



The fear of globalizing capital markets[☆]

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Abstract

It is generally accepted that free flow of goods benefits both economies without serious risks. The situation with the free flow of capital is different. Many policy makers and economists are skeptical not only about the benefits of free flow of capital, but also see uncontrolled capital flows as risky and destabilizing. Other economists, however, firmly believe that free capital flows will lead to a more efficient allocation of resources and greater economic growth. Nevertheless, the debate has little empirical evidence to rely on. We hope to fill that gap in this paper. We study the benefits and risks associated with capital flows by examining the experience of emerging economies around the time that foreign investment in stock markets was allowed. We investigate the impact of capital flows on stock returns, stock market efficiency, inflation, and exchange rates. We also examine the effect on different kinds of volatility that might arise as a consequence of capital flows: volatility of stock returns, volatility of inflation rates, and volatility of exchange rates. We find no evidence of an increase in inflation or an appreciation of exchange rates. Stock returns reflect a lower cost of capital after liberalization. There is no increase in stock market volatility and the volatility of inflation and exchange rates actually decreases. Stock markets become more efficient as determined by testing the random walk hypothesis. © 2000 Elsevier Science B.V. All rights reserved.

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The logic of permitting unrestricted capital flows is obvious. If capital is allowed to flow freely, only value creating projects will be accepted and value destroying projects will be rejected. Since value creation implies higher returns and a better use of capital, worldwide economic growth will increase and social welfare will be enhanced. Net exporters of capital will be rewarded by higher returns that their capital will generate, and net importers of capital will be able to invest in projects that would otherwise be rejected due to shortage of capital.

Unlike the unanimity of opinion on the necessity of free trade, however, there is considerable diversity of opinion relating to free capital flows. Economists like the late Merton Miller claim that governments must allow freer flow of capital.¹ They argue that instead of limiting access to capital markets, the markets should be made more open by removing existing controls. Similarly, economists at the International Monetary Fund like Stanley Fischer and Michael Mussa believe that currencies must be allowed to float so that markets, not governments, determine currency values.

Naturally, these economists are against any controls on capital flows. They believe that capital flows can help both developed and developing countries.² For emerging economies, however, the potential benefits are greater because paucity of capital has inhibited their economic growth. Opening of capital markets represents an important opportunity to attract the necessary foreign capital. It also hastens the development of equity markets that is positively related to long run economic growth and a reduction in the cost of external finance. Foreign equity flows result in global diversification and stock market integration that results in improved resource allocation and large steady-state welfare gains.

In addition, foreign investors will demand transparency and improved disclosure rules that are crucial for improved allocational efficiency of capital. They will also demand accountability of management and shareholder rights in order to protect themselves against expropriation of wealth by controlling investors. A convincing and satisfactory response to these demands will decrease the risk of holding stocks, which in turn lowers the cost of capital.

On the other hand, the 1994 Mexican peso crisis and the 1997 turmoil in East Asian financial markets have prompted many academics and politicians to question the desirability of free flow of capital. They cite Chile's and China's success with restraints on capital flows. Even highly respected economists like Joseph Stiglitz, formerly of the World Bank, and Paul Krugman of MIT have championed capital controls.

These economists and other policy makers are concerned about the risks associated with opening and globalization of markets. One issue of major concern is the movement of so-called 'hot money,' international flow of funds that are allegedly highly sensitive to differences in interest rates, expectations of future economic growth, and expected returns from holding securities. Given the sensitiv-

¹Miller (1998).

²Many developed countries have benefited from foreign capital: Norway borrowed to develop North Sea and Germany borrowed for reunification.

ity of these investments, even a small shock to the economy can lead to a volatile change in fund flows, which exacerbates the shock and destabilizes the domestic economy. The greater volatility will increase risk and discourage investment.

In addition, some policy makers believe that the economy cannot be left alone to unpredictable market forces and requires their guidance for controlled growth. For instance, capital inflows may cause the domestic currency to appreciate in real terms. For export oriented economies, appreciation of exchange rates may threaten their competitive position in the global marketplace. The government also worries that there may not be enough investment opportunities to absorb the sudden influx of money after market opening and the excess capital will fuel inflation.

Unfortunately, much of the debate on the benefits and risks of capital flows has been based more on speculation, fears, and emotions, and less on fact. In this paper, we hope to provide relevant evidence by examining changes in the economy around the time that it liberalizes foreign portfolio investment so that foreign investors can more freely participate in the stock market.

We focus our attention on stock market openings by emerging economies which is a major step towards globalization of capital markets. We estimate changes in the level and volatility of stock prices, exchange rates, and inflation rates around market openings. Briefly, we find that steady-state stock returns become lower, suggesting a lower cost of capital after stock market openings. There is no accompanying increase in the volatility of stock returns. We also find stock markets tend to become more efficient, as determined by testing the random walk hypothesis.

When we examine changes in inflation and exchange rates around market openings, we do not find an increase in inflation or an appreciation in exchange rates, nor do we find an increase in volatility of inflation rates or exchange rates. While the results vary across countries, on average, the evidence suggests that market openings have had beneficial effects on the emerging economies.

The paper is organized as follows: Section I discusses the sample of emerging countries. Section II examines the effect of liberalization on stock returns, inflation rates, and currency returns. Section III focuses on the volatility (or risk) of these economic variables around market openings. Section IV investigates the incidence of rejection of the random walk hypothesis around market openings to test for market efficiency. Section V concludes.

1. Sample description

The sample consists of 20 emerging stock markets that are followed by the International Finance Corporation (IFC) in its Emerging Markets DataBase (EMDB). Though additional markets are continually added to the EMDB, the 20 countries in our sample represent the major markets that underwent significant liberalization during the 1980s and early 1990s. A similar sample is used in many other studies of emerging markets.

The dates of market opening, listed in Table 1, are important because much of

Table 1
Descriptive statistics of monthly excess dollar returns (January 1976 to September 1996)^a

Country	Market opening date	Start date of monthly data	Excess dollar returns		
			Number of months	Mean	Standard deviation
Argentina	November 1989	January 1976	249	4.32%	27.51%
Brazil	May 1991	January 1976	249	1.52%	16.48%
Chile	October 1989	January 1976	249	2.23%	10.83%
Colombia	February 1991	January 1985	141	2.34%	8.87%
Greece	August 1986	January 1976	249	0.12%	9.74%
India	November 1992	January 1976	249	0.80%	8.02%
Indonesia	September 1989	January 1990	81	0.26%	8.78%
Jordan	January 1978	January 1979	213	0.21%	4.96%
Korea	January 1992	January 1976	249	0.92%	8.89%
Malaysia	Prior to 1985	January 1985	141	0.88%	7.61%
Mexico	May 1989	January 1976	249	1.52%	12.62%
Nigeria	closed	January 1985	141	1.28%	15.12%
Pakistan	February 1991	January 1985	141	0.76%	7.21%
Philippines	March 1986	January 1985	141	2.84%	10.32%
Portugal	July 1986	February 1986	128	1.98%	12.03%
Taiwan	January 1991	January 1985	141	2.19%	14.20%
Thailand	August 1988	January 1976	249	1.18%	7.80%
Turkey	August 1989	January 1987	117	2.86%	20.03%
Venezuela	January 1990	January 1985	141	1.67%	13.76%
Zimbabwe	July 1993	January 1976	249	0.71%	9.80%

^aAn excess dollar return is the monthly dollar return minus the monthly risk-less rate based on the 3-month Treasury Bill rate. A monthly dollar return is the change in the local market index expressed in US dollars as reported in the Emerging Markets DataBase

the analysis in the paper evaluates changes that took place around market openings.³ Recognizing the importance of these dates, many different sources have been consulted to ascertain and confirm the validity of opening dates.⁴ One of the markets (Nigeria) is still considered closed and another market (Malaysia) has been open to foreign investment in financial securities much before the availability of stock return data. Therefore, the sample of countries available for analysis around market openings drops to 18 from the original 20.

³While the focus in this paper is on removal of restrictions on capital flows *into* the domestic market, there are often restrictions on capital flows *out of* the country. If domestic investors are allowed to own foreign securities prior to removal of restrictions on capital inflows, then the effect of liberalization may differ from countries where capital outflows are restricted. There are four countries (Indonesia, Mexico, Taiwan, and Venezuela) where residents were allowed to own foreign securities prior to our definition of market opening. Our analysis with and without these four countries reveals no differences.

⁴For details regarding the level of foreign participation allowed and information relating to the process of liberalization, see the Appendix in Kim and Singal (2000). Bekaert and Harvey (1999) have also documented the major political and economic events in the sample countries, most of which are consistent with those used in this study.

Some caveats regarding the opening dates are in order. First, market opening is a gradual process and the dates reported represent only the most significant liberalization of the market. Therefore, changes measured around these dates will understate the true effect of market openings. Second, these are the actual opening dates, not the announcement dates. Since the announcement is typically made before the actual opening and asset prices are likely to react to the announcement, the effects detected around the actual opening dates are due to market pressures associated with foreign demand and resolution of uncertainty regarding market opening. To control for the possibility of liberalization announcements affecting stock returns, inflation rates, and exchange rates, the year prior to the actual opening is excluded from the analysis. Third, stock market liberalization is often accompanied by other economic reforms like relaxation of product market controls, trade liberalization, and privatization. These economic reforms will also affect the economic variables we examine in this paper.⁵

To evaluate the impact of market liberalization on selected economic variables, we have chosen a long sample period: a total period of 10 years (five years before market opening and five years after market opening) for our analysis. We believe this is long enough to capture the effects related to market liberalization. Any changes in the economic variables that occur after that period are unlikely to be attributable to market openings.

2. The effect on stock returns, inflation rates and exchange rates

The steady-state stock returns reflect the rate of return required by investors from their equity stake in the firm. For the firm, it represents an important cost of capital. If there is a reduction in the return required by investors, then the firm will be able to accept more investment projects which will enhance economic growth. Because foreign investors tend to have portfolios with greater diversification, they are likely to demand lower returns than the domestic investors with limited diversification opportunities.

On the negative side, policy makers of emerging economies are concerned that inflow of capital after market opening may result in greater inflation and a stronger currency. If there are not enough investment opportunities to absorb the new inflow of foreign capital, the excess capital will push up inflation. Similarly, a strong currency makes the exports less competitive thereby hurting the export sector of the economy. Since most emerging economies depend extensively on exports, deterioration in the terms of trade due to a strengthening currency may hurt the domestic economy.

In this section, we analyze the impact of market openings on the level of stock returns, inflation rates, and exchange rates. The data are drawn from the EMDB

⁵Henry (2000) controls for economic reforms and still finds a qualitatively similar effect of market liberalization on stock returns.

that contains a monthly total return index for each market based on a representative set of stocks followed by the IFC and adjusted for all distributions and stock splits. The second source of data is the International Financial Statistics that contains macroeconomic financial data.

2.1. Stock returns

We compute and compare stock returns before market opening with the stock returns after market opening. The month of market opening is defined as month zero. The returns for each country are measured using the US\$ as the single reference currency. For comparison across countries and different periods, excess dollar returns are used. An excess dollar return is computed as the change in the market index expressed in US dollars as reported by IFC minus the monthly risk-less rate based on the three-month Treasury Bill rate. These excess dollar returns and S.D. are reported for all 20 countries in Table 1. The mean excess returns range from 0.12% per month to 4.32% per month.

To assess the effect of market opening on stock returns, the mean excess returns are computed for 15 countries for a period of 10 years (± 60 months) around the month of market opening.⁶ We compare stock returns around market openings by comparing excess dollar returns for a calendar month prior to opening with a corresponding calendar month post-opening. Because of the anticipation of market opening and pre-opening announcements, one year prior to opening is excluded. The month by month comparison is made for each country giving us a total of 170 country-month observations. For the 12 months after market opening (relative month +1 to +12), the returns are compared with the 12 months of the second year before market opening (relative month -13 to -24). The second year after opening (relative month +13 to +24) is also compared with the second year prior to market opening (relative month -13 to -24), the third year after opening (relative month +25 to +36) is then compared with the third year prior to market opening (relative month -25 to -36), etc.⁷

Three statistical tests are conducted. The parametric test gives an estimate of the size of average effect of market openings on changes in stock returns. Non-parametric tests are also used since the emerging market returns are non-normal (see Claessens et al., 1995). The first non-parametric test employs the binomial test and the second non-parametric test is a simple sign test of no difference between the pre-opening and post-opening returns.

⁶We require that countries have at least six months of data before market opening and six months of data after market opening for comparison. Based on these criteria five countries are excluded from the sample: Nigeria was closed as of 1998; Malaysia opened before December 1984, the first month for which data are available for Malaysia; Indonesia opened in September 1989, 3 months before the first set of data are available for Indonesia; Jordan opened in January 1978, 12 months before the availability of first return; and Portugal has only 4 months of pre-opening data available.

⁷In this manner, we can also identify trends that might lead to spurious conclusions. If there is a trend, then as the observation period around market opening widens we should see the changes increase or decrease monotonically.

Table 2

Tests of changes in stock returns, inflation, and exchange rates around market openings^{a,b}

Description of comparison	Number of observations	Non-parametric test		Sign test of no difference (<i>P</i> -value)	Parametric test	
		Percent positive	<i>z</i> -stat		Mean change	<i>t</i> -stat of mean change
Panel A: Changes in monthly excess dollar returns ^c						
Post 1st year vs. Pre 2nd year	170	61.8	3.00	0.00	+6.23%	4.02
Post 2nd year vs. Pre 2nd year	170	52.9	0.68	0.49	+1.70%	1.16
Post 3rd year vs. Pre 3rd year	163	46.6	-0.79	0.43	-3.03%	-2.07
Post 4th year vs. Pre 4th year	144	42.4	-1.74	0.08	-0.49%	-0.34
Post 5th year vs. Pre 5th year	128	44.5	-1.16	0.25	-1.47%	-0.82
Panel B: Changes in inflation rates ^d						
Post 1st year vs. Pre 2nd year	179	40.8	-2.38	0.02	-0.75%	-3.97
Post 2nd year vs. Pre 2nd year	179	40.8	-2.38	0.02	-0.76%	-4.04
Post 3rd year vs. Pre 3rd year	168	38.1	-3.01	0.00	-0.65%	-4.09
Post 4th year vs. Pre 4th year	159	59.7	2.37	0.02	0.14%	1.02
Post 5th year vs. Pre 5th year	143	50.3	0.01	1.00	0.22%	0.91
Panel C: Changes in nominal exchange rates ^d						
Post 1st year vs. Pre 2nd year	180	66.7	4.41	0.00	1.01%	8.35
Post 2nd year vs. Pre 2nd year	180	71.1	5.59	0.00	1.10%	8.64
Post 3rd year vs. Pre 3rd year	180	70.0	5.29	0.00	1.04%	6.78
Post 4th year vs. Pre 4th year	174	62.6	3.25	0.00	0.60%	4.66
Post 5th year vs. Pre 5th year	158	55.7	1.35	0.18	0.09%	0.55

^aPre-opening rates (excess dollar returns, inflation rates, and exchange rates) are compared with post-opening rates in the following manner. First year after opening (relative months +1 to +12) is compared with the second year prior to opening (relative months -13 to -24). Since there is anticipation of market opening, the year immediately preceding market opening is excluded. The second year after opening is compared with the second year before opening. The third year after opening is compared with the third year before opening, etc.

^bThree tests are used to test for the difference between the two periods. The first non-parametric test is the *z*-statistic based on the number of increases and decreases. The second non-parametric test is the sign test for which the *P*-values are given. The last one is a parametric test which reports the difference in means. The significance is evaluated by a *t*-test that assumes independence. The standard error for the *t*-test is based on the actual changes.

^cThe following countries are not included: Jordan and Malaysia (no data before opening), Nigeria (closed), and Indonesia and Portugal (less than 6 months of data before opening).

^dThe following countries are not included: Malaysia (no data before opening), Nigeria (closed), and Taiwan (no data in the International Financial Statistics) and high inflation countries, viz. Argentina and Brazil that experienced inflation exceeding 10% per month.

The results are presented in Panel A of Table 2. The overall impression is that, on average, the stock returns increase soon after opening of markets which is followed by subsequent decreases in returns that are sometimes significant. The initial increase in returns suggests that stock prices increase due to greater demand for the domestic securities by foreign investors. Once prices have readjusted, the

decrease in returns is indicative of the fact that domestic firms are able to access lower cost funds from international investors. Apparently, allowing foreign participation hastens market integration that lowers the long-run average returns.

The decrease in stock returns is consistent with Bekaert and Harvey (1999) who find that increases in equity flows are associated with a lower cost of capital. Similarly, Henry (2000) finds that liberalizing countries experience an upward revaluation of the domestic stocks reflecting a reduction in the cost of equity capital. The lower cost of capital is good for economic growth as it encourages new investment.

2.2. Inflation

The Consumer Price Indices are used for measuring inflation in all countries in the sample except Taiwan which is not covered by the IFC. Rates of inflation are computed for 17 countries around market openings. Statistical tests for individual countries show that inflation seems to have increased significantly for Pakistan, Thailand, and Turkey, and decreased significantly for Argentina, Chile, Korea, Mexico, Philippines, and Portugal.⁸

To get an overall picture of the effect of liberalization on inflation, inflation rates are aggregated across different countries. We exclude Argentina and Brazil because their very high rates of inflation will swamp the inflation rates of other countries.⁹ Panel B of Table 2 reports the month-by-month aggregate changes in inflation rates. There is a significant decrease in inflation for all three years after market opening irrespective of whether parametric or non-parametric tests are used. The average decrease in inflation is 0.70% per month, or an annualized rate of 8%.

Changes in the inflation rate indicate that the host countries, on average, were able to effectively manage foreign portfolio inflows without causing prices to rise. This evidence is important since policy makers are concerned with the effect that new capital can have on the economy: misdirected capital will merely increase the demand for the existing aggregate supply resulting in higher prices and inflation. However, the decline in inflation rate implies that foreign capital was instrumental in increasing the supply of goods and services for the consumers rather than finding its way into greater consumption as feared by the policy makers.

2.3. Exchange rates

Exchange rates are measured as US\$ per unit of local currency. Changes in nominal exchange rates are computed for 17 countries for which data are

⁸None of the individual country results are reported here to conserve space.

⁹An alternative of using standardized inflation rates is discussed and evaluated in Kim and Singal (2000). The results are unaffected if the standardized inflation rates are used.

available.¹⁰ Taiwan is excluded because no exchange rate data are available; Malaysia has no data available prior to opening; and Nigeria has no data available after market opening. An increase in the exchange rate implies an appreciation of the local currency while a decrease in the exchange rate means a depreciation of the local currency.

Individual country results show that the currencies of Korea, Pakistan, and Turkey fall more rapidly after market opening than in the pre-opening period. For all other countries, the rate of depreciation is either significantly lower or insignificantly different in the post-opening period than in the pre-opening period. Currencies show persistent depreciation both before and after market opening, but in general, they fall at a lower rate in the post-opening period, with the rate of depreciation falling from 1.44% to 0.75% per month. But no country shows a significant appreciation in the nominal exchange rate during either the pre or post-opening period.

The month by month test statistics for aggregate changes in exchange rates for all markets excluding Argentina and Brazil (high inflation countries) are presented in Panel C of Table 2. The results reveal that while the currencies of emerging economies continued to depreciate, they did not depreciate nearly as much as they did in the pre-period. The table confirms that there is a significant decrease in the rate of currency depreciation irrespective of whether the parametric or non-parametric tests are used.¹¹ It seems that the confidence of foreign investors in the host country's currency increases when the markets are liberalized.

3. Changes in volatility of stock returns, volatility of inflation rates and volatility of changes in exchange rates

Changes in volatility of stock returns, inflation rates, and currency returns are important in analyzing benefits and risks of free capital flows to the host country. If free flow of foreign capital means large changes in portfolio flows that increase the volatility, it will increase the risk of investing capital in the economy. Since higher risk leads to higher required returns, i.e. higher cost of capital, it will result in the acceptance of fewer projects dampening economic growth. Therefore, an increase in volatility due to portfolio flows can be an unacceptable risk for many economies and their policy makers.

On the other hand, integration with world equity markets might lower volatility as it makes the domestic market more resilient due to greater participation by sophisticated investors with superior information processing capabilities. They would also demand improved corporate governance and better investor protection

¹⁰ Effective exchange rates are not used because of non-availability of data for most countries in the sample and because the US\$ is the most common currency of choice for international trade and pricing.

¹¹ Since the nominal exchange rates are unadjusted for relative inflation rates, we also analyze changes in real exchange rates. The results, not reported here, are similar to those for nominal exchange rates.

through greater transparency and accountability, all of which will reduce uncertainty facing the investor. Perhaps most important, the threat of capital flight may provide the domestic government with the political will to implement policies that would enhance efficiency and stability of domestic capital markets. In this section, we evaluate the impact of liberalization on volatility in various sectors of the economy.

3.1. Stock return volatility

We examine changes in stock return volatility noting that periods of extreme volatility are concentrated in time, i.e. high volatility is followed by periods of high volatility. To account for the level of volatility in a previous period, we employ the Auto-Regressive Conditional Volatility model (ARCH) and variants thereof such as the Generalized Auto-Regressive Conditional Volatility model (GARCH).¹²

The stock return volatility is estimated by country and then aggregated for all markets. In addition to the five countries excluded from stock return computations, Philippines is excluded because it has only four observations during the pre-period.

Panel A of Table 3 reports the results of one parametric test and two non-parametric tests similar to Table 2. The non-parametric tests of volatility reveal no significant change in volatility of stock returns, though the signs are negative in four out of five years after market opening. The more powerful parametric test reveals that stock market volatility decreased significantly in the fourth and fifth years after opening.

If integration with the world markets makes the equilibrating process more efficient for stocks in emerging markets, it is reasonable to expect a drop in stock return volatility and a concomitant drop in expected returns. One may argue, however, that foreign investors are quick to react to changes in short term economic outlook in emerging economies, making unrestricted capital flows very volatile. This volatility of capital flows may increase the volatility of the stock market. Based on the results presented herein though, we conclude that, contrary to the popular belief, foreign investors may reduce volatility but certainly do not add to stock market volatility.¹³

3.2. Volatility of inflation rates

The volatility of inflation rates is estimated in the manner as described above for

¹²We choose the conditional mean model given by Eq. (1) because it provides the best fit, has better auto-correlation properties, and is frequently used by researchers (see Schwert, 1989).

$$\tilde{R}_t = \sum_{j=1}^{12} \alpha_j D_{jt} + \sum_{i=1}^{12} \beta_i R_{t-i} + \tilde{\varepsilon}_t \quad (1)$$

¹³Two recent papers have studied stock return volatility around market openings. de Santis and Imrohorglu (1997) find no evidence of a change in volatility while Bekaert and Harvey (1997) report a decrease in stock return volatility. However, neither paper finds evidence of an increase in stock return volatility.

Table 3

Tests of changes in conditional volatility of stock returns, inflation, and exchange rates around market openings

Description of comparison	Number of observations	Non-parametric test		Sign test of no difference (<i>P</i> -value)	Parametric test	
		Percent positive	<i>z</i> -stat		Mean change	<i>t</i> -stat of mean change
Panel A: Changes in conditional volatility of stock returns ^a						
Post 1st year vs. Pre 2nd year	163	50.9	0.15	0.88	0.78%	0.85
Post 2nd year vs. Pre 2nd year	163	49.7	-0.02	1.00	-0.48%	-0.50
Post 3rd year vs. Pre 3rd year	156	44.9	-1.19	0.23	-0.81%	-1.37
Post 4th year vs. Pre 4th year	144	49.3	-0.08	0.93	-2.10%	-2.24
Post 5th year vs. Pre 5th year	117	47.9	-0.36	0.71	-3.78%	-2.66
Panel B: Changes in conditional volatility of inflation rates ^b						
Post 1st year vs. Pre 2nd year	168	32.7	-4.41	0.00	-0.33%	-4.20
Post 2nd year vs. Pre 2nd year	168	35.7	-3.62	0.00	-0.37%	-4.36
Post 3rd year vs. Pre 3rd year	168	33.3	-4.24	0.00	-0.23%	-4.44
Post 4th year vs. Pre 4th year	159	40.7	-2.28	0.02	-0.10%	-3.09
Post 5th year vs. Pre 5th year	143	40.4	-2.24	0.03	0.05%	0.41
Panel C: Changes in conditional volatility of nominal exchange rates ^b						
Post 1st year vs. Pre nd year	180	40.6	-2.45	0.01	-0.02%	-0.36
Post 2nd year vs. Pre 2nd year	180	37.2	-3.36	0.00	-0.09%	-2.10
Post 3rd year vs. Pre 3rd year	180	36.1	-3.65	0.00	-0.17%	-3.08
Post 4th year vs. Pre 4th year	165	47.3	-0.62	0.53	-0.03%	-1.32
Post 5th year vs. Pre 5th year	146	52.7	0.57	0.56	-0.01%	-0.28

^aThe following countries are not included: Jordan and Malaysia (no data before opening), Nigeria (closed), and Indonesia, Philippines, and Portugal (insufficient data before opening for volatility estimation).

^bThe following countries are not included: Malaysia (no data before opening), Nigeria (closed), and Taiwan (no data in the International Financial Statistics) and high inflation countries, viz. Argentina and Brazil that experienced inflation exceeding 10% per month.

stock return volatility. In all of the volatility calculations, Eq. (1) is estimated using ARCH or GARCH to model conditional volatilities in individual countries. Individual country test results reveal that no country experienced significant increases in the volatility of inflation. The volatility decreased significantly in nine out of 17 countries: Argentina, Brazil, Colombia, India, Korea, Mexico, Philippines, Portugal, and Venezuela.

The volatility estimates are aggregated across low inflation markets and presented in Panel B of Table 3 for 15 countries excluding Argentina and Brazil. All of the tests reveal a significant decrease in volatility of inflation rates for the entire period of observation (except that the parametric test shows no change in the fifth year after opening). This leads us to conclude that volatility of inflation rates falls as a result of market opening. Perhaps, the reduction in the rate of inflation documented in the previous section contributes to the reduction in volatility of

inflation. Lower and more constant rates of inflation reduce the risk related to inflation uncertainty and are characteristic of a positive economic environment.

3.3. Volatility of changes in exchange rates

Exchange rate volatility is estimated in a manner similar to estimation of stock return volatility. The individual country test results show that the volatility increased significantly in Colombia and Turkey and marginally in Pakistan while it decreased significantly in seven countries. Month-by-month comparisons for the low inflation markets are presented in Panel C of Table 3. The non-parametric tests suggest that there was a significant decrease in volatility for three years after market opening when compared with the corresponding pre-opening periods. Results of the parametric test are also consistent with the non-parametric tests, except that the decreases are significant only for the second and third years after opening. However, none of the tests imply an increase in the volatility of changes in nominal exchange rates.¹⁴

The reduction in currency risk implies that foreign investors exert a calming influence on volatility. The lower volatility of changes in exchange rates is useful in two ways. First, the volume of trade is likely to increase as a result of less risk related to trade. Second, the lower currency risk will encourage foreign investors to invest more at a lower required rate of return.

Overall, both the volatility of inflation and volatility of currency value show a decrease after market opening while stock return volatility does not change. The decrease in volatility implies that capital inflows due to stock market openings are not disruptive to the economy. Instead, the reduction in risk should be a big ‘plus.’

4. Stock market efficiency

Stock market efficiency is important for efficient allocation of resources. In an informationally more efficient market, prices will reflect available information more accurately. Since prices are used to make production decisions, prices in a more efficient market will result in a better allocation of resources. If participation by foreign investors does indeed make the stock market more efficient, then a more optimal allocation of capital will result.

We examine changes in stock market efficiency around market openings by investigating whether stock returns become more random. Though randomness of stock prices need not imply efficiency, it can generally be claimed that randomness is related to market efficiency. Thus, while we test the random walk hypothesis, our conclusions are loosely construed to reflect market efficiency. The random walk

¹⁴ Volatility estimates of real exchange rates are similar to those for nominal exchange rates.

hypothesis is tested using the variance ratio test proposed by Lo and MacKinlay (1988).¹⁵

In addition to monthly stock index data described in section I, weekly stock market indices are also available for all countries but for varying periods. We choose monthly data or weekly data based on the frequency that gives the greatest number of observations (see the ‘data used’ column in Table 4).

The tests are conducted using local currency returns. In this instance, it is not necessary to use U.S. dollar returns because raw returns across different countries are neither compared nor aggregated. Results for 14 countries prior to market opening and after market opening are presented in Table 4.¹⁶ The variance ratios should be equal to one if stock prices follow a random walk.¹⁷ The variance ratios are reported using two and eight base observations, where ‘base’ refers to the length of the observation period in weeks or months depending on the frequency chosen.

The pre-opening data in Table 4 show that the returns in many countries were predictable either in the 2-base or 8-base tests or both: Brazil, Chile, Colombia, India, Mexico, Philippines, Venezuela, and Zimbabwe. Several other studies have documented predictability of returns in emerging markets. Claessens et al. (1995) find significant autocorrelations for many emerging markets. Harvey (1995) also documents higher predictability for emerging market returns than for stock returns in developed markets.

The change in predictability of returns around market openings is given in the last two columns of Table 4. There is a statistically significant reduction in predictability of returns for Brazil, Colombia, and Mexico. There is an increase in predictability only for Pakistan. For the remaining countries, the change is insignificantly different from zero.

For the sample as a whole, however, stock markets tend to become more efficient in impounding information over longer periods: the heteroscedasticity corrected *z*-statistic for the overall sample is significantly negative for 8-base observations. For 2-base observations, the *z*-statistic is negative but not significantly different from zero. The results for the complete sample indicate that the

¹⁵We begin with the recursive relation

$$X_t = \mu + X_{t-1} + \varepsilon_t \quad (2)$$

where $X_t \equiv \ln P_t$ and P_t is the stock price at time t , μ denotes drift and ε_t the random disturbance. The expectation of ε_t is assumed to be zero. Variance ratio tests exploit the property of random walks that the variance is a linear function of period: $1/q$ th of the variance of $X_t - X_{t-q}$ should be equal to the variance of $X_t - X_{t-1}$.

¹⁶Indonesia, Jordan, Malaysia, Nigeria, Portugal, and Thailand are excluded due to insufficient data.

¹⁷For instance, using two base observations for Argentina, the variance ratio prior to market opening is 1.16. However, the heteroskedasticity-robust *z*-statistic of 1.24 suggests that it is not statistically different from one. After market opening, the variance ratio decreases to 0.83 which is also insignificantly different from one.

Table 4
 Tests of random walk around market openings^{a,b}

Country	Data used (Reason)	Pre-opening			Post-opening			Difference	
		N	2	8	N	2	8	2	8
Argentina	Monthly	160	1.16 (1.24)	1.40 (1.32)	80	0.83 (-0.84)	0.93 (-0.19)	-0.33 (-1.37)	-0.47 (-0.99)
Brazil	Weekly	120	1.34 (2.69)	1.66 (2.06)	272	0.98 (-0.92)	0.96 (-0.85)	-0.36 (-2.81)	-0.70 (-2.16)
Chile	Monthly	160	1.17 (2.11)	1.81 (3.25)	80	1.29 (2.41)	1.73 (2.14)	0.12 (0.83)	-0.08 (-0.19)
Colombia	Weekly	104	1.49 (3.45)	2.77 (4.91)	288	1.21 (2.41)	2.11 (4.07)	-0.28 (-1.68)	-0.66 (-1.46)
Greece	Monthly	120	1.08 (0.75)	1.03 (0.11)	120	1.15 (1.72)	1.29 (0.89)	0.07 (0.51)	0.26 (0.61)
India	Weekly	192	1.11 (1.14)	1.71 (2.51)	200	1.12 (1.36)	1.23 (1.01)	0.01 (0.08)	-0.48 (-1.32)
Korea	Weekly	152	0.95 (-0.51)	1.06 (0.26)	240	1.07 (0.80)	1.22 (0.96)	0.12 (0.91)	0.16 (0.49)
Mexico	Monthly	160	1.39 (2.55)	2.09 (2.79)	80	1.15 (1.06)	1.19 (0.55)	-0.24 (-1.15)	-0.90 (-1.73)
Pakistan	Monthly	72	1.00 (-0.04)	0.67 (-0.91)	64	1.26 (1.57)	1.67 (1.62)	0.26 (1.57)	1.00 (1.82)
Philippines	Monthly	8	1.42 (3.68)	1.71 (2.51)	120	1.21 (2.11)	1.36 (1.23)	-0.21 (-1.39)	-0.35 (-0.86)
Taiwan	Weekly	96	1.02 (0.15)	1.71 (1.75)	296	1.03 (0.55)	1.37 (1.81)	0.01 (0.07)	-0.34 (-0.75)
Turkey	Weekly	24	1.27 (1.37)	0.87 (-0.23)	368	1.04 (0.61)	1.01 (0.03)	-0.23 (-1.11)	0.14 (0.21)
Venezuela	Weekly	48	1.40 (2.43)	2.48 (3.20)	344	1.22 (3.08)	1.73 (3.91)	-0.18 (-1.00)	-0.75 (-1.50)
Zimbabwe	Monthly	208	1.11 (1.29)	2.25 (5.32)	32	1.34 (1.60)	1.77 (1.35)	0.23 (1.00)	-0.48 (-0.78)
Overall								(-1.48)	(-2.30)

^aThe method for the variance ratio test results reported here is described in the text. The tests are conducted using 2-base and 8-base observations.

^bHeteroskedasticity-robust z-statistic is in brackets.

stock returns become less predictable after market opening up to 8 periods in advance.

If markets are predictable and foreign investors are sophisticated, then the foreign investors are likely to profit from the predictability of returns. As the foreign investors take advantage of market inefficiencies, those market inefficiencies will decrease and the prices will react more quickly to new information.¹⁸ To

¹⁸Another explanation for the observed decrease in predictability could be a reduction in the non-synchronicity bias due to more frequent trading. Our analysis in Kim and Singal (2000) excludes such a possibility.

the extent that less predictability in stock prices reflects greater stock market efficiency, it should result in a more efficient allocation of capital.

5. Concluding remarks

Our study reveals that globalizing stock markets significantly increases stock prices without a concurrent increase in stock return volatility. The increase in stock prices is consistent with lower expected returns and a lower cost of capital.

Policy makers are often concerned that benefits of foreign capital at a lower cost are offset by macroeconomic instability stemming from upward pressure on inflation and exchange rates and the increased volatility due to large and volatile movements in portfolio flows. Our empirical investigation reveals no such harmful effects. Indeed, the results suggest that inflation rates, on average, fall after stock market liberalization. The fall in the inflation rate suggests that, capital inflows are directed more towards enhancing production of goods and services than towards enhancing consumption.

The results regarding exchange rates are also comforting. We observe no evidence of an appreciation of the local currency that may adversely affect competition abroad.

The volatility of inflation fell significantly after market openings and so did the volatility of exchange rate changes. These reductions mean less inflation-related risk and less risks associated with international trade and international borrowing and lending.

When we test the random walk hypothesis we find that the stock prices are less auto-correlated subsequent to market opening. The increased randomness of returns is likely to suggest an improvement in market efficiency. A more efficient market means better allocation of capital and an increase in the productivity of capital.

What is the lesson that a country can draw from the experience of emerging markets, especially a country contemplating greater capital controls? As each country has its unique features that are different from our 'average' country, it is difficult to argue that the country will lose the benefits associated with free capital flows by instituting capital controls. Nor can we claim that the countries that open their capital markets to foreign investors will only benefit from further internationalization and that the risks associated with internationalization are irrelevant. However, by examining a sample of emerging economies instead of a single country, this study is better equipped to isolate the impact of market opening from country specific factors. Thus we conclude that everything else being equal, the benefits are likely to outweigh the perceived risks associated with foreign portfolio flows.

We, therefore, agree with the advocates of free flow of capital that rather than imposing controls on capital flows, capital markets should be made more open and transparent. Perhaps, it is time to recognize that we are now in a global economic environment where capital users (sovereign countries) must compete for capital

just as they would in any competitive market. In such an environment, the only way to insure against a sudden outflow of capital and the ensuing financial crisis is to maintain confidence of suppliers of capital, which requires that the capital be used productively, investors treated fairly and information flow freely.

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