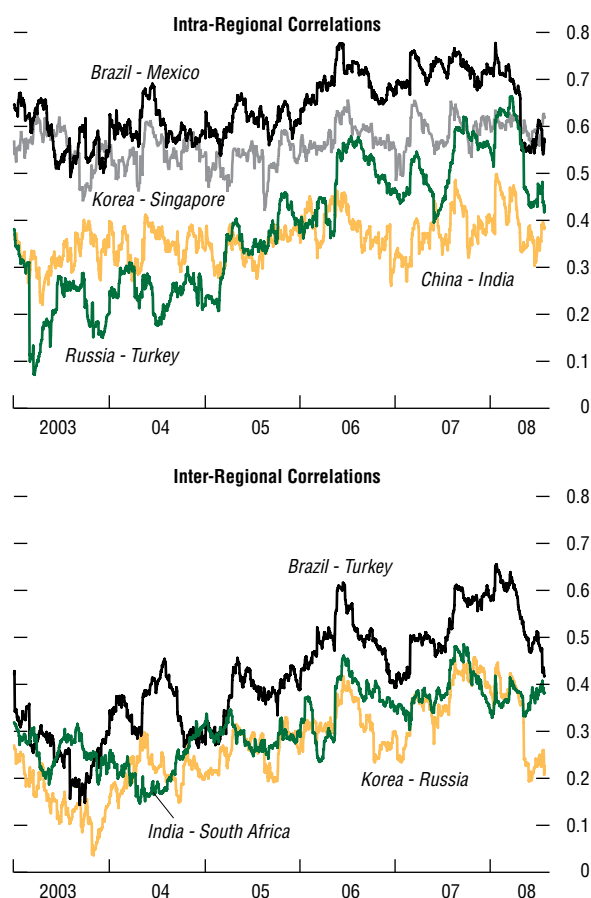
This section develops an empirical framework for assessing the determinants of EM equity prices. The framework employs fixed-effects panel data specifications for monthly observations—January 2001 to May 2008—covering 30 EM economies (see Annex 4.1 for a detailed presentation of the estimation specifications and results). The model utilizes two sets of explanatory variables:

- *Domestic or fundamental factors* include (1) economic growth; (2) the differential between domestic and global interest rates; (3) the forward exchange rate; (4) the inflation differential; and (5) equity market capitalization (measured as a ratio to GDP), which, in addition to price effects, captures increases in the volume of shares—such as new shares issued by listed companies and initial public offerings—and provides a proxy for equity market depth.⁵
- *Global factors* include proxies for (1) global excess liquidity (the difference between broad money growth and estimates for money demand in the euro area, Japan, and the United States); (2) credit risk premium (the level of the 10-year U.S. dollar swap spread); and (3) market risk premium (the implied volatility of the S&P 500 index [VIX]).

The estimation results for the full 30-country sample over the 89-month period suggest that,

⁵Although, at first view, the log change in equity prices and the stock market capitalization-to-GDP ratio may seem highly correlated, the correlation between the series is only 0.19 for the full country and period sample.

Figure 4.10. Emerging Market Countries: Implied Correlations from Dynamic Conditional Correlation GARCH Specification



Sources: Datastream; S&P Emerging Markets Database; and IMF staff estimates.
Note: GARCH = Generalized Autoregressive Conditional Heteroskedasticity.

Table 4.2. Fixed-Effects Panel Least-Squares Estimation of the Determinants of Emerging Market Equity Prices—Monthly Observations (January 2001–May 2008), 30 Countries, First Specification

Economies	30 Countries	Asia	EMEA	Latin America
Domestic factors				
GDP growth	0.5916 (0.0004)***	0.6191 (0.0193)**	0.4114 (0.1771)	0.3869 (0.0752)*
Interest rate differential	-0.0893 (<0.0001)***	-0.0923 (0.0772)*	0.0338 (0.6143)	-0.0391 (0.0616)*
Forward exchange rate	0.0260 (0.0002)***	0.0061 (0.2091)	0.3615 (<0.0001)***	0.2266 (<0.0001)***
Inflation rate differential	-0.0564 (0.0155)**	0.0033 (0.9497)	-0.0310 (0.3786)	-0.1900 (0.0002)***
Market capitalization/GDP ratio	0.5172 (<0.0001)***	0.7572 (<0.0001)***	0.3608 (<0.0001)***	0.6450 (<0.0001)***
External factors				
Global excess liquidity	1.0842 (<0.0001)***	0.4366 (0.0109)**	0.9136 (0.0024)***	1.0303 (<0.0001)***
Credit risk premium	-6.0922 (<0.0001)***	-2.8994 (0.0119)**	-4.8127 (0.0233)**	-6.7605 (<0.0001)***
Market risk premium	-0.2247 (<0.0001)***	-0.1381 (<0.0001)***	-0.2542 (<0.0001)***	-0.2839 (<0.0001)***
Foreign equity inflow	-0.0001 (0.1984)	0.0000 (0.8676)	0.0001 (0.4444)	0.0000 (0.0473)
Error correction term				
	-0.0472 (<0.0001)***	-0.0443 (<0.0001)***	-0.0408 (<0.0001)***	-0.0724 (<0.0001)***
Other factors				
Constant	-0.4429 (<0.0001)***	-0.6888 (<0.0001)***	-0.2933 (<0.0001)***	-0.5407 (<0.0001)***
Adjusted R^2	0.5663	0.7634	0.4671	0.7456
Time-series sample (monthly)	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008
No. of cross-section countries	30	12	12	6
No. of observations	2,294	892	875	527

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Market Database; Bloomberg L.P.; and Datastream.

Note: Probability values are in parentheses (***)significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level). EMEA = Emerging Europe, Middle East, and Africa.

for a given economy, equity prices are positively associated with GDP growth, an expected exchange rate appreciation, and an increase of market capitalization as a ratio to GDP (Table 4.2). As regards the global factors, all three are statistically significant, with global excess liquidity being positively related and credit and market risk premia having a negative relation to equity prices as expected.⁶ A comparison of the three main geographical regions

of Latin America, Asia, and EMEA indicates stronger spillover effects for Latin America as the three global factors remain significant and with higher negative coefficients than in the full country sample for credit and market risk. Equity prices in EMEA are being driven strongly by exchange rate expectations, while in Asia they have the closest positive association with rises in the market-capitalization-to-GDP ratio.

In response to the intuition that equity market capitalization may be serially correlated with equity prices, an alternative model specification is used, which replaces equity market capitalization with private sector credit growth as a proxy for domestic financial deepen-

⁶A fourth external factor, portfolio equity inflows, is statistically insignificant; this result is consistent with previous studies indicating no statistically apparent effect of foreign inflows on domestic equity prices (see, for example, IMF, 2007b, Box 1.3).

Table 4.3. Fixed-Effects Panel Least-Squares Estimation of the Determinants of Emerging Market Equity Prices—Monthly Observations (January 2001–May 2008), 30 Countries, Second Specification

Economies	30 Countries	Asia	EMEA	Latin America
Domestic factors				
Credit growth	0.7124 (<0.0001)***	0.6777 (<0.0001)***	0.4711 (<0.0001)***	0.3456 (<0.0001)***
GDP growth	0.3777 (0.0893)*	0.6727 -0.1785	0.1577 -0.6549	-0.1014 -0.7599
Forward exchange rate	0.0361 (0.0002)***	0.0162 (0.0774)*	0.3816 (<0.0001)***	0.6384 (<0.0001)***
Interest rate differential	0.0210 (0.4125)	-0.2244 (0.0228)**	0.1084 (0.1884)	0.0993 (0.0026)***
Inflation rate differential	0.0507 (0.1104)	-0.0720 (0.4711)	0.0532 (0.2212)	0.0188 (0.8076)
External factors				
Global excess liquidity	0.9203 (<0.0001)***	1.5011 (<0.0001)***	0.3663 (0.3334)	0.8726 (0.0235)**
Market risk premium	-0.2746 (<0.0001)***	-0.2699 (<0.0001)***	-0.3177 (<0.0001)***	-0.3514 (<0.0001)***
Credit risk premium	-6.7535 (<0.0001)***	-7.3195 (0.0011)***	-4.1517 (0.1277)	-7.0568 (0.0082)***
MSCI	0.1141 (0.0187)**	0.1744 (0.0168)**	0.0474 (0.5823)	0.1224 (0.1587)
Foreign equity inflow	0.0001 (0.2157)	-0.0002 (0.7282)	0.0004 (0.0169)**	0.0000 (0.2741)
Error correction term	-0.0358 (<0.0001)***	-0.0222 (0.1930)	-0.0305 (0.0003)***	-0.0660 (0.0002)***
Other factors				
Constant	0.0613 (<0.0001)***	0.0513 (<0.0001)***	0.0711 (<0.0001)***	0.0900 (<0.0001)***
Adjusted R^2	0.1842	0.1564	0.1825	0.4017
Time-series sample (monthly)	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008	Jan. 2001–May 2008
No. of cross-section countries	30	12	12	6
No. of observations	2,301	892	882	527

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Market Database; Bloomberg L.P.; Datastream.

Note: Probability values are in brackets (***significant at 1 percent level; **significant at 5 percent level; *significant at 10 percent level). EMEA = Emerging Europe, Middle East, and Africa; MSCI = Morgan Stanley Capital International world index.

ing, and includes the Morgan Stanley Capital International world index (MSCI)—a measure of prices from advanced stock markets—as an additional global push factor. The results are along the same lines as in the previous model and, in this case, credit growth and the MSCI are significant and positively related to equity price increases (Table 4.3). Along regional lines, under this specification as well, the results indicate global factors are strong in both Latin America and Asia, with global excess liquidity having a strong positive relation and global market and credit risk being significantly negative, although the MSCI shows no significant

effect in Latin America and EMEA. Exchange rate expectations are strongest in EMEA and Latin America, and domestic credit is significant in all three regions.

Two “what if” scenarios were performed to further analyze the impact of global factors on equity prices.⁷ The first scenario is a 10 percent decline in global excess liquidity—from its May 2008 level of 4.5 percentage points—and

⁷The results are specific to this model’s estimated coefficients, and a different analysis using a different methodology, country, and period coverage would likely come with slightly different results.

a 10 percent increase in both the credit and market risk premia. The results indicate that EM equity price growth would decline by 1.25 percentage points when all three global indicators worsen, with the liquidity indicator having the largest effect when applied individually. The second scenario, which is a much larger shock of zero excess liquidity and a sharp increase in risk premia, points to an equity price growth rate that could be as much as 16 percentage points lower than the base case.⁸

Spillovers and Their Impact

The results discussed in the previous section point to the strong influence of external factors on EM equity prices, thus indicating that spillovers play a potentially important role. This section considers an additional approach—vector autoregression (VAR)—in order to further test the role of co-movements in EM stock valuations. It then discusses the effect that such spillovers could have on consumption and investment when transmitted through the equities channel.⁹

A More Dynamic Analysis—Vector Autoregressions

A key limitation of the cross-economy panel regression approach used in the previous section is that it only allows for relatively simple interactions across economies. An analysis using a cross-economy set of VAR models allows for more precise disentangling of the separate spillover effects of unexpected changes in equity prices. Specifically, using the same sets of indicators that are statistically significant as

⁸The risk premia in the second scenario increase to their high levels of May 2000 for credit risk, which was at 1.39 versus 0.59 in May 2008, and August 1998 for market risk, which was at 44 versus 18 in May 2008. Psalida and Sun (forthcoming) contains an elaboration of these scenarios.

⁹This is a modest approach, as the data requirements and model specification do not lend themselves to testing directly for cross-border spillovers and potential contagion across a large number of EMs.

in the data panel, we estimate an eight-variable structural VAR model for seven economies—Argentina, Chile, China, Romania, Russia, Singapore, and South Africa.¹⁰ The VAR is partitioned into an exogenous foreign block and a country-specific block of variables. The foreign block includes global excess liquidity and credit and market risk premia in the United States, while the economy-specific block includes (economy-specific) GDP growth, the forward exchange rate, the interest rate and inflation rate differentials, and the market-capitalization-to-GDP ratio.¹¹ The data have monthly frequency, typically available for January 2001 to May 2008.¹²

Overall, the results of the dynamic VAR analysis are in line with those in the panel regressions. (Figures 4.11–4.13 in Annex 4.2 present some of the impulse responses for the seven countries examined.) Three observations can be made: (1) most individual equity price responses to shocks in the global indicators are as expected and in the same direction as for the panel; (2) the equity price response tapers off after three months in most cases; and (3) smaller countries have slightly larger responses overall.

¹⁰The seven economies are selected using the criterion of the most and the least open in their respective geographic region among the overall 30-country sample based on the Chinn-Ito Financial Openness Indicator. The least open economies are Argentina, China, and Russia, while the most open are Chile, Romania, Singapore, and South Africa.

¹¹The lag length is selected using Schwarz's Bayesian information criterion, which points to one lag except for Romania (two lags).

¹²Granger Causality/Block Exogeneity Wald Tests were carried out to identify the exogeneity of variables. Wald statistics show that global excess liquidity, and credit and market risk premia, are generally not influenced by other variables in the model and are therefore treated as exogenous. Moreover, the Cholesky decomposition method (degrees-of-freedom adjusted) is used to transform the impulses. Several different orderings were performed keeping the most exogenous variable first and the most endogenous last. Changes in the ordering of the variables do not have a material effect on the statistical significance of the spillover effects.

Impact of Emerging Market Equity Valuation on Consumption and Investment

Does the significant impact of stock market changes on the consumption of advanced economies carry over to emerging markets? Research has shown that while results vary depending on the methodology or sample period used, estimates in the United States regarding changes in consumption are 0.3 to 0.7 percent for every 10 percent fluctuation in the real returns in the stock market. Similarly, wealth effects are estimated to be 0.15 to 0.3 percent in Japan and 0.1 to 0.3 percent across various European countries.¹³

The relationship between equity fluctuations and consumption patterns is also robust across emerging market countries, but is often of smaller magnitude, in most cases probably due to the lower and more concentrated domestic participation rate in the equity market and the relatively recent significant increases in equity valuations relative to GDP. Estimates for 22 EM economies indicate a statistically significant but small real wealth effect of about 0.15 percent for a 10 percent change in the stock market between 1985 and 2007 (see Box 4.1 for more details).

The effects of stock market valuation changes are also relevant for a number of other macroeconomic variables such as government revenues and private investment. Results from estimating a simple model for private investment suggest that a 10 percent change in stock prices would lead to about a 1 percent change in investment, which is a substantially stronger effect than on private consumption.¹⁴

¹³For more information, see IMF (2000, 2002), Ludwig and Sløk (2004), and Slacalek (2006), among others.

¹⁴It should also be noted that, when comparing the investment of publicly listed firms to aggregate private investment, in a number of EMs, unlisted companies may represent a larger share of economic activity. Nonetheless, their dynamics seem to mirror those of the aggregate economy.

The Role of Local Institutional Investors

It has been argued that a broad and diverse domestic investor base can cushion the domestic capital market from abrupt changes in international investor sentiment. The growing role of EM institutional investors—as funded pension schemes and insurance sectors grow across EM economies—contributes to broadening and diversifying the pool of investment into EM equities, both domestically and across EM borders. (Box 4.2 discusses aspects of this issue.)

The long-term horizon of institutional investors, such as pension and mutual funds and insurance companies, can play a stabilizing role in domestic equity markets. At the same time, the rise of more active and short-term-oriented local investors, such as hedge funds and private equity funds, albeit rather small at present, diversifies and broadens the investor base, although herding behavior among some more active participants potentially could also exacerbate market volatility during a downturn or financial turmoil.

Key Results and Conclusions

The key results from the empirical analysis above suggest that both global forces and domestic economic fundamentals contribute to emerging equity prices. More specifically, the panel estimations and the vector autoregression analysis presented in the previous sections can be summarized as follows:

- There is evidence of spillovers to emerging markets through the equity market channel as shown by the significant negative relationship of global credit and market risk premia, and the positive relationship of global excess liquidity to EM equity prices, indicating that emerging equity markets are integrated with advanced economies.¹⁵
- Strong domestic economic growth and indicators of financial deepening such as credit

¹⁵These results are consistent with studies on Asian and Latin American economies (IMF, 2007c, 2008a, 2008b).

Box 4.1. Is There a Stock Market Wealth Effect in Emerging Markets?

This box examines whether stock market valuation changes in emerging markets would affect consumption and finds that there is such an effect. With large increases in emerging equity prices in recent years and a fairly sharp recent correction, the magnitude of the impact of stock market wealth on household consumption becomes of interest.

Although there is a large body of literature about the effect of asset price changes on private consumption in advanced economies, such studies are scarce for emerging market (EM) economies.¹ To shed more light on the relationship between stock market valuation changes and private consumption, a simple two-step panel model following Bayoumi and Edison (2003) is estimated, covering 1985–2007 for 22 EMs in the Morgan Stanley Capital International EM equity index (MSCI).² The two-step procedure allows for differentiation between the long- and the short-run stock market wealth effects.³

At the first stage, the following levels-equation is specified:

$$C_{it} = \alpha BM_{it-1} + \beta GDP_{it-1} + \gamma SM_{it-1} + \varepsilon_{it}, \quad (1)$$

where

C_{it} = log real private consumption expenditure per capita in country i and year t ,

BM_{it-1} = log real broad money per capita and a proxy for money wealth

Note: Heiko Hesse prepared this box.

¹Estimates of stock market wealth effects in the United States range from 0.3 to 0.7 percent for a 10 percent change in equity prices and vary across other advanced economies (see, for example, Bayoumi and Edison, 2003; Slacalek, 2006; and IMF, 2000, 2002). Funke (2004) presents evidence of a small but statistically significant stock market wealth effect in 16 EMs over 1985–2000 ranging from 0.2 to 0.4 percent.

²The countries are Argentina, Brazil, Chile, China, Colombia, Czech Republic, Hungary, India, Indonesia, Israel, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Thailand, and Turkey.

³The long-run impact from changes in the stock market index on private consumption expenditure per capita refers to the estimated sample from 1985–2007 (and to 1997–2007 for one specification).

Stock Market Wealth Effect, 1985–2007

(Percent change in private consumption expenditure from a 10 percent change in stock market returns)

Model Specification	Short-Run	Long-Run
Baseline	0.12 (0.029)**	0.15 (0.002)***
Threshold of +/- 20 percent	0.12 (0.092)*	0.14 (0.057)*
Threshold of +/- 30 percent	0.07 (0.381)	0.36 (0.001)***
1997–2007	0.12 (0.094)*	0.21 (0.005)***

Sources: IMF, World Economic Outlook and International Financial Statistics databases; World Bank, World Development Indicators database; S&P Emerging Markets Database; Bloomberg L.P.; Datastream; and IMF staff estimates.

Note: The results are based on a two-step procedure with estimates from a short- and long-run relationship. The threshold of +/- 20 percent includes only observations where the stock market increased/decreased by more than 20 percent during any given year. The models are estimated with country fixed effects and include year dummy variables as well as robust standard errors. Nonstationarity and cointegration tests were conducted. P-values are in parentheses: *** significant at 1 percent level; ** significant at 5 percent level; and * significant at 10 percent level.

GDP_{it-1} = log real GDP per capita capturing household income, and

SM_{it-1} = log real stock market index.

At the second stage, differences are taken of the variables in equation (1) and an error correction mechanism (ECM), taken as the residual from (1), is introduced as well as the inflation rate.

$$C_{it} = b_1 \Delta BM_{it-1} + b_2 \Delta GDP_{it-1} + b_3 \Delta SM_{it-1} + b_4 ECM_{it} + b_5 inflation_{it-1} + \varepsilon_{it} \quad (2)$$

where b_3 is the short-run marginal propensity to consume out of equity wealth, proxied by the change in stock market returns, and b_4 is the rate at which the system converges to deviations from long-run equilibrium.

The table presents estimated stock market wealth effects under different model specifications, distinguishing between the long- and short-run relationship. A 10 percentage increase in the stock market valuation would on average lead to an increase of private per capita consumption of 0.12 percent in the short run and 0.15 percent in the long run. These

results are of the same order of magnitude as Funke (2004). Restricting the sample period to 1997–2007, when stock market valuations exhibited large increases as percent of GDP, shows a slightly higher stock market wealth effect.

Additional specifications consider the effect of large valuation changes, where the equity market increased/decreased by more than 20 and 30 percent, respectively, in any given year. These findings suggest a slightly more pronounced wealth effect for the 30 percent threshold.⁴

In addition to private consumption, the wealth effects of stock market valuation changes are also relevant for a number of other key macroeconomic variables, notably govern-

⁴The model presented here does not take into account other factors affecting household wealth, such as increases in real estate values, structural differences across EM financial markets, such as depth and volatility, and the relatively low degrees in EMs of consumer leverage and stock market participation.

ment revenues and private investment. A simple fixed-effects model (with year dummy variables) of real private investment regressed on contemporaneous and lagged real stock market returns for 19 EM countries over the period 1985–2007 suggests that a 10 percent change in stock prices would lead to about 1 percent change in investment. This is in line with the results in Henry (2000), who utilizes the same methodology.

Overall, the findings suggest that there is a stock market wealth effect in EM countries, albeit smaller than in advanced economies. What are the possible implications for policymakers? The significant effect of stock market fluctuation on private consumption and therefore demand is something that policymakers need to be aware of, especially since large build-ups of asset prices are often followed by busts. Such considerations become even more relevant as—with continuing financial integration—domestic asset prices are increasingly influenced by regional and global factors.

growth and higher market capitalization are key driving forces for equity prices, which supports the view that high EM equity prices are driven, at least partially, by underlying domestic fundamentals.

- Exchange rate expectations have been playing an important role in determining EM equity prices. The effective appreciation of EM currencies during the U.S. dollar's recent depreciation has contributed to EM equity price rises.

These results are reinforced by the results of the VAR models and the increased correlations during recent years between EM stock market indices and indices in Europe and the United States as well as rising correlations between EMs themselves.

The empirical analysis also suggests a relatively small but significant impact of changes in EM stock market valuations on EM con-

sumption and investment. In general, there is no one-size-fits-all approach for dealing with the stock market wealth effect. The approach should be country-specific, depending on domestic factors such as the monetary policy framework, financial regulation, the degree of consumer leverage, especially for retail investors, and the level of stock market participation in the economy.

The empirical results point to a number of macroeconomic policy challenges facing the authorities in emerging markets. The protracted global financial crisis and dual inflation and growth threats are presenting a more serious test for emerging markets:

- As the experience of the past year has shown, emerging market authorities need to be alert to the negative impact of slowing global growth and its effect, among other factors, on EM asset prices.

Box 4.2. The Role of Emerging Market Institutional Investors in Emerging Market Equities

This box examines the evolving role of emerging market institutional investors in emerging stock markets and notes illustrative examples from a few selected countries. Emerging institutional investors with a long-term horizon can play a stabilizing role in emerging equity markets, while herding behavior among more active and short-term-oriented institutional investors could potentially exacerbate market volatility during a downturn or financial turmoil.

Financial globalization has been associated with increasing emerging market (EM) investor diversification (IMF, 2007a, 2007b, Chapter 1). In recent years, the EM institutional investor (EMII) base, including pension funds, insurance companies, and mutual funds, has grown substantially in many EM countries. Specifically, total assets of EM pension funds have risen by more than 140 percent since 2000, driven by both rising asset prices and the growth of domestic pension systems (first

figure). The strong growth of the EM mutual fund industry corresponds with rapidly increasing equity valuations, fast income growth, and the emergence of a growing middle class channeling some of its savings away from traditional bank deposits.

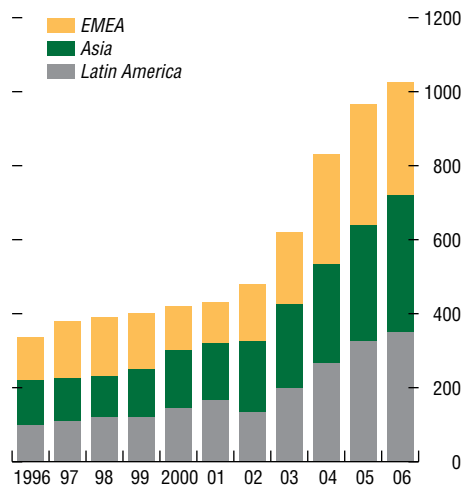
In recent years, countries such as Brazil, Korea, Malaysia, and Mexico have adopted legislation to build up their insurance and mutual fund sectors as well as domestic pension systems, while some have also eased domestic as well as outward investment limits by EMIIIs. In addition, some EM sovereigns have set up new types of investment funds—often to complement their sovereign wealth funds—that actively invest in foreign assets in both advanced and other emerging markets, including equities.¹

Despite its growth in recent years, the level of the EMII asset base remains relatively small

Note: Heiko Hesse is the primary author of this box.

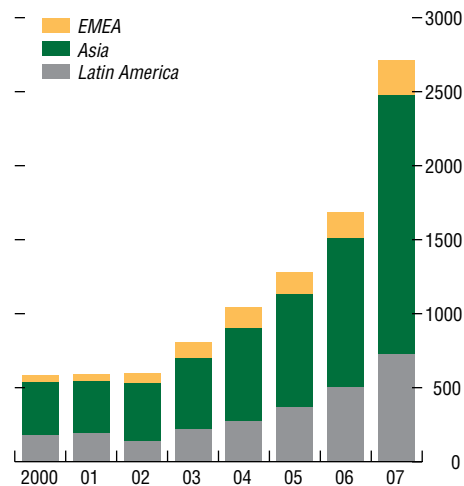
¹Sovereign wealth funds typically invest most of their assets beyond their national borders, with a few exceptions where they are also active players in domestic financial markets.

Emerging Market Economies: Pension Fund Assets Under Management
(In billions of U.S. dollars)



Source: JPMorgan Chase & Co.
Note: EMEA = Emerging Europe, Middle East, and Africa.

Emerging Market Economies: Total Assets Under Management of Mutual Funds
(In billions of U.S. dollars)



Source: Investment Company Institute.
Note: EMEA = Emerging Europe, Middle East, and Africa.

compared to that of advanced economies, and it varies across countries and regions (second figure). For example, Turkey's mutual fund industry and private pension funds are very small compared to some of their middle-income peers, with 70 percent of the free float on the stock market held by nonresidents.² In contrast, South Africa has a thriving and large EMII base with the state-owned pension fund (Public Investment Corporation—PIC)—one of the largest in the world—being the biggest domestic equity holder, and with the insurance sector having the highest penetration (in terms of premia to GDP) among EMs. Similarly in Brazil, a large and diverse EMII base has contributed to the deepening of the financial market. However, compared to advanced economies, the asset allocation of pension funds and insurance com-

²The relatively undeveloped state of Turkey's nonbank financial sector may be partly due to past periods of macroeconomic volatility and high inflation. Recent legislation with regard to private pension funds and insurance led to some rapid growth of the local EMII asset base, albeit from a low level.

panies in many EMs tends to include a higher proportion of government securities, in part due to government regulation.

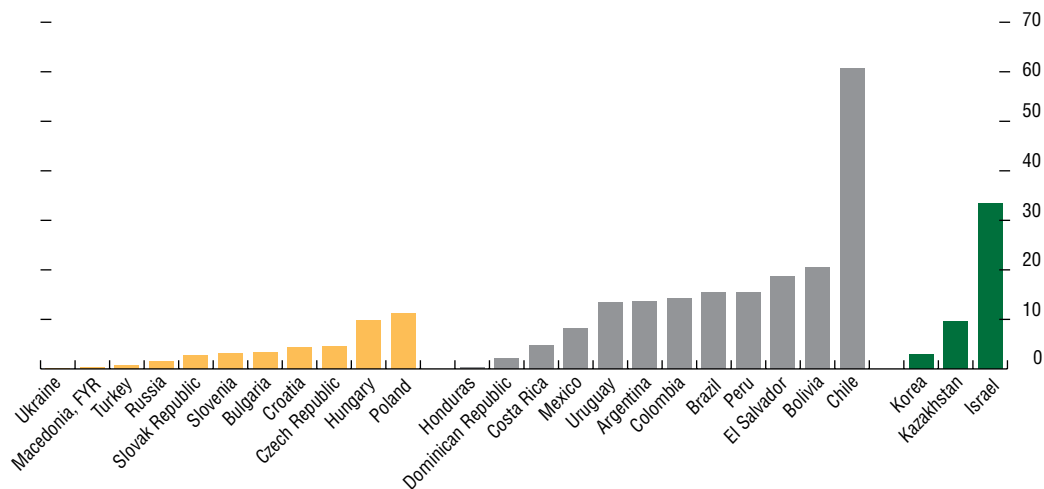
Amplifiers or Not?

In principle, a diverse investor base—with regard to investment horizons and risk appetite—can contribute to financial stability, especially by spreading risks more widely. In practice, however, whether EMII are a stabilizing factor moderating boom-and-bust cycles in equity markets depends on their asset allocation behavior, which in turn is driven by their risk profile, investment horizon, liability profile, and constraints imposed by their governance and regulation.

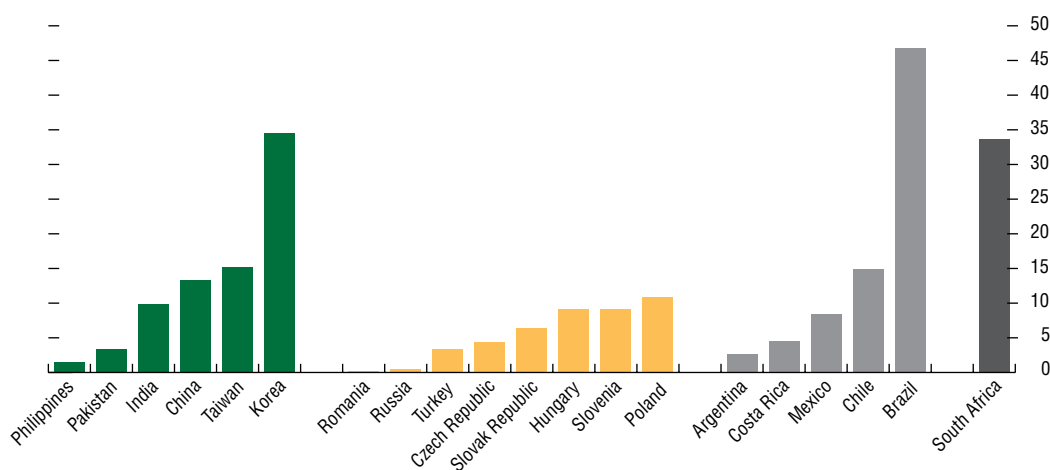
The stable investment horizon and typically buy-and-hold behavior of pension funds and insurance companies can contribute to a financially stable base for domestic stock markets.³ These EMII are able to keep their

³See Roldos (2007) for a discussion of instances where pension funds can contribute to asset price distortions.

Pension Fund Assets in Selected Countries, 2006
(In percent of GDP)



Sources: International Federation of Pension Funds Administrators; OECD; IMF, World Economic Outlook database; and IMF staff estimates.

Box 4.2 (concluded)**Mutual Fund Assets in Selected Countries, 2007**
(In percent of GDP)

Sources: Investment Company Institute; European Fund and Asset Management Association; and other national mutual fund associations.

asset allocations unchanged during market downturns or even go against market trends and may enhance the depth and breadth of equity markets. In addition, guided by their mandate, they pursue portfolio reallocations gradually, which can limit abrupt price movements. For example, in Korea, institutional investors' stable funding to the market can act as a buffer against the reversal of foreign equity inflows, especially since they are highly domestically oriented in their portfolios. However, the regulatory changes of recent years are reducing home bias, as indicated by the increasing foreign allocations of the Korean National Pension Fund as well as retail investors.

In some larger EM countries, foreign investors, including hedge funds, can contribute

to equity price volatility. For example, foreign investor sentiment dominates developments in the Turkish stock market since free float holdings of local EMIs are small compared to those of nonresidents. In the Brazilian equity market, one-third of the trading volume is by foreign investors, and nonresidents were the main players in the initial public offerings market until this segment significantly slowed following the onset of the international financial turbulence.

Overall, the EMII base is expected to continue to grow, benefiting from high GDP and export earnings growth and further enabling reforms and regulation, especially in the domestic pension systems and asset allocation liberalization, leading to a larger investment share of EMIs in emerging equities.

- Changes in exchange rate expectations and a perception that monetary policy is “behind the curve” could be a possible trigger for further EM equity price declines. Therefore, greater

exchange rate flexibility may help reduce pressures related to one-way exchange rate bets, while prompt and transparent monetary policy may help stabilize investor risk appetite.

The empirical results discussed above and the policy challenges associated with them point to the need to enhance the structural resilience of emerging equity markets. Although not directly stemming from the empirical work presented, there are a number of actions that facilitate the development of emerging capital markets more broadly and enhance their resilience:

- Fostering deeper and more liquid capital markets with diverse institutional investors, including domestic and foreign as well as both buy-and-hold and active participants, helps improve the resilience of a national financial market to withstand shocks.
- Establishing funded pension schemes and a domestic insurance sector broadens the local institutional investor base and creates demand for long-term financial instruments.
- Increasing the demand for long-term instruments may in turn facilitate the development of more diverse local financial products. This may entail extending the yield curve on sovereign and corporate fixed-income securities as well as equities, which would help to deepen and diversify domestic financial markets and, therefore, help to mitigate sensitivity to external shocks.¹⁶
- The benefits of discretionary interference by the authorities in a structured and formally regulated market—for example, to artificially delay or limit the magnitude of price declines during times of financial stress—need to be counterbalanced against possible reputational costs that can derail capital market development over the medium term.
- When reforms are adopted in the legal, regulatory and prudential, and accounting systems, they need to be consistent with international standards.
- At the firm level, the governance and transparency of performance and decision-making structures need improvement, and greater

¹⁶For example, in Korea the strong growth of local savings instruments such as mutual funds, of which over 50 percent are invested in equities, has increased the household sector's stake in equity markets substantially.

emphasis needs to be put on strengthening risk management.

As regards the development of EM equity markets more concretely, robust securities market infrastructure and institutions, including in the securities exchange and clearing systems, are necessary for developing a sound capital market.¹⁷ Specifically, a well-functioning securities market and supporting infrastructure—such as repo markets, margin trading, securities lending, and derivatives markets—can reduce transaction costs and foster liquidity. A well-structured stock exchange also spreads risks through loss-sharing arrangements with members. Systemic risk is reduced when trading occurs in a formally regulated exchange that engages in market surveillance, undertakes adequate disclosure, and imposes appropriate margin requirements and position limits. Careful implementation is important at each stage:

- Enhancements to the securities market infrastructure and the introduction of new financial instruments in particular need to be properly sequenced, and with appropriate oversight in place, so as to reap the full benefits of innovation, while at the same time managing with due care the risks to financial stability and ensuring the proper functioning of markets.
- Derivatives markets in particular need to be developed within an appropriate framework of solid product design, regulation, and sound market infrastructure and oversight.
- A prerequisite for a proficient short selling mechanism is a well-functioning stock-lending system, which can develop with a sufficiently large participation of stock lenders to reduce the costs of covering short positions and, overall, to minimize the occurrence of a short squeeze. It should also be noted that

¹⁷For further elaboration on these topics, see Purfield and others (2006), Fratzscher (2006), and Shah and others (forthcoming). See Ghosh and Revilla (2007) for a discussion on East Asia in particular.

introducing shorting in a bearish equity market could exacerbate the downturn.

In sum, while EM economies have so far remained relatively unaffected by the global turbulence, this chapter shows that they are not immune. Active steps to enhance their resilience are still needed in most EM countries.

Annex 4.1. Panel Estimation Specification and Results¹⁸

Two panel fixed-effects data models are employed to examine the factors driving equity valuations. In addition, the analysis employs nonstationary panel techniques to deal explicitly with the nonstationarities that are present in some individual time series that constitute the members of the panel. The error correction terms from the panel cointegration are taken as inputs to the driving factors panel specification. Therefore, this combination of conventional and nonstationary panel techniques allows us to focus explicitly on the stochastic and nonstochastic long-run trend features of the data and filter out the effects of short-run transitional dynamics.

Two steps are taken in each group of models.

Step 1. Unit root tests are performed for all variables and then cointegration tests are executed for nonstationary variables. The regressions of the price indices and nonstationary explanatory variables are then run to obtain error correction terms.¹⁹

Step 2. The driving factor model is run by incorporating the error correction terms.

Data Panel with Equity Market Capitalization

The first panel uses a monthly sample of 30 economies from January 2001 to May 2008.²⁰ The dependent variable—equity price growth—

is modeled as a function of five domestic indicators, four global or external indicators, and an error correction term. The coefficients for these variables provide a measure of the magnitude of spillovers.

The panel regressions are run on a sample of the following 30 economies:

Asia: China, Hong Kong SAR, India, Indonesia, Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, and Vietnam.

Europe, Middle East, and Africa (EMEA): Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Nigeria, Romania, Russia, South Africa, and Turkey.

Latin America: Argentina, Brazil, Chile, Colombia, Mexico, and Peru.

The dependent variable in the panel regression is the log change in the U.S. dollar equity price indices, while the panel cointegration utilizes the log level in the U.S. dollar equity price indices. The independent variables are as follows:

- Domestic Factors
 - (a) GDP growth: The change of the monthly consensus forecast for annual GDP growth rate in the Consensus Forecast Database, in local currency, as a proxy for macroeconomic fundamentals;²¹
 - (b) Interest rate differential: The spread between the one-year domestic and the six-month U.S. treasury rates;²²
 - (c) Exchange rate expectation: The log change in forward exchange rates (including nondeliverable forward rates in 18 economies for which data were available); the log level in forward exchange rates in the panel cointegration;
 - (d) Inflation rate differential: The difference between the domestic and the U.S. monthly inflation rates;

availability, especially portfolio equity inflows, was much improved from that date.

²¹Forecasted GDP growth is chosen as a proxy for fundamentals rather than corporate profits, dividend yield, or taxes for reasons of data availability for this country sample.

²²We use the six-month U.S. treasury rate because we do not have the one-year U.S. treasury rate for the full period sample.

¹⁸Tao Sun prepared this annex.

¹⁹See Psalida and Sun (forthcoming) for more details on panel cointegration tests performed on these data.

²⁰The period since 2001 is chosen for two reasons. First, 2001 marked the beginning of a long upward trend for EM equities starting from a low point. Second, data

(e) Equity market capitalization: Equity market capitalization-to-GDP ratio, calculated as $(1 + \text{growth of market capitalization}) / (1 + \text{GDP growth})$ in the panel regressions, as a proxy of capital market size; the log level of equity market capitalization in the panel cointegration.

- Global or External Factors
 - (a) Global excess liquidity: The difference between broad money growth and estimates for money demand in the euro area, Japan, and the United States;
 - (b) Market volatility premium: The implied volatility of the S&P 500 index (VIX) as a proxy for market volatility;
 - (c) Credit risk premium: The level of the 10-year U.S. dollar swap spread, which is the difference between the 10-year U.S. dollar swap rate and the 10-year U.S. treasury note, as a proxy for aggregate default risk;²³
 - (d) Portfolio equity inflows: The growth of flows to emerging markets' (Asia, EMEA, and Latin America) equity funds as a proxy for portfolio equity inflows.

Error Correction Term

By employing nonstationary panel techniques, we obtain error correction terms from the panel cointegrations among log equity price index, log market capitalization, and the log forward exchange rate. The economic rationale for this cointegration is as follows: equity prices are related to market capitalization; an expected exchange rate appreciation could promote capital inflows and encourage domestic capital to remain in domestic equity markets, thus driving up equity prices. The results indicate that a 1 percent reduction in the error correction term is associated with a 0.05 percent increase in equity price growth, reflecting the adjustment over time for closing the gap with respect to the long-run relationship between these variables (see Table 4.2 for the results).

²³For similar approaches see Hartelius, Kashiwase, and Kodres (2008), and Gonzalez-Hermosillo (2008).

Table 4.4. Unit Root Tests

	Log Equity Price Indices	Log Forward Exchange Rate	Log Market Capitalization
Levin-Lin rho-stat	4.13	1.99	4.76
Levin-Lin t-rho-stat	5.39	3.73	6.81
Levin-Lin ADF-stat	3.57	3.87	4.57
IPS ADF-stat	4.30	1.14	5.22

Sources: IMF, International Financial Statistics database; S&P Emerging Markets Database; Bloomberg L.P.; and Datastream.
Note: The critical values are -1.28 (10 percent) and -1.64 (5 percent).

Unit Root Tests and Panel Cointegration Test

Unit root tests show that the indicators used in panel cointegration tests—the log equity price index, log market capitalization, and log forward exchange rate—are nonstationary, while all other variables used in the panel regressions are stationary (Table 4.4). According to the Pedroni panel cointegration tests performed on the log equity price index, log market capitalization, and log forward exchange rate, the majority of statistics point to the conclusion that the variables are cointegrated (Table 4.5) (Pedroni, 1999).

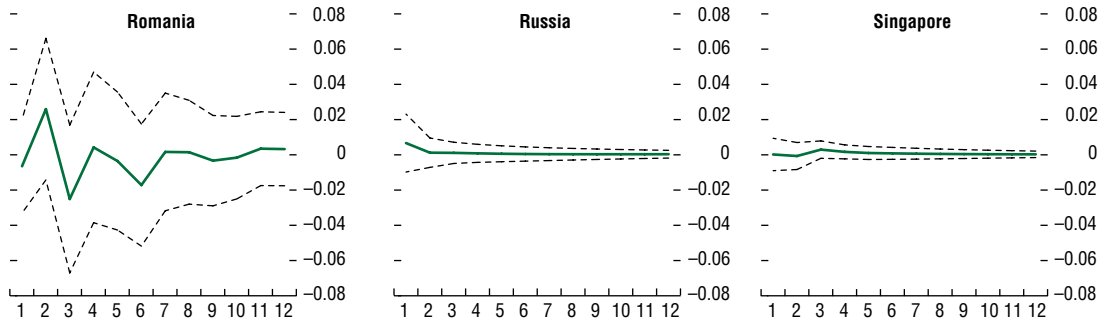
Table 4.5. Pedroni Heterogeneous Panel Cointegration Tests

	Log Equity Price Index, Log Forward Exchange Rate, Log Market Capitalization
Panel v-stat	3.47**
Panel rho-stat	-3.67**
Panel pp-stat	-2.16**
Panel adf-stat	1.34
Group rho-stat	-4.28**
Group pp-stat	-3.69**
Group adf-stat	1.49

Sources: IMF, International Financial Statistics database; S&P Emerging Markets Database; Bloomberg L.P.; and Datastream.

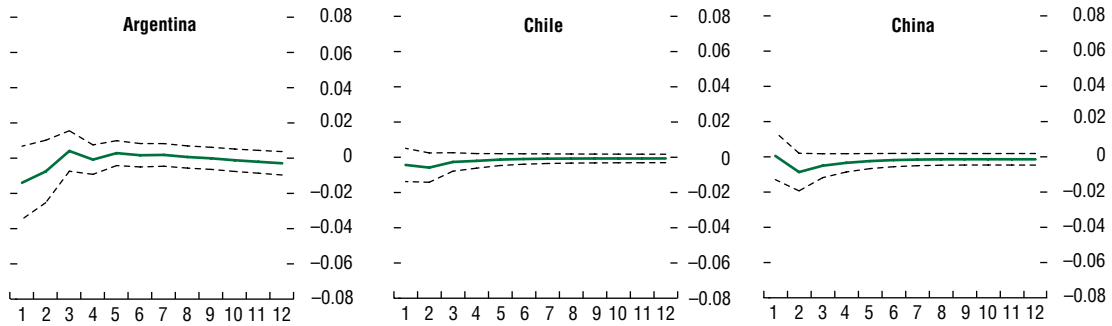
Note: The first four tests are pooled within-dimension tests and the last three tests are group mean between-dimension tests. Specifically, the first three statistics correct for serial correlation, the fourth parametric test similar to the ADF-type test allows the number of lags in the model to be estimated directly. The last three statistics treat the parameter of interest as varying across the members of the panel. The critical values for the variance statistic (v-stat) are 1.28 (10 percent) and 1.64 (5 percent), and those for all others are -1.28 (10 percent) and -1.64 (5 percent).

Figure 4.11. Equity Price Response to Global Excess Liquidity Increase
(Percentage points)



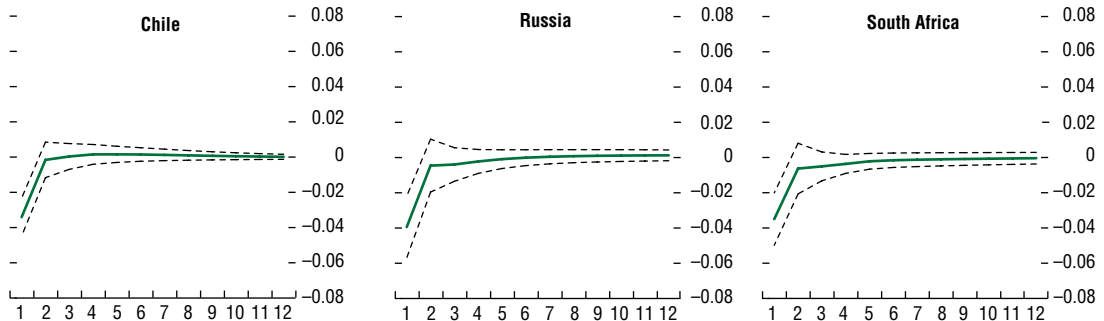
Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Figure 4.12. Equity Price Response to Credit Risk Premium Increase
(Percentage points)



Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Figure 4.13. Equity Price Response to Market Risk Premium Increase
(Percentage points)



Sources: S&P Emerging Markets Database; Datastream; and IMF staff estimates.
Note: The solid line represents impulse response; the dotted lines are two-standard-error confidence interval.

Data Panel with Domestic Credit and the MSCI

The second panel employs the same countries, frequency of data, and explanatory variables, the only difference being that equity market capitalization is replaced by private credit in the domestic factors and the MSCI is added to the global factors. Specifically:

- Domestic credit: The log change in the credit to the private sector, as a proxy for financial deepening; and
- MSCI: The log change in the Morgan Stanley Capital International world index of 23 major stock markets.²⁴

See Table 4.3 for the results.

Annex 4.2. Vector Autoregression Model Results

Figures 4.11 to 4.13 in this annex present some of the equity price impulse responses for the seven countries examined.

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²⁴Only two of the 23 MSCI country components are also in our panel, namely Hong Kong SAR and Singapore, keeping to a minimum any endogeneity issues that may arise from adding the MSCI as an explanatory variable.

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