IMF Working Paper

Spillovers to Emerging Equity Markets:An Econometric Assessment

L. Effie Psalida and Tao Sun

INTERNATIONAL MONETARY FUND

IMF Working Paper

Monetary and Capital Markets Department

Spillovers to Emerging Equity Markets: An Econometric Assessment

Prepared by L. Effie Psalida and Tao Sun[1]

Authorized for distribution by Laura Kodres

May 2009

Abstract

This Working Paper should not be reported as representing the views of the IMF.
The views expressed in this Working Paper are those of the authors and do not necessarily represent those of the IMF or IMF policy. Working Papers describe research in progress by the authors and are published to elicit comments and to further debate.

This paper shows that emerging market equity prices are influenced by growing global factors, and therefore global factors constitute a significant channel for spillovers when the international economic environment changes. Strengthening their resilience to equity price declines remains an important goal for emerging market economies.

Contents   Page

I. INTRODUCTION

After more than a year of relatively small spillovers from the financial turmoil in advanced economies, equity prices in emerging markets (EM) succumbed to the dramatic worsening of financial distress in mid-September 2008. Still, in spring 2009, despite their steep and abrupt declines, emerging equity prices as a group were still above their level in 2003, which marked the beginning of their steep rally. The price declines, however, may not be over.

This paper 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 in addition to their partial reversal in recent months, the resilience of EM equities will likely continue to be tested as financial stresses broaden further and the global economic downturn deepens.

The paper addresses two key questions:

> *How vulnerable are EMs to changing external conditions?* In tackling this question, the paper explores the external and domestic determinants of EM equity market valuations and determines whether the external determinants are economically important. It finds that, although closer links with foreign markets are as big drivers of equity prices as are domestic fundamentals, to date, the more open EM economies or those with higher foreign investor participation have not been affected disproportionately by the global financial turbulence.[2]

> *What can EM countries do to minimize their vulnerability to spillovers?* The paper 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 standards, and developing a well-functioning securities market with supporting infrastructure.

The paper first traces developments in the equity prices of EMs during their upturn and the 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 (Section II). In Section III, the paper develops an empirical framework for assessing what drives EM equity prices, and finds, in Section IV, that domestic/fundamental factors, such as growth and exchange rate expectations, and global/external conditions, such as excess liquidity and credit and market risk premia, both play important and roughly equal roles. Two "what if" scenarios were performed in Section V to further analyze the impact of global

---

[2] Most of the empirical work in the paper runs through May 2008 as the paper's origin is the October 2008 Global Financial Stability Report.

factors on equity prices, followed in Section VI by an analysis of the relative contributions of domestic versus global determinants of equity price changes. Section VII uses a cross-economy set of vector autoregresssion (VAR), which allows for more precise disentangling of the separate spillover effects of unexpected changes in equity prices. The paper 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.

II. PERFORMANCE OF EMERGING MARKET EQUITY MARKETS

After a period of lackluster growth, EM equity market prices rose significantly beginning in 2003 (Figure 1). This development was associated with a concomitant rise of EM capital inflows (Figure 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 3).

Figure 1. Selected Equity Market Indices
(January 1, 2003=100; in U.S. dollars)
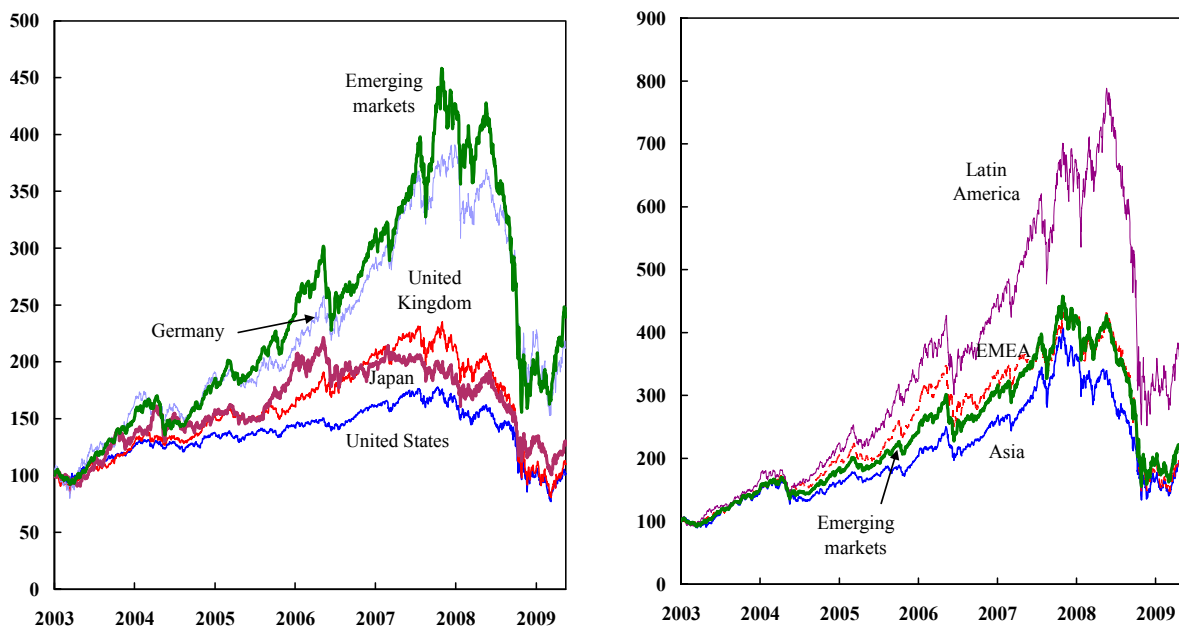
Sources: Bloomberg L.P. and Datastream.

Figure 2. Emerging Market Economies: Composition of Capital Inflows
(In billions of U.S. dollars)
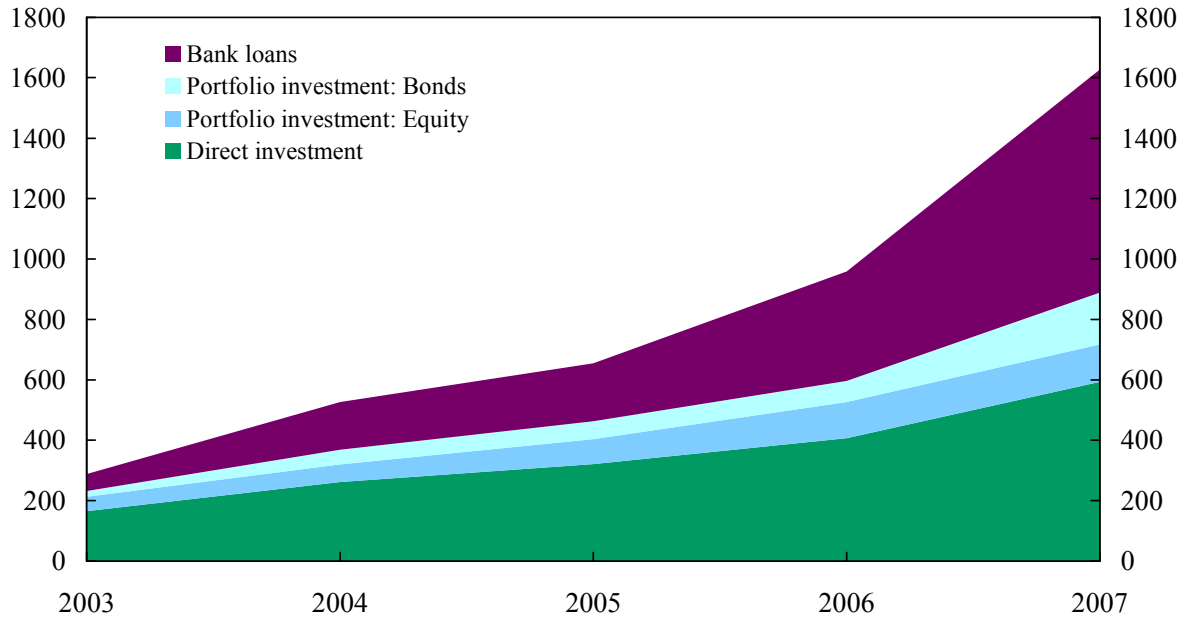
Source: IMF, *International Financial Statistics* database.

Figure 3. Current Account Balances and Capital Flows from a Global Perspective
(In percent of GDP)
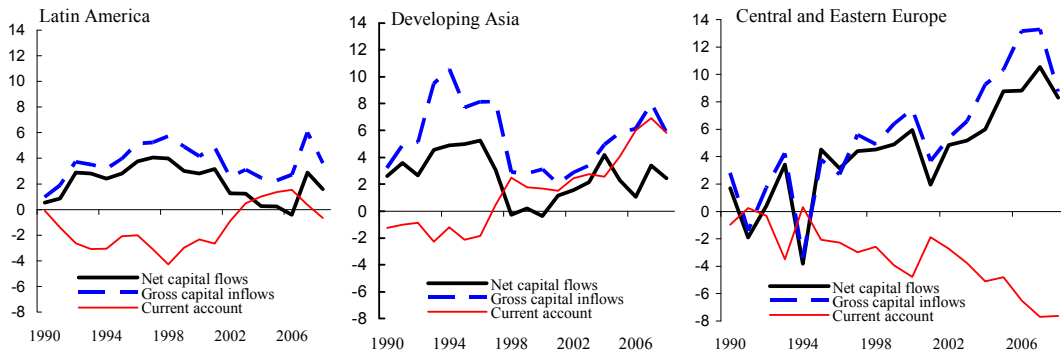
Source: IMF, *World Economic Outlook* database.

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). It is noteworthy that in many EM economies, total equity market returns have increased at a much faster pace than in advanced economies (Figure 5), although, on the whole, the price-earning ratios are comparable (Figure 6).

Figure 4. Stock Market Capitalization

(In percent of GDP)
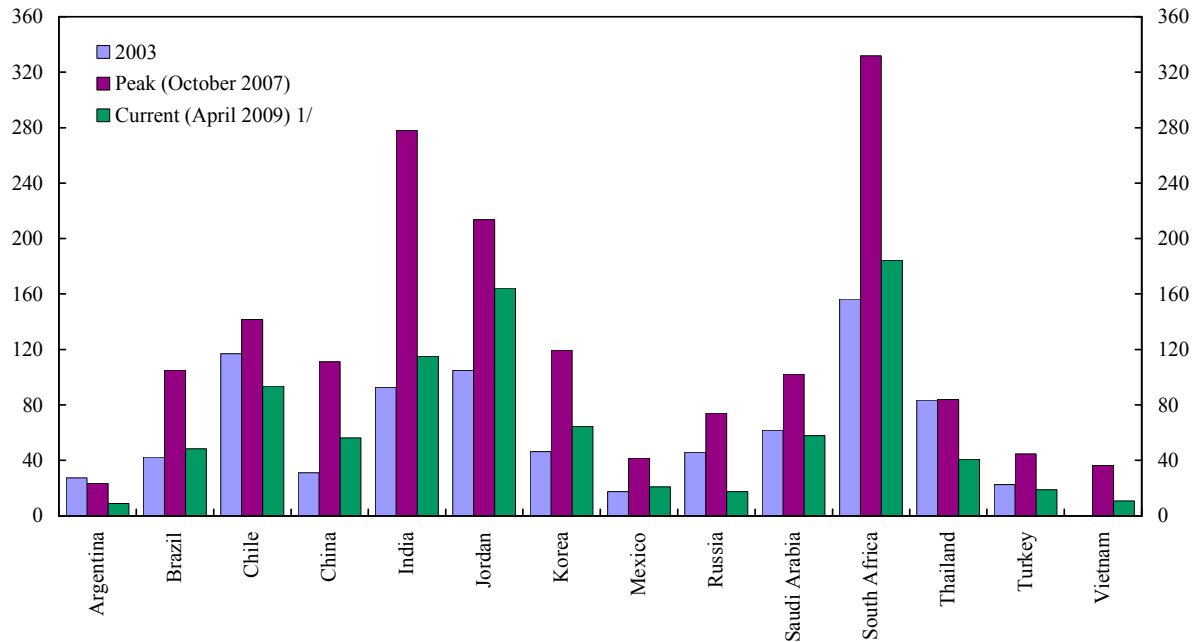
Sources: World Federation of Exchanges; Bloomberg L.P.; and *World Economic Outlook* database.
[1]In percent of GDP for 2008.

Figure 5. Total Equity Market Returns
(January 2003 - July 2008; percent change)

1199%

Brazil Bulgaria Argentina Russia Indonesia Turkey India Mexico Chile China South Africa Germany Korea Thailand United Kingdom Japan United States
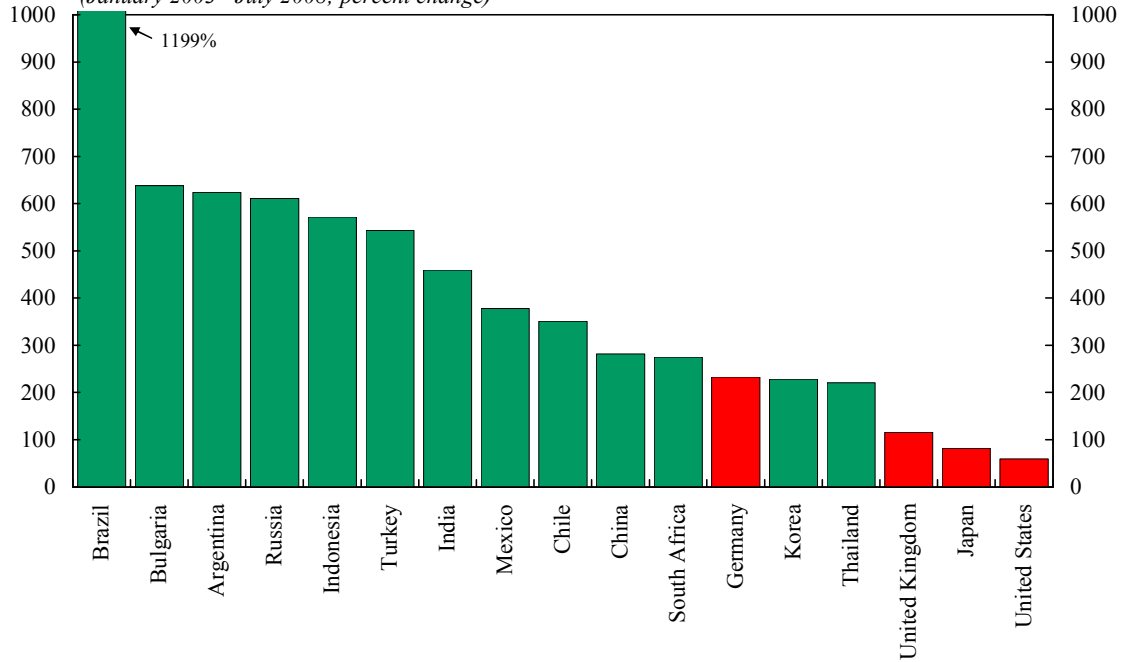
Sources: S&P Emerging Markets Database and Datastream.

Figure 6. Price/Earnings Ratios, May 1, 2009

China Korea Germany United Kingdom Saudi Arabia Japan Brazil Chile Mexico United States Hong Kong Thailand Jordan India Indonesia South Africa Turkey Argentina Russia
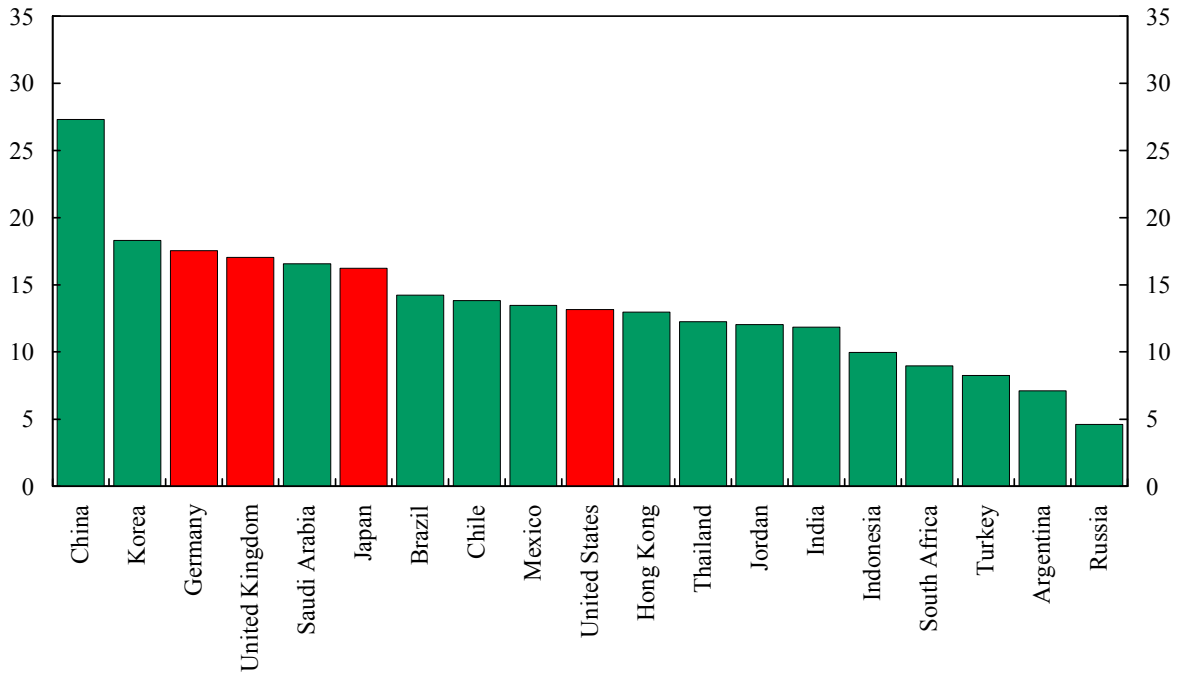
Sources: Datastream; and Bloomberg L.P.

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 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, 2007c) and the opening up and maturation of emerging financial markets (IMF, 2007d). 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 8).

Table 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 current price decline. A few observations are noteworthy. Unlike the previous large and, in many cases, disorderly corrections, which emanated from generalized crises in EM countries and spread broadly through the EM universe, downward equity price adjustments in the current cycle have been shallower and less abrupt, although 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.

Figure 7. Total Foreign Holdings of Equity
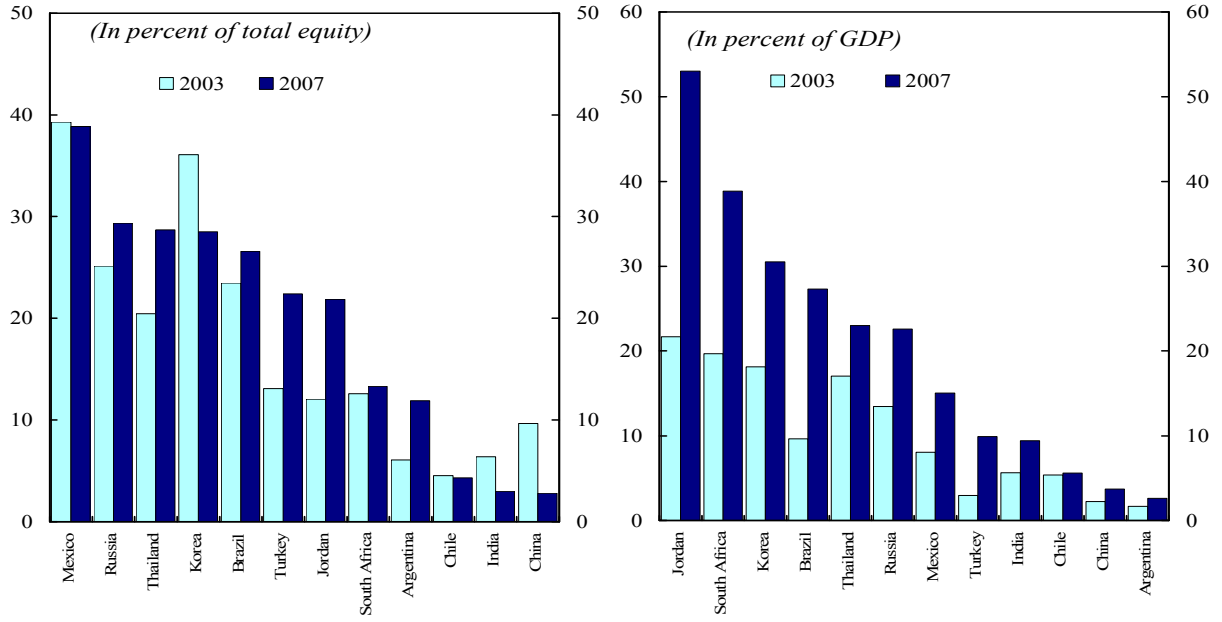
Sources: International Monetary Fund, *Balance of Payments* and *World Ecoomic Outlook* databases.
Note: For China, data refer to 2004 and 2007.

Figure 8. Emerging Markets Equity Indices and Foreign Investor Presence[1]
(Percent change)
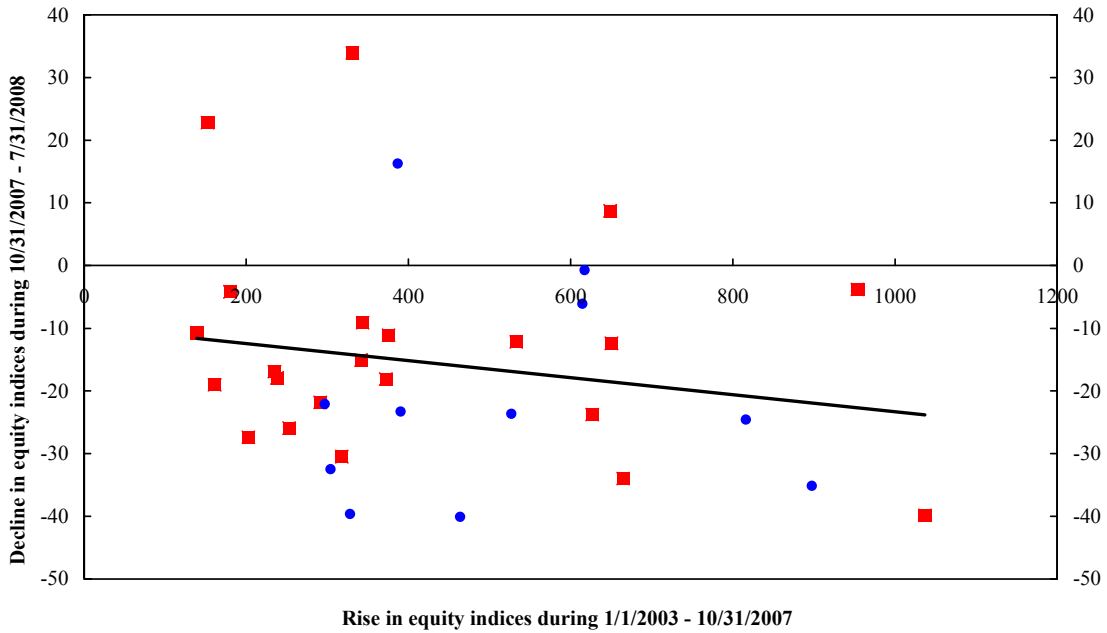
Sources: International Monetary Fund, *World Economic Outlook* and *Inernational Financial Statistics* databases.
[1]Red squares indicate countries with foreign holdings of equities exceeding 5 percent of GDP.

Table 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	
Memorandum item:									
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		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
Memorandum item:									
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.

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

[2]Equity market capitalization of TOPIX stock index.

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.

The fact that declines to date have been shallower and more differentiated across EM countries point to a number of contrasts when compared with the previous cycle, including stronger underlying fundamentals and deeper financial markets in EM economies, the differentiation that international investors now make between EM economies, the substantial growth of "South-South" investment flows, and petrodollar recycling.

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 has increased from 0.17 during the period January 1998–December 2002 to 0.91 during the period January 2003–May 2008.[3]

III. METHODOLOGY OF PANEL ESTIMATION

As the financial crisis spreads and the global economic downturn deepens, EM equity prices will likely continue to be under pressure. This section develops an empirical framework for assessing what drives EM equity prices and presents the methodological approach used in the panel specification.

There is an extensive literature on the driving forces of equity prices ranging from the 1962 Gordon 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. Expectations about the future path of dividend growth and discount rates can be influenced by global financial conditions such as the abundant liquidity experienced during the run-up to the 1997–98 turbulence and 2003–07 asset price increases (IMF, 2000; IMF, 2007a) or irrational exuberance (Shiller 2000), in addition to domestic micro and macro determinants. Empirical studies on the topic have been quite diverse in terms of model specification that embed 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; IMF, 2000).

We make two contributions to the empirical literature on spillovers to emerging equity markets. First, we employ high-frequency data on two sets of factors as determinants of equity prices: domestic/fundamental and global/financial factors, including GDP growth and exchange rate expectations, and excess liquidity and risk premium. Second, we use conventional and nonstationary techniques—panel cointegration, panel regression, scenario

---

Correlations are known for being biased estimates of potential linkages as they are overestimated in times of high volatility and underestimated in tranquil times. Appropriate corrections, however, require assumptions about the reason for the bias.

analysis, contribution analysis, VAR and impulse response—to investigate spillovers in a comprehensive econometric framework. In particular, the cointegrated panel specification framework provides us with a broader and flexible approach, by which the statistical proxies, such as the fixed effects and heterogeneous trend components, can serve to capture a broad class of unobserved mechanisms.

We define two fixed-effects panel data specifications to examine the factors driving equity valuations.[4] We use monthly observations—January 2001 to May 2008—covering 30 EM economies. The model utilizes two groupings of explanatory variables.

- *Domestic or fundamental factors* include economic growth, the differential between domestic and global interest rates, the forward exchange rate, the inflation differential, and 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 (i) global excess liquidity (the difference between broad money growth and estimates for money demand in the euro area, Japan, and the United States; (ii) credit risk premium (the level of the 10-year U.S. dollar swap spread); and (iii) market risk premium (the implied volatility of the S&P 500 index (VIX)).

The model is specified in terms of (log) differences of all fundamental/domestic and all global/external variables, and the error correction term from the panel cointegration is also introduced (see discussion below).

The two alternative specifications for the panel data are as follows:

$$\Delta SM_{it} = C + \beta_1 \Delta GDP_{it} + \beta_2 \Delta INT_{it} + \beta_3 \Delta EXCHRATE_{it} + \beta_4 INFLATION_{it} + \beta_5 \Delta MARRATIO_{it}$$
$$+ \beta_6 \Delta LIQ_{it} + \beta_7 \Delta CREDRISK_{it} + \beta_8 \Delta MARRISK_{it} + \beta_9 \Delta EQINF_{it} + \varepsilon_{it-1}$$

and

$$\Delta SM_{it} = C + \beta_1 \Delta GDP_{it} + \beta_2 \Delta INT_{it} + \beta_3 \Delta EXCHRATE_{it} + \beta_4 INFLATION_{it} + \beta_5 \Delta PRICRED_{it} + \beta_6 \Delta LIQ_{it} + \beta_7 \Delta CREDRISK_{it}$$
$$+ \beta_8 \Delta MARRISK_{it} + \beta_9 \Delta MSCI + \beta_{10} \Delta EQINF_{it} + \varepsilon_{it-1}$$

where "D" denotes log differences

---

[4] We use panel data models since they allow us to construct and test more complicated behavioral models than individual country regressions and they are better able to identify and measure effects that are simply not detectable in individual country regressions.

[5] Although, 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.

Δ GDP = the change of GDP growth

Δ INT = Interest rate differential

Δ EXCHRATE = Exchange rate expectation

Δ INFLATION = Inflation rate differential

Δ MARRATIO = Equity market capitalization to GDP ratio

Δ PRICRED = Credit to the private sector

Δ LIQ = Global excess liquidity

Δ CREDRISK = Credit risk premium

Δ MARRISK = Market risk premium

Δ EQINF = Portfolio equity inflow

Δ MSCI = Morgan Stanley Capital International world index

ε = Error correction term

(see Annex II for more information on the variable specification)

Panel cointegration

The study 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. Then the regressions of the price indices and nonstationary explanatory variables are run to obtain error correction terms, which are taken as inputs to the specification of the panel estimations. 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 (see details in Annex I).

The panel cointegration and specification is as follows:

$$SM_{it} = \alpha_{1i,t} + \beta_{1i,t} EXCHRATE_{1i,t} + \beta_{2i,t} MARCAP_{2i,t} + e_{it}$$

where

SM_{it} = log equity price index

$EXCHRATE_{1i,t}$ = log forward exchange rate

$MARCAP_{2i,t}$ = log market capitalization

If SM_{it} has a unit root (t=1,….,T, i represents the member of economies), so that $SM_{it} \sim I(1)$. And if $EXCHRATE_{1i,t}$ and $MARCAP_{2i,t}$ have a unit root (t=1,….,T), so that $EXCHRATE_{1i,t} \sim I(1)$, $MARCAP_{2i,t} \sim I(1)$. The equity price index, forward exchange rate, and market

capitalization are cointegrated if the residual, $e_{it} = SM_{it} - \alpha_{it} - \beta_{1i,t} EXCHRATE_{1i,t} - \beta_{2i,t} MARCAP_{2i,t}$, is stationary, so that $e_{it} \sim I(0)$.

In this cointegrated panel specification framework, the combination of the extra dimension (the cross-sectional added to the time-series dimension) and the long run properties of the cointegrating relationship provides us with a broader and flexible approach, by which the statistical proxies such as the fixed effects and heterogeneous trend components can serve to capture a broad class of unobserved mechanisms.

Moreover, the nonstationary panel framework allows us to relax many of the strong assumptions that have typically been required in cross-sectional-based approaches. This framework relaxes the exogeneity assumptions and picks up the long run relationships between the variables in a manner that is robust to the presence of short run dynamics, and the steady state relationships even in the presence of endogeneity among the right-hand-side variables. Overall, this cointegration framework allows for a broad set of mechanisms that may explain stock prices across economies.

Unit root tests and panel cointegration test

Unit root tests show that the indicators used in panel cointegration tests—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 2). According to the Pedroni panel cointegration tests performed on the log price indices, log market capitalization, and log forward exchange rates, the majority of statistics point to the conclusion that the variables are cointegrated (Table 3) (Pedroni 1995, 1999).[6]

Table 2. Unit Root Tests

	Log 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 (significant at 10 percent level, denoted by *) and −1.64 (significant at 5 percent level, denoted by **). The positive unit root test results show that price indices, forward exchange rate and market capitalization are nonstationary.

---

[6] The non-stationarity of forward exchange rates during the sample period indicates the general appreciation trend, the global 'catching up' and integration into global capital markets of most emerging economies.

Table 3. Pedroni Heterogeneous Panel Cointegration Tests

	Log Price Indices, 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	1.48

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 (significant at 10 percent level, denoted by *) and 1.64 (significant at 5 percent level, denoted by **), and those for all others are −1.28 (significant at 10 percent level, denoted by *) and −1.64 (significant at 5 percent level, denoted by **).

Error correction term

By employing nonstationary panel techniques, we obtain error correction terms from the panel cointegrations among log equity prices, log market capitalization, and 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 prices, reflecting the adjustment over time for closing the gap with respect to the long-run relationship between these variables. (Table 4).

Panel regressions

After we obtain the error correction term we incorporate it into the panel estimation.

IV. RESULTS OF THE PANEL ESTIMATION

The estimation results for the full 30-country sample over the 89-month period suggest that, 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). 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.[7] A comparison of the three main geographical regions of Latin America, Asia, and Emerging Europe, Middle East and Africa (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 deepening, and includes the MSCI—a measure of prices from advanced economy 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 5). 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. Exchange rate expectations are strongest in EMEA and Latin America, and domestic credit is significant in all three regions.

---

[7] A 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, Box 1.3, IMF (2007d).

Table 4. 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	0.9849	1.3615	0.5364	0.5282
	(0.00000)***	(0.00081)***	(0.11908)	(0.06237)*
Interest rate differential	-0.0671	-0.1848	0.0557	-0.0201
	(0.00258)***	(0.02039)**	(0.46182)	(0.45839)
Forward exchange rate	0.0419	0.0146	0.4994	0.3771
	(0.00000)***	(0.04899)**	(0.00000)***	(0.00000)***
Inflation rate differential	0.0252	-0.0699	0.0120	0.1917
	(0.37505)	(0.38505)	(0.76169)	(0.00348)***
Market capitalization/GDP ratio	0.2580	0.3778	0.1759	0.3071
	(0.00000)***	(0.00000)***	(0.00000)***	(0.00000)***
External factors	0.0000	0.0000	0.0000	0.0000
Excess global liquidity	1.4400	1.8083	0.8258	1.2565
	(0.00000)***	(0.00000)***	(0.01487)**	(0.00007)***
Credit risk premium	-12.5266	-10.9920	-9.0441	-11.3054
	(0.00000)***	(0.00000)***	(0.00017)***	(0.00000)***
Market risk premium	-0.3064	-0.2954	-0.3170	-0.4207
	(0.00000)***	(0.00000)***	(0.00000)***	(0.00000)***
Foreign equity inflow	0.0000	0.0001	0.0002	0.0000
	(0.52484)	(0.85392)	(0.15043)	(0.13934)
	0.0000	0.0000	0.0000	0.0000
Error correction term	-0.0519	-0.0381	-0.0451	-0.0811
	(0.00000)***	(0.00597)***	(0.00000)***	(0.00000)***
Other factors	0.0000	0.0000	0.0000	0.0000
Constant	0.0978	0.0735	0.0977	0.1230
	(0.00000)***	(0.00000)***	(0.00000)***	(0.00000)***
Adjusted R^2	0.3498	0.4465	0.3225	0.5754
Time-series sample (monthly)	2001m1-2008m5	2001m1-2008m5	2001m1-2008m5	2001m1-2008m5
No. of cross-section economies	30	12	12	6
No. of observations	2293	891	875	527

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

Table 5. 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	0.6777	0.4711	0.3456
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
GDP growth	0.3777	0.6727	0.1577	-0.1014
	(0.0893)*	-0.1785	-0.6549	-0.7599
Forward exchange rate	0.0361	0.0162	0.3816	0.6384
	(0.0002)***	(0.0774)*	(<0.0001)***	(<0.0001)***
Interest rate differential	0.0210	-0.2244	0.1084	0.0993
	(0.4125)	(0.0228)**	(0.1884)	(0.0026)***
Inflation rate differential	0.0507	-0.0720	0.0532	0.0188
	(0.1104)	(0.4711)	(0.2212)	(0.8076)
External factors				
Global liquidity	0.9203	1.5011	0.3663	0.8726
	(<0.0001)***	(<0.0001)***	(0.3334)	(0.0235)**
Market risk premium	-0.2746	-0.2699	-0.3177	-0.3514
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<0.0001)***
Credit risk premium	-6.7535	-7.3195	-4.1517	-7.0568
	(<0.0001)***	(0.0011)***	(0.1277)	(0.0082)***
MSCI	0.1141	0.1744	0.0474	0.1224
	(0.0187)**	(0.0168)**	(0.5823)	(0.1587)
Foreign equity inflow	0.0001	-0.0002	0.0004	0.0000
	(0.2157)	(0.7282)	(0.0169)**	(0.2741)
Error correction term	-0.0358	-0.0222	-0.0305	-0.0660
	(<0.0001)***	(0.1930)	(0.0003)***	(0.0002)***
Other factors				
Constant	0.0613	0.0513	0.0711	0.0900
	(<0.0001)***	(<0.0001)***	(<0.0001)***	(<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 economies	30	12	12	6
No. of observations	2301	892	882	527

Sources: IMF, World Economic Outlook database and International Financial Statistics database; 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.

V. Scenarios of Impact

Two "what if" scenarios were performed to further analyze the impact of global factors on equity prices. The first scenario is a 10 percent decline in global excess liquidity—from its current level of 4.5 percent—and a 10 percent increase in both the credit and market risk premia. The results indicate that EM equity price growth would decline by 1.94 percentage points when all three global indicators worsen, with the U.S. credit risk premium 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 25 percentage points lower than the base case (Table 6). The 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.

Table 6. Effects of External Shocks on the Growth Rates of Emerging Market Equity Prices
(*in percent*)

Scenario 1	Percent change in equity prices
Global excess liquidity declines by 10 percent	-0.65
U.S. credit risk premium increases by 10 percent	-0.74
U.S. market risk premium increases by 10 percent	-0.55
Three combined scenarios	-1.94
Scenario 2	
Zero global excess liquidity	-6.52
U.S. credit risk premium at historical peak (May 2000)	-10.02
U.S. market risk premium at historical peak (August 1998)	-8.10
Three combined scenarios	-24.64

Sources: Authors' calculations.

VI. CONTRIBUTION OF DOMESTIC AND EXTERNAL FACTORS

We multiply the actual values in May 2008 of each variable across economies by the corresponding coefficients that the model attributes to each variable to get contributions of each variable. Then we calculate the new contributions resulting from the assumed change in the values of global excess liquidity, credit risk and market risk premium. Finally, the difference between the two contributions are taken as the change in the growth rates of the equity prices, resulting from the changes in the global factors. An analysis of the explanatory power of each factor was performed to determine their relative effect on EM equity prices. Using the model's estimated coefficients for each independent variable, this analysis indicates that the relative contribution of global and domestic factors is about half and half.

Specifically, by decomposing the model dynamics from January 2001 to May 2008 we can gain an insight into the importance of changes in global factors—global excess liquidity, credit risk premium, and market risk premium—relative to changes in domestic factors—GDP growth, interest rate differential, exchange rate expectation, inflation differential, equity market capitalization-to-GDP ratio, and the domestic share of the error correction term—in determining equity price growth over this period. Our analysis of the relative contribution of global and domestic factors follows four steps as follows:

Step 1: Model Values
Multiply the historical value of each variable by the corresponding estimated coefficient to get the "model values" (those for the domestic factors and for equity price growth are weighted by each economy's annual GDP).

Step 2: Total Change
Add up the "model values" from step 1 above across the 30 economies and 89 periods in the sample to get the total change for each independent variable in the panel (given the rising trend of the market-to-GDP ratio, its values are averaged across periods).

Step 3: Share
Calculate the share of each variable's change in the total change of all variables (total change for each variable).

Step 4: Contribution
Sum up separately the shares of the domestic and external factors to get their respective contributions (the global factors' contribution is averaged over the 30 countries in the sample).

Our approach indicates that the global and the domestic factors in our model explain equity price increases during this period in roughly equal measure. This result is specific to this model's estimated coefficients stemming from our country and period coverage as well our specification.

Table 7. Contribution of Global and Domestic Factors to Equity Price Changes
(*In percent*)

Share of global factors	45.8
Share of domestic factors	54.2

Sources: Authors' calculations.

VII. Vector Autoregression Model and Results

A key limitation of the cross-economy panel regression approach used in the previous sections is that it only allows for relatively simple interactions across economies. An analysis using a cross-economy set of vector autoregression (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 in the data panel, we estimate seven separate eight-variable structural VAR models for seven economies—Argentina, Chile, China, Romania, Russia, Singapore, and South Africa. The 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. Least open economies are Argentina, China and Russia, while Chile, Romania, Singapore, and South Africa are the most open.

The VAR is partitioned into an exogenous foreign block and a country-specific block. 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.[8] The data have monthly frequency, typically available for January 2001 to May 2008.

Granger Causality and 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 most exogenous variable first and most endogenous last. Changes in the ordering of the variables do not have a material effect on the statistical significance of the spillover effects.
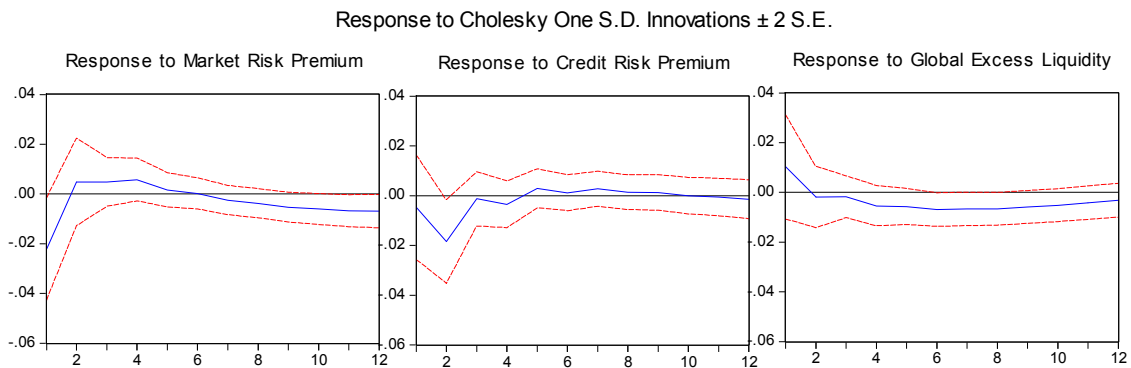
---

[8] The lag length is selected using Schwarz's Bayesian information criterion, which points to one lag except for Romania (2 lags).

Figure 9 presents some of the equity price impulse responses for the seven countries examined under the VAR approach to further test the role of co-movements in EM stock valuations.
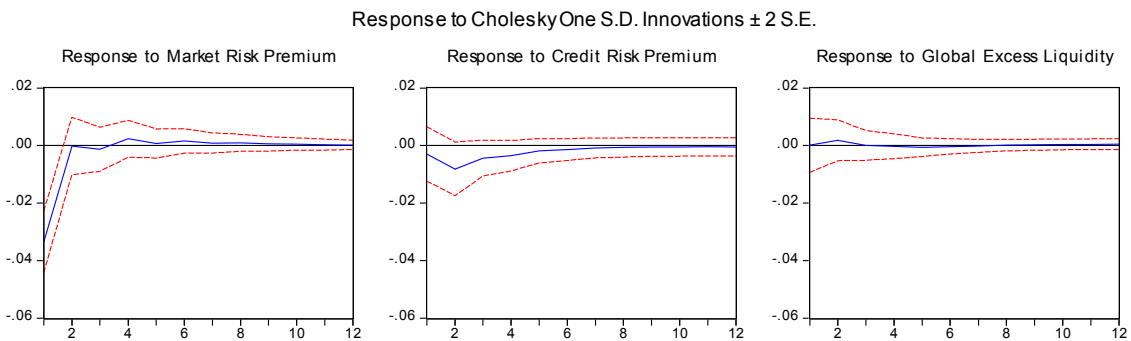
Overall, the results of the dynamic VAR analysis are in line with those in the panel regressions. For some of the impulse responses for the seven countries examined, three observations can be made: (i) most individual equity price responses to shocks in the global indicators are as expected and in the same direction as for the panel; (ii) the equity price response tapers off after three months in most cases, and (iii) smaller countries have slightly larger responses overall. In most cases, the shocks are not statistically different from zero except in response to the market risk in the first month for all but Argentina and China.

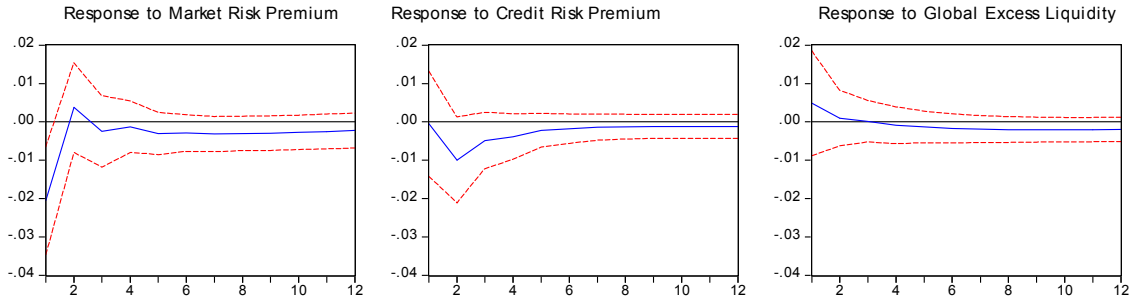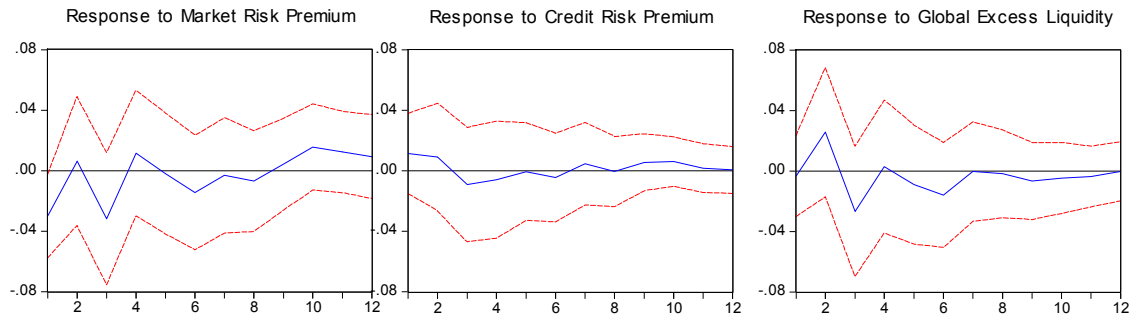## Figure 9. Impulse Responses to the Global Shocks for the Seven Countries

Argentina

Response to Cholesky One S.D. Innovations ± 2 S.E.

Chile

Response to Cholesky One S.D. Innovations ± 2 S.E.

China

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response to Market Risk Premium	Response to Credit Risk Premium	Response to Global Excess Liquidity

Romania

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response to Market Risk Premium	Response to Credit Risk Premium	Response to Global Excess Liquidity

Russia

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response to Market Risk Premium	Response to Credit Risk Premium	Response to Global Excess Liquidity

South Africa

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response to Market Risk Premium	Response to Credit Risk Premium	Response to Global Excess Liquidity

Singapore

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response to Market Risk Premium	Response to Credit Risk Premium	Response to Global Excess Liquidity

VIII. MAIN CONCLUSIONS

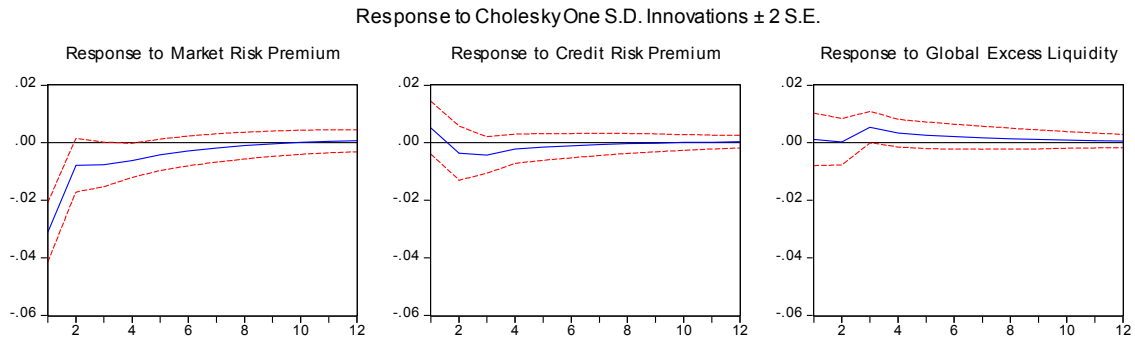The key results from the empirical analysis above suggest that global forces about as much to emerging equity prices as do domestic economic fundamentals. More specifically, the panel estimations and the vector autoregression analysis presented in the previous sections can be summarized as follows:

- 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 with EM equity prices, indicating that emerging equity markets are integrated with advanced economies.[9]

- Strong domestic economic growth and indicators of financial deepening such as credit growth and higher market capitalization are key driving forces for equity prices,

---

[9] These results are consistent with studies on Asian and Latin American economies (IMF, 2007a; IMF, 2008a; 2008b).

which supports the view that high EM equity prices are driven, at least partially, by underlying domestic fundamentals.

These results are reinforced by the results of the VAR models. However, though not explicitly tested here, the spillovers to EM equity markets do not necessarily undermine the long-run benefits of EM integration into global markets. In the long term, integration will lead to higher growth and financial market development.

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 help 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 could help to mitigate sensitivity to external shocks.[10]

- 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, some of which might be reformed in light of the current crisis.

---

[10] For example, in Korea the strong growth of local savings instruments, such as mutual funds, of which 54 percent are invested in equities, has increased the household sector's stake in equity markets substantially.

- At the firm level, governance and transparency of performance and of decision making structures need improvement, and greater 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.[11] 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 minimize the occurrence of a short squeeze. It should also be noted that introducing shorting in a bearish equity market could exacerbate the downturn.

---

[11] For further elaboration on these topics see Purfield and others (2006), Fratzscher (2006), Ghosh and Revilla (2007) for a discussion on East Asia in particular, and Shah and others (2008).

Annex I. Methodological Issues

Since dynamic panel techniques based on IV or GMM estimation cannot correct for endogeneity induced by latent heterogeneity, we take Pedroni panel cointegration tests to allow complete endogeneity, heterogeneous dynamics and cointegrating vectors. Panel cointegration approach can provide desirable properties of cointegration since it is robust to endogeneity and many forms of omitted variables, simultaneity and measurement error. It can also isolate long-run steady state relationships from short-run dynamics. Pedroni (1995,1999) relaxed the assumption of homogeneity in that the slope coefficient β is allowed to vary across the i individual members of the panel.

Specifically, the panel cointegration regression is as follows:

$$y_{it} = \alpha_i + \beta_{1i,t}x_{1i,t} + \beta_{2i,t}x_{2i,t} + \ldots + \beta_{ki,t}x_{ki,t} + \gamma_i t + e_{it} \qquad (1)$$

If y_{it}, t=1,….,T, i represents each economy, has a unit root, so that $y_{it} \sim I(1)$, and $x_{ki,t}$, t=1,….,T, has a unit root, so that $x_{ki,t} \sim I(1)$, then $x_{ki,t}$ and y_{it} are cointegrated if some linear combination $e_{it} = y_{it} - \alpha_i - \beta_{ki,t} x_{ki,t}$ is stationary, so that $e_{it} \sim I(0)$.

Since the α_i and various β_i are allowed to vary across the members of the panel, this approach allows for considerable short- and long-run heterogeneity—in effect the dynamics and fixed effects can differ across the individuals in the panel and the cointegration vector can also differ across members under the alternative hypothesis (Richard Harris and Robert Sollis, 2003).

In the cointegrated panel specification framework, the combination of the extra dimension (by adding the cross-sectional to the time-series dimension) and the long run properties of the cointegrating relationship provide us with a broader and more flexible approach, by which the statistical proxies such as the fixed effects and heterogeneous trend components can serve to capture a broad class of unobserved mechanisms.

Moreover, the nonstationary panel framework allows us to relax many of the strong assumptions that have typically been required in cross sectional-based approaches. This framework completely relaxes the exogeneity assumptions and can also isolate long-run steady state relationships from short-run dynamics. Overall, this cointegration framework allows for a broad set of channels that may explain stock prices across economies.

To avoid the use of nonstationary variables and to maintain a relatively large sample, we performed the unit root test for all variables. For those that follow a stationary process, we use them in the driving force panel specifications. For those that are nonstationary, we run cointegration test to uncover the stochastic and nonstochastic long run trending features of the data.

Annex II. Data and exlanatory variables

The panels use a monthly sample of 30 economies from January 2001 to May 2008.[12] 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 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 in the first specification 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; [13]
(b)   Interest rate differential: the spread between the 1-year domestic and the 6-month U.S. Treasury rates; [14]
(c)   Exchange rate expectation: the log change in forward exchange rates (including non-deliverable forward rates (NDF) in 18 economies for which data were available); the log level in forward exchange rates in the panel cointegration; [15]

---

[12] The period since 2001 is chosen for two reasons. First, the year 2001 marked the beginning of a long upward trend for EM equities starting from a low point. Second, data availability, especially portfolio equity inflows, was much improved from that date.

[13] Forecasted 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.

[14] We use the 6-month U.S. Treasury rate because we do not have the 1-year U.S. Treasury rate for the full period sample.

[15] As a proxy for the exchange rate, NDFs are prevalent in some countries where forward foreign exchange trading has been banned by the government, and, in most cases, are primarily used for speculation (take exposure) in countries that have capital controls. In such cases, covered interest rate parity does not necessarily

(continued)

(d)   Inflation rate differential: the difference between the domestic and the U.S monthly inflation rates;

(e)   Equity market capitalization: equity market capitalization to GDP ratio, calculated as (1+growth of market capitalization)/(1+ 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 bond, as a proxy for aggregate default risk.[16]

(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.

The second panel specification 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:

a.   Domestic credit: the log change in the credit to the private sector, as proxy for financial deepening; and

b.   MSCI: the log change in the Morgan Stanley Capital International world index of 23 major stock markets.[17]

---

hold. The panel specification, therefore, incorporates both interest rate differential and exchange rate expectation.

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

[17] Only 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.

REFERENCES

Baig, Taimur, and Ilan Goldfajn,1999, "Financial Market Contagion in the Asian Crisis,"
Staff Papers, International Monetary Fund, Vol. 46 (June), pp. 167–95.

Bayoumi, Tamim, and Hali Edison, 2003, "Is Wealth Increasingly Driving Consumption?"
DNB Staff Reports No. 101 (Amsterdam: De Nederlandsche Bank).

Bekaert, Geert, http://www0.gsb.columbia.edu/faculty/gbekaert/

Engle, Robert 2002, "Dynamic Conditional Correlation: A Simple Class of Multivariate
Generalized Autoregressive Conditional Heteroskedasticity Models," *Journal of
Business & Economic Statistics*, Vol. 20, pp. 339–50.

Frank, Nathaniel, Brenda González-Hermosillo, and Heiko Hesse, 2008, "Transmission of
Liquidity Shocks: Evidence from the 2007 Subprime Crisis," (Washington:
International Monetary Fund).

Fratzscher, Oliver, 2006, "Emerging Derivative Market in Asia," *Journal of Emerging
Market Finance*, Vol. 5, pp. 207–15.

Funke, Norbert, 2004, "Is there a stock market wealth effect in emerging markets?"
Economics Letters, Vol. 83, No. 3, pp. 417–21.

Gelos, Gaston, and Ratna Sahay, 2000, "Financial Market Spillovers in Transition
Economies," IMF Working Paper 00/71 (Washington: International Monetary Fund).

Ghosh, Swati, and Ernesto Revilla, 2007, "Enhancing the Efficiency of Securities Markets in
East Asia," World Bank Policy Research Working Paper 4129 (Washington: World
Bank)

Gonzalez-Hermosillo, Brenda, 2008 "Investors' Risk Appetite and Global Financial Market
Conditions," IMF Working Paper 08/85 (Washington: International Monetary Fund).

Gordon, Myron J., 1962, "The Investment, Financing, and Valuation of the Corporation"
(Homewood: Irwin Publishers).

Harris, Richard and Robert Sollis, "Applied Time Series Modelling and Forecasting", 2003
John Wiley & Sons Ltd, pp. 189-212.

Hartelius, Kristian, Kenichiro Kashiwase, and Laura E. Kodres, 2008, "Emerging Market Spread Compression: Is it Real or is it Liquidity?" IMF Working Paper 08/10 (Washington: International Monetary Fund).

Harvey, Campbell, http://www.duke.edu/~charvey/curvit.html.

Henry, Peter Blair, 2000, "Do Stock Market Liberalizations Cause Investment Booms?" *Journal of Financial Economics*, Vol. 58, pp. 301-34.

Hoffmaister, Alexander W., and Jorge E. Roldos, 2001, "The Sources of Macroeconomic Fluctuations in Developing Countries: Brazil and Korea, *"Journal of Macroeconomics,* Vol. 23, No. 1, pp. 213–39.

International Monetary Fund, 1998, "Financial Crises: Causes and Indicators," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, May).

———, 2000, "Asset Prices and the Business Cycle," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, May).

———, 2001, "International Linkages: Three Perspectives," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, October).

———, 2002, *World Economic Outlook*, World Economic and Financial Surveys (Washington, April).

———, 2003, "When Bubbles Burst," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, May).

———, 2007a, "Decoupling the Train? Spillovers and Cycles in the Global Economy," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, April).

———, 2007b, "The Changing Housing Cycle and the Implications for Monetary Policy," in *World Economic Outlook*, World Economic and Financial Surveys (Washington, October).

———, 2007c, "Changes in the International Investor Base and Implications for Financial Stability," *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, April).

———, 2007d, "The Quality of Domestic Financial Markets and Capital Inflows," in *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, October).

———, 2008a, "Can Asia Decouple? Investigating Spillovers from the United States to Asia," in *Regional Economic Outlook—Asia and Pacific*, World Economic and Financial Surveys (Washington, April).

———, 2008b, "Latin American Linkages to Global Financial Market Turbulence," in *Regional Economic Outlook—Western Hemisphere*, World Economic and Financial Surveys (Washington, April).

———, 2008c, "Spillovers to Emerging Equity Markets" in *Global Financial Stability Report*, World Economic and Financial Surveys (Washington, October).

Ludwig, Alexander, and Torsten Sløk, 2004, The Relationship between Stock Prices, House Prices and Consumption in OECD Countries, *Topics in Macroeconomics*, Volume 4, No. 1. Available via the Internet: http://www.bepress.com/bejm/topics/vol4/iss1/art4

Pedroni, Peter, 2001, "Purchasing Power Parity Tests in Cointegrated Panels," *The Review of Economics and Statistics*, Vol. 83, No. 4, pp. 727–31.

———, 2007, "Social Capital, Barriers to Production and Capital Shares: Implications for the Importance of Parameter Heterogeneity from a Nonstationary Panel Approach," *Journal of Applied Econometrics,* Vol. 22, No. 2, pp. 429–51.

Purfield, Catriona, Hiroko Oura, Charles Kramer, and Andreas Jobst, 2006, "Asian Equity Markets: Growth, Opportunities, and Challenges," IMF Working Paper 06/266 (Washington: International Monetary Fund).

Roldos, Jorge, 2007, "Pension Reform and Macroeconomic Stability in Latin America," IMF Working Paper 07/108 (Washington: International Monetary Fund).

Shah, Hemant, Ana Carvajal, Mangal Goswami, Andy Jobst, Jack Ree, and Ivan Guerra, 2008, "Securitization in Emerging Markets," Forthcoming (Washington: International Monetary Fund).

Shiller, Robert J., 2000, *Irrational Exuberance* (Princeton: Princeton University Press).

Slacalek, Jirka, 2006, "International Wealth Effects," DIW Discussion Papers No. 596 (Berlin: German Institute for Economic Research).