

IMF Policy Discussion Paper

Vanishing Contagion?

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Research Department

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Abstract

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While a number of emerging market crises were characterized by widespread contagion during the 1990s, more recent crises (notably, in Argentina) have been mostly contained within national borders. This has led some observers to wonder whether contagion might have become a feature of the past, with markets now better discriminating between countries with good and bad fundamentals. This paper argues that a prudent working assumption is that contagion has not vanished permanently. Available data do not seem to point to a disappearance of the main channels that contribute to transmitting crises across countries. Moreover, anticipation of the Argentine crisis by international investors may help explain the recent absence of contagion.

JEL Classification Numbers: F02, F15, F36

Keywords: crises, international integration, international transmission of shocks

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I. INTRODUCTION

The contagious nature of the crises of the 1990s, especially those in Mexico, East Asia, and Russia, captured widespread attention.² The Mexican crisis of 1994 was transmitted rapidly to other countries in Latin America. The crisis that began with the devaluation of the Thai baht in 1997 spread to several countries, especially in East Asia. The Russian crisis of 1998 had more global implications, affecting many countries—both advanced and developing. In contrast, more recent crises have been contained, for the most part, within national borders. The most notable example is the 2001-02 Argentine crisis, which had a massive impact on close neighbor Uruguay (mainly through links in the banking sector), but not on other countries. Nor did other recent episodes, such as the devaluation by Turkey in February 2001, have major consequences for other emerging market countries.

The limited degree of contagion across countries in recent crises has led some observers to wonder whether contagion might have become a feature of the past, with markets now better discriminating between countries with good and bad fundamentals.³ Possible underlying factors for the lower likelihood of contagion would include—perhaps as a reaction to the crises of the 1990s—better macroeconomic policies; larger stocks of

² In this paper we use a broad definition of “contagion” as a price movement in one market resulting from a shock in another market (Kodres and Pritsker, 2002).

³ For example, JPMorgan (2004, page 1) claims that “...there has been a structural decline of contagion across emerging market credits as evidenced by the lack of volatility following Argentina’s 2001 default.” Likewise, Fitch Ratings (2005, page 18) notes “...contagion risk appears to have fallen.” Reuters (2001) argues that “...foreign exchange reserves, estimated at some 514.4 billion dollars in 2001 [excluding Japan] are a protective force making the [Asian] region less exposed than previously to contagion risk.” Reuters (2002) makes a similar point.

reserves or more widespread use of flexible exchange rates; and greater emphasis on supervision, transparency, and appropriate regulation of banking systems.

At first sight, data on emerging market bond spreads and returns would indeed seem to point to a structural decline in cross-country co-movement. Whereas spreads increased in near-unison during the crisis episodes of the 1990s, the shocks of the 2000s appear more idiosyncratic—resulting, for example, in country-specific spikes in the Argentine, Brazilian, Nigerian, and Venezuelan spreads (Figure 1, top panel).⁴ This is confirmed by simple pairwise correlation coefficients for emerging market bond returns: the average six-month correlation coefficient (for 66 country pairs) was lower in 2000-2005 than in 1994-1999, possibly implying that investors are now paying greater attention to country-specific fundamentals than they did in the 1990s (Figure 1, middle panel). However, this type of evidence is far from conclusive.⁵

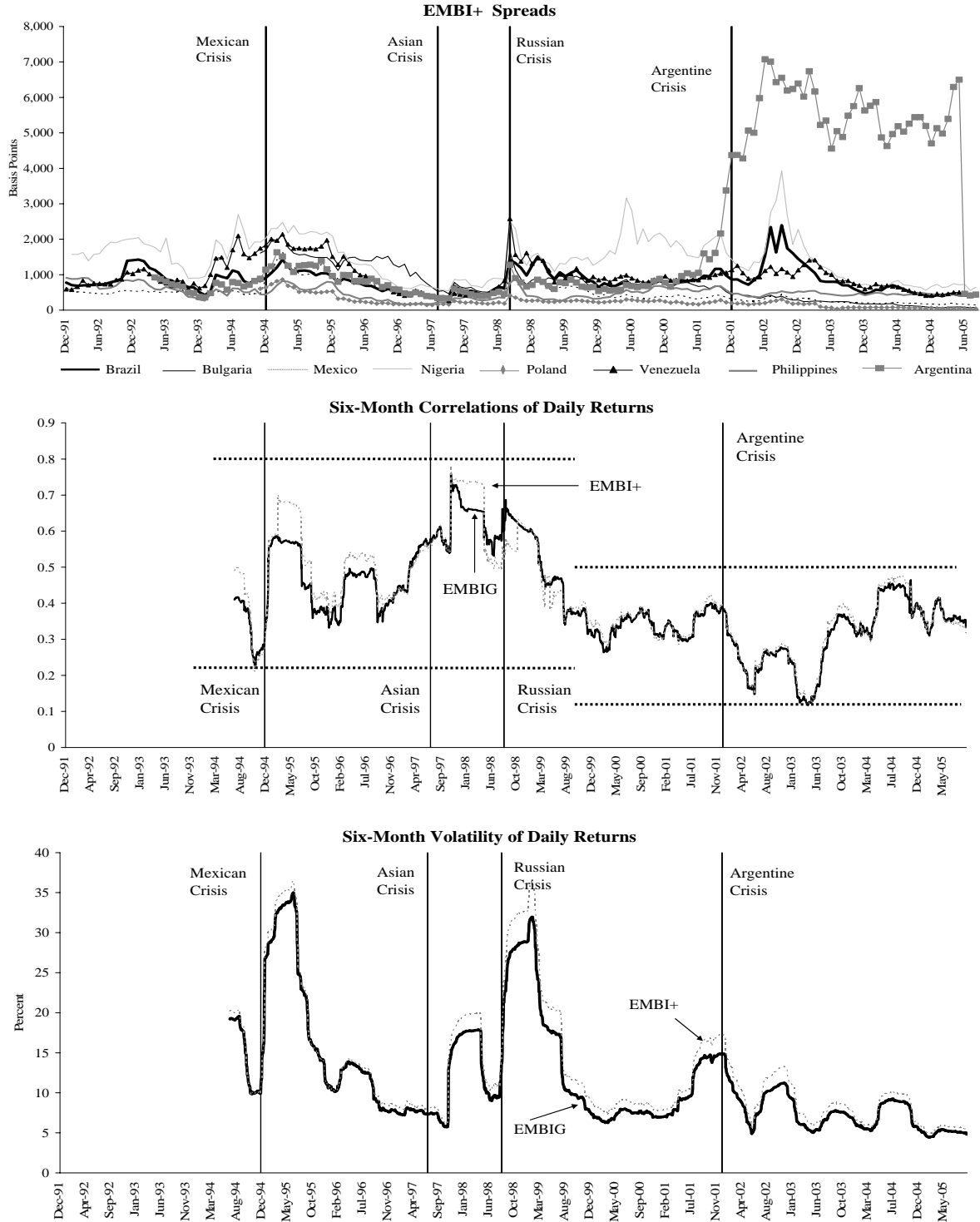
It is probably too early to tell whether contagion has diminished in a long-lasting manner. And, of course, it is impossible to predict whether financial account crises or contagion will reappear in the next few years.⁶ Nevertheless, to gain an informed view on the risk of possible future contagion, the next section briefly revisits the current state of

⁴ See Mauro, Sussman, and Yafeh (2006) for further analysis.

⁵ While observed correlations seem to have declined, correlation coefficients tend to be higher—other things equal—during periods of turmoil (Forbes and Rigobon 2002). Thus the decline in the volatility of returns (bottom panel in Figure 1) may have contributed to the fall in correlation coefficients. Corrections for this possible factor are difficult, because to keep “other things equal” they require strong assumptions on the source and extent of shocks. Another caveat to the interpretation of correlations as measures of contagion is that they might well reflect the impact of common factors.

⁶ For recently developed scenarios of what the next crisis in emerging market countries might look like, see Goldstein (2005).

Figure 1. Emerging Market Bond Spreads and Returns, 1991–2005



Source: JPMorgan.

Notes: The top panel plots the EMBI spreads for the eight countries for which they are available since late 1994. The middle panel plots the average six-month correlations among 66 country pairs of the JPMorgan EMBI+ and EMBIG indexes. The correlation coefficients are based on daily returns of each index. The countries included are those for which returns data are available since 1994: Argentina, Brazil, Bulgaria, Ecuador, Korea, Mexico, Nigeria, Peru, Philippines, Poland, Russia, and Venezuela. The bottom panel plots the six-month volatility of the JPMorgan EMBI+ and EMBIG indexes. The volatility is calculated from daily returns over the previous six months for each country pair.

knowledge regarding how crises propagate across countries and asks whether there is conclusive evidence of a structural change in the spillover mechanisms. Section III asks what other factors might have contributed to the relatively low incidence of contagion that has been observed since 2000. Section IV concludes.

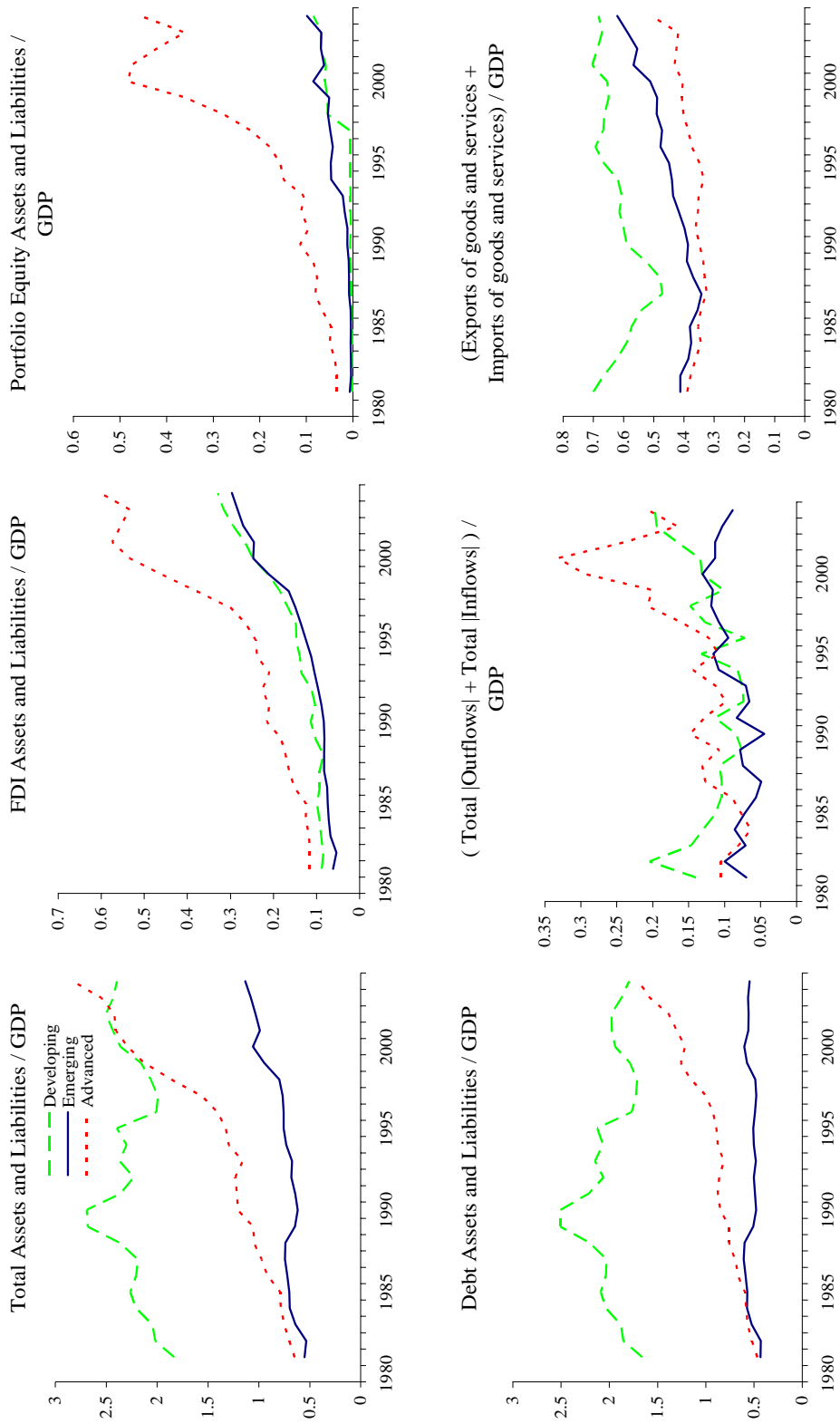
II. CHANNELS OF CONTAGION

Contagion can be broadly defined as the transmission of crises across countries beyond what would be implied by common shocks. A necessary, though not sufficient, condition for such channels to operate is of course a substantial degree of international trade and financial integration. In this respect, linkages among countries have deepened substantially over the past two decades (Figure 2). International trade grew considerably faster than GDP for all groups of countries; several measures of financial integration also point to increased international links. The remainder of this section considers in further detail the two main channels of contagion: trade and finance.

A. The Trade Channel

Trade links work through the impact of the devaluations associated with crises. They encompass two distinct effects, which can be amplified in turn by credit constraints: a competitiveness effect (through changes in relative prices that affect the country's ability to compete abroad) and an income effect (to the extent that crises reduce income measured in foreign currency, thereby curbing import demand). Trade links have been viewed as an important factor underlying contagion, and some studies have argued that the 1992–93 European Exchange Rate Mechanism (ERM) crisis, the 1994 Mexican crisis, the 1997 Asian crisis, and the 1999 Brazilian crisis were transmitted to other countries primarily through trade (Eichengreen and Rose, 1999; Glick and Rose, 1999; and Forbes, 2001 and 2004).

Figure 2. International Integration of Financial Flows and Trade, 1980–2003



Sources: *Balance of Payments Statistics* and *International Financial Statistics*, International Monetary Fund; *World Development Indicators*, World Bank; and Lane and Milesi-Ferretti (2005).

Note: The middle, lower panel reports outflows plus inflows, both in absolute values, as a share of GDP.

Trade in goods and services relative to GDP has consistently increased in all regions—including those that were affected by contagion in the past—accentuating trade linkages (Table 1). Moreover, regional concentration of trade has increased in some areas that experienced contagion in the 1990s.⁷ These trends suggest that trade remains a potentially important channel of contagion among open economies for future crises.

Although the trade channel seems to have played a role, to different degrees, in the crises of the 1990s, it does not explain the contagion observed in the context of the 1998 Russian crisis, where trade links—either bilateral trade or third party competition—among the affected countries were quite limited. Thus, the experience of the Russian crisis suggests that trade is unlikely to be the only channel of contagion. Other channels are necessary to account for the evidence.

Table 1. Trade Flows, 1985-2003
(Imports plus exports, in percent of GDP)

Region	1985	1990	1995	2000	2003
Latin America and the Caribbean	28	32	38	42	45
South Asia	18	21	28	32	34
East Asia and Pacific	33	45	60	72	81
World	38	38	42	50	52

Source: *World Development Indicators* (WDI), World Bank

Note: The aggregate value of trade (imports plus exports) in goods and services is shown for each region as a percentage of GDP. The figure shows the total trade of each region, including trade within the region and with other regions. The classification of countries into regions follows the WDI.

⁷ For example, the share of regional trade in total trade for the ASEAN+3 region (Brunei Darussalam, Cambodia, China, Indonesia, Japan, Korea, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam) rose from about 30 percent in the mid-1980s to about 45 percent in 2004.

B. The Financial Channel

After the Russian crisis, the financial channel of contagion has received much attention.⁸ Financial links typically operate through the financial account among countries connected to the international financial system. In a few cases, crises are transmitted across countries because of direct financial linkages between their residents. More frequently, however, the financial channel involves international investors (“common creditors”) in the financial centers, who transmit crises across the various countries where they hold assets.

Financial links may well result from the mode of operation of financial institutions investing internationally, especially in response to shocks affecting their liquidity and asset quality, which in turn depends on whether asset managers use their own or others’ capital. For example, when open-end mutual funds foresee future redemptions after a shock in one country, they raise cash by selling assets in other countries. Furthermore, when leveraged investors, such as banks and especially hedge funds, face regulatory requirements, internal provisioning practices, or margin calls, they rebalance their portfolios by selling their asset holdings in other countries. Thus, losses in one country affected by crisis can prompt international investors to sell off assets or curtail lending in other countries as well.

Beyond these somewhat mechanical factors, financial links can also result from factors related to investor behavior, such as risk aversion, information asymmetries, herding, and principal-agent problems. Risk aversion affects the composition of an investor’s

⁸ For example, Kaminsky and Reinhart (2000) and Martinez Peria, Powell, and Vladkova-Hollar (2005) document the role of banks. Borensztein and Gelos (2003), Kaminsky, Lyons, and Schmukler (2004), and Broner, Gelos, and Reinhart (2005) discuss the role of mutual funds. Allen and Gale (2000), Kodres and Pritsker (2002), and Schnabel and Shin (2004) provide theoretical analysis of the mechanisms underpinning contagion.

portfolio: a crisis in one country might lead to a decline in risk appetite and to portfolio rebalancing, prompting investors to reduce their exposure to risky assets. With asymmetric information, investors might shift their assessments about countries even without any change in fundamentals. Investors might react to news revealed in the crisis country by avoiding, and pulling back from, countries that share some characteristics with the crisis country, even if no other news emerged. Information asymmetry might also generate “information cascades,” according to which investors, acting in their own self-interest, take uninformative imitative actions and disregard their own private information. This type of behavior could reinforce the transmission of shocks and might occur in an environment where less informed investors tried to gain information by observing the actions of other market participants, not necessarily better informed.⁹ Factors related to reputation and compensation may also provide incentives for managers to follow the herd: financial managers’ performance is often assessed by comparison with their peers, rather than on the basis of absolute returns; managers thus have strong incentives to follow others in the industry and would take a big risk if they deviated from their competitors (Rajan, 2005).

Many observers have argued that the financial channel has been the main channel of transmission of shocks across countries during the 1990s (Baig and Goldfajn, 1999; Kaminsky and Reinhart, 2000; Van Rijckeghem and Weder, 2001; and Caramazza, Ricci, and Salgado, 2004). Financial links were present in the 1992–93 ERM crisis; moreover, they appear to have been the main transmission channel (through U.S. investors) of the Mexican

⁹ For further discussion on information cascades, different types of herding, crises, and contagion, see Bikhchandani and Sharma (2000), Calvo and Mendoza (2000), and Chamley (2004).

1994 crisis. During the 1997 Asian crisis, the financial channel seems to have worked through European and, especially, Japanese commercial banks that had lent to Indonesia, Korea, Malaysia, and Thailand; and through mutual funds selling off assets in Hong Kong SAR and Singapore. There is also some evidence of herding behavior in Korean stock markets (Choe, Kho, and Stulz, 1999; and Kim and Wei, 2002). In the case of the 1998 Russian crisis, mutual funds and hedge funds seem to have been a key vehicle of transmission of the crisis to other regions. Increases in investor risk aversion and portfolio rebalancing to cover losses and margin calls affected even the international financial centers, particularly through the debacle of Long-Term Capital Management (LTCM), a large hedge fund.¹⁰

Could the absence of contagion during the 2000s be due to a marked decline in financial links? One way to address this question is to study whether the exposure of, and trading by, international investors has changed in recent years. This is important because for the financial channel to operate, investors need to hold and trade assets issued by several countries, especially crisis-prone emerging market countries.¹¹

Exposure to emerging market countries by international banks, mutual funds, and hedge funds does not seem to have changed sufficiently for concerns regarding potential contagion to disappear. Overall exposure to emerging market countries by banks owned by

¹⁰ See the World Bank *contagion* website for numerous references:

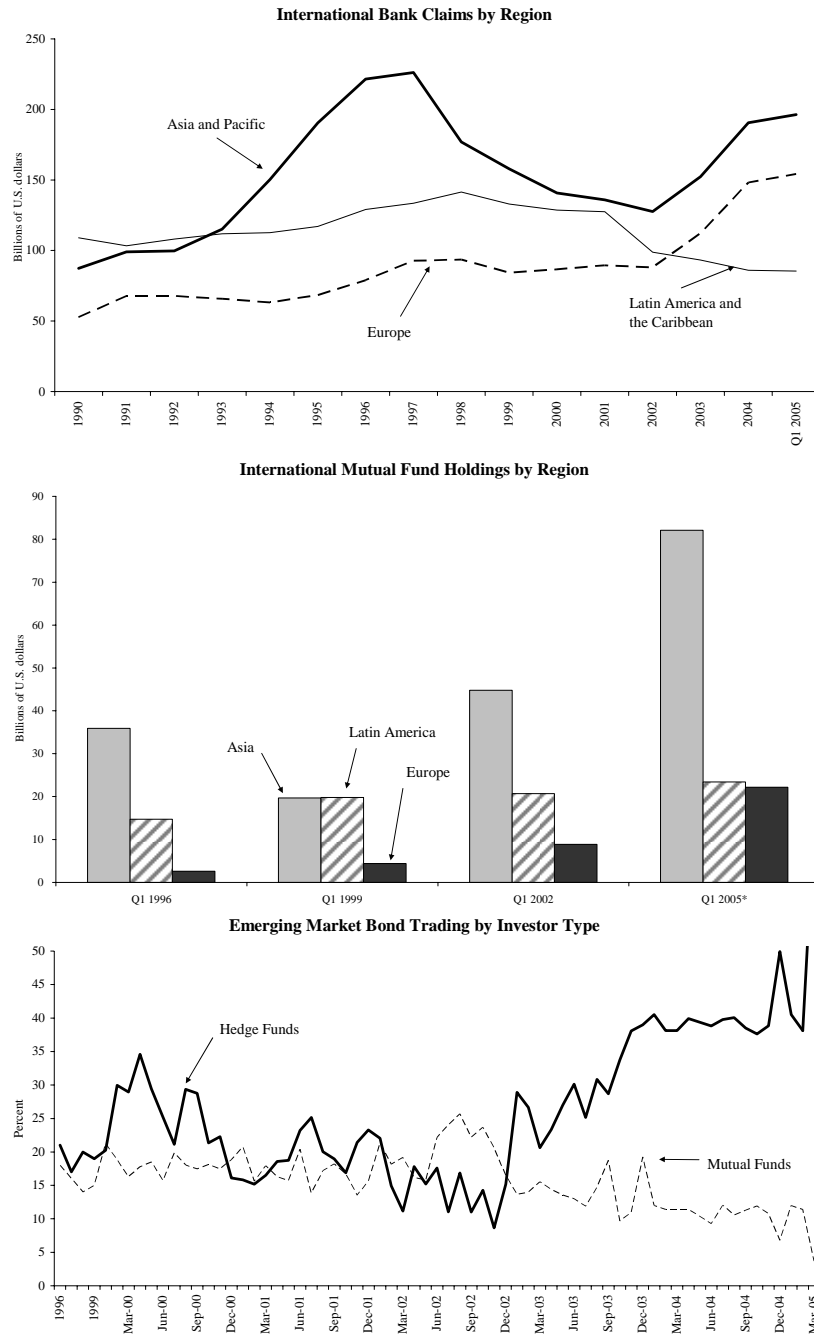
<http://www1.worldbank.org/economicpolicy/managing%20volatility/contagion/>.

¹¹ Although exposure and participation by international investors are necessary for contagion, they are not sufficient. This said, other things equal, if exposure increases, the likelihood of contagion probably rises as well. Our focus on exposure is determined by the availability of data. As mentioned above, a quantitative analysis of how other potentially important factors—like information asymmetries and trading practices—have changed in recent years is unfortunately hindered by data constraints.

residents of the largest advanced economies peaked prior to the East Asian crisis, declined in its aftermath, and has recently returned to pre-crisis levels. The regional composition of exposure has changed over time, however: international bank claims on Eastern European countries have recently increased, whereas those on Latin American countries have declined; claims on East Asian countries are now close to pre-crisis levels (Figure 3, top panel).¹² Turning to mutual funds, their overall exposure has increased substantially across all emerging market countries in recent years. Assets issued by Asian economies under management by mutual funds grew by more than US\$62 billion (316 percent) between March 1999 and February 2005 (Figure 3, middle panel). A similar trend is observed with respect to Latin American and Eastern European assets, with mutual fund holdings increasing by US\$3.5 billion (18 percent) and US\$17.8 billion (407 percent), respectively, during the same period. Data are much more limited for hedge funds, owing to their relatively unregulated nature. Nevertheless, analyzing these investors is important, owing to their leverage levels, risk management techniques, and trading practices, which arguably could have large effects during crises. Hedge funds are also increasing their importance as an investor group: assets under their management doubled between 2000 and 2004, and have grown considerably in emerging market countries since early 2004 (IMF, 2005). Trading activity by hedge funds has risen as well, and has been a dominant factor in the trading activity of emerging country bond markets, partly as a result of hedge funds' characteristically high turnover (Figure 3, bottom panel). Among hedge funds, those dedicated to emerging market countries are capturing a rising share of trading activity.

¹² See also International Monetary Fund (2004).

Figure 3. International Investors in Emerging Markets, 1990–2005



Sources: Bank for International Settlements (BIS), EmergingPortfolio.com, and JPMorgan.

Notes: The top panel plots end-of-year consolidated international claims of banks reporting to the BIS from Germany, Japan, the United Kingdom, and the United States, on non-advanced countries in the Asian and Pacific region, Latin America and the Caribbean, and Europe. These claims include consolidated cross-border claims in all currencies and local claims in non-local currencies. The middle panel plots end-of-first-quarter assets held in emerging markets by approximately 700 equity mutual funds. These are international funds (both retail and institutional) registered in Asia, Canada, Europe, the United Kingdom, and the United States, or major offshore fund jurisdictions. The data for 2005 reflect asset holdings at end-February. The bottom panel plots the percent of JPMorgan trading volumes in emerging market country bond markets by type of market participant. Other participants include proprietary trading accounts, securities and broker market dealers, and private banking accounts. The data frequency is yearly in 1996–99, and monthly beginning in 2000.

On the whole, the exposure of international institutional investors to emerging market economies seems to have increased in recent years. Again, although exposure is not the only factor that makes crises contagious through financial markets, the fact that it has not diminished suggests that a prudent working assumption would be that contagion might well re-emerge.

III. THE EFFECT OF ANTICIPATION

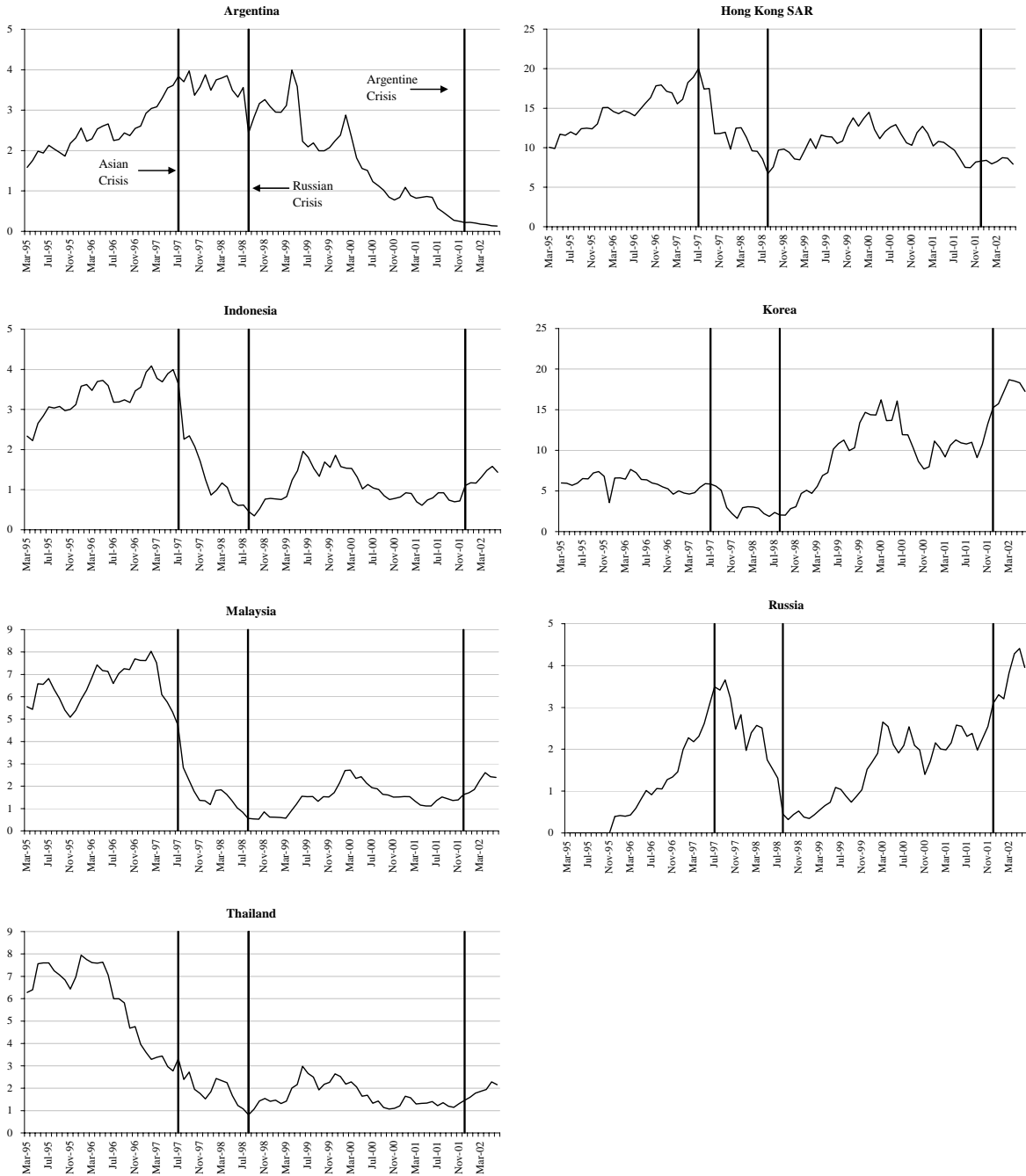
What then explains the relatively low incidence of contagion during the 2000s? One crucial difference compared with the previous decade might lie in the anticipation of crises. Many investors were taken by surprise by the crises of the 1990s, whereas they anticipated more recent crises—especially in Argentina—well in advance.¹³ In the remainder of this section, we focus on the Argentine crisis because of its full-blown nature.

A first step in studying the degree of anticipation is to consider how international mutual fund holdings (in billions of U.S. dollars at current prices) changed over time and around crises (Figure 4), though as we show below the results become fully revealing only once one corrects for the market-wide developments in asset prices.¹⁴ In several cases, mutual fund holdings at current prices declined sharply only after crises erupted: examples

¹³Spreads on Argentine sovereign bonds and non-deliverable forward peso exchange rates rose significantly beginning at least half a year prior to the crisis. Similar asset price evidence of anticipation is also present for the devaluation by Turkey in early 2001. The crises of the 1990s do not seem to have been anticipated, at least not to the same extent.

¹⁴ We focus on mutual funds because this is one type of international institutional investor that in the past has been associated with contagion, and for which data are available. Of course, if holdings decline for mutual funds then they have to increase for another type of investor. However, other investors acquiring a country's liabilities may have less international links than do mutual funds; more important, if mutual funds reduce their holdings well ahead of an anticipated crisis, a capital loss will be incurred by the mutual funds (early on), rather than by the new investors.

Figure 4. Holdings of International Mutual Funds by Economy
(In Billions of U.S. Dollars)



Source: EmergingPortfolio.com

Note: This figure plots end-of-month mutual fund holdings in crisis countries, using approximately 700 equity mutual funds. These are international funds (both retail and institutional) registered in Asia, Canada, Europe, the United Kingdom, and the United States, or major offshore fund jurisdictions. Each graph also displays the dates of major crises with vertical lines: July 1997 (Thailand); August 1998 (Russia); and December 2001 (Argentina).

include Hong Kong SAR, Indonesia, and Korea after Thailand devalued the Thai baht in July 1997.¹⁵ Holdings decreased in advance of a number of other crises, though Argentina stands out as a clear extreme case, with holdings falling from a peak of US\$3.98 billion in April 1999 to US\$0.25 billion in November 2001—about a month before the devaluation of the peso, bank closures, and overall financial collapse.

As mentioned above, it is necessary to take into account the price fluctuations that affect mutual fund holdings. For example, stock market prices were declining in both Thailand and Russia before their respective crises, and this could explain the decrease in the value of mutual fund assets. A decline in stock market prices can be interpreted as a market-wide expectation of an upcoming crisis, but it does not imply that investors holding assets from different nations were actually leaving the country in advance. To understand how mutual funds behave before crises, one needs to account for these price effects. This is relevant because the actions of internationally diversified institutions may generate contagion through the financial channel.

In an effort to try to correct for changes in asset prices, Table 2 and Figure 5 adjust the total change in the value of mutual fund holdings by the change due to market performance.¹⁶ Table 2 shows the mutual fund net buying/selling in millions of U.S dollars before the crisis in each country. Figure 5 shows the percentage net buying/selling in crisis countries prior to their respective crises, using total holdings at the beginning of the period

¹⁵ Though not shown in the figure, mutual funds also reduced their holdings in other emerging market countries.

¹⁶ In correcting for valuation effects, the overall stock market index (MSCI or S&P/IFC equity index) is used as an approximation instead of the mutual fund portfolios.

Table 2. International Mutual Fund Net Buying/Selling Before Crises

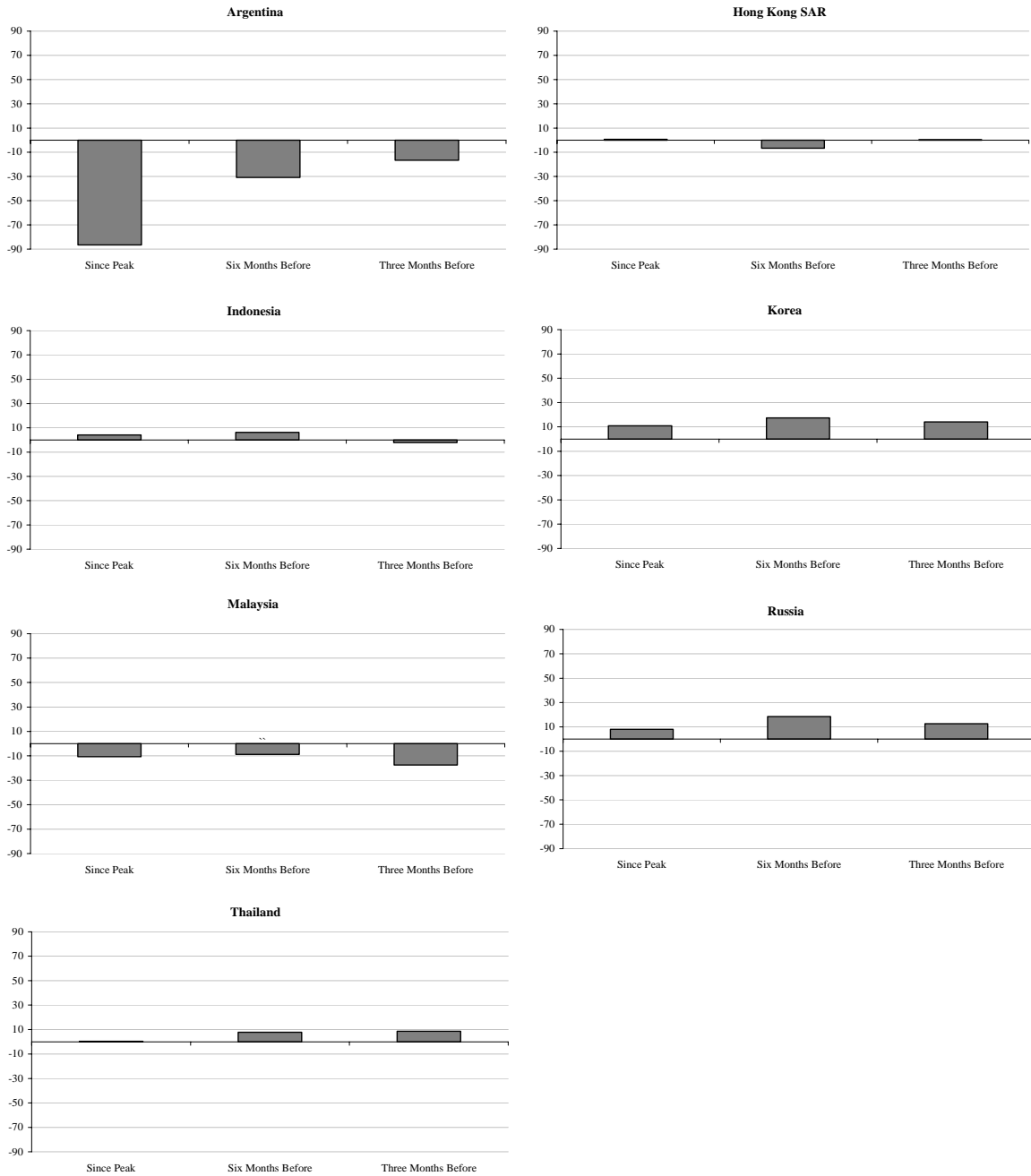
Crisis Economies	Month of Peak	Month of Crisis	Since Peak	Six Months Before	Three Months Before
				(In Millions of U.S Dollars)	
Argentina	04/99	12/01	-3,456	-259	-63
Hong Kong SAR	05/97	07/97	142	-1,134	58
Indonesia	02/97	07/97	170	248	-79
Malaysia	02/97	07/97	-865	-671	-1,068
Russia	09/97	08/98	294	443	218
Korea	08/96	07/97	654	871	676
Thailand	01/96	07/97	38	282	296

Source: EmergingPortfolio.com

Note: This table shows mutual fund net buying/selling (in millions of U.S. dollars) in crisis economies, prior to their respective crises. The net buying/selling is calculated by taking the total change in the market value of the holdings in a particular country (during the period under study) and adjusting it by the change in the MSCI or S&P/IFC stock market index for that country. The column "Since Peak" covers the change from the month of peak holding values to the crisis. These changes correspond to: Argentina (April 1999 – November 2001), Hong Kong SAR (May 1997 – June 1997), Indonesia (February 1997 – June 1997), Korea (August 1996 – June 1997), Malaysia (February 1997 – June 1997), Russia (September 1997 – July 1998), and Thailand (January 1996 – June 1997). The other two columns cover the periods of six and three months before each crisis. In all cases, the crisis month is excluded.

analyzed as the benchmark. Argentina is the only case where the results survive the correction for price changes. Mutual funds began considerably reducing their exposure to Argentina more than two years before the crisis. In fact, from April 1999 to November 2001, mutual funds sold (in net terms) almost US\$3.5 billion (Table 2), equivalent to 87 percent of their initial asset holdings (Figure 5). In contrast, mutual funds did not seem to reduce their exposure in advance of the other crises. In fact, they do not appear to have sold their Thai or Russian assets in anticipation, despite the decline in their stock market prices. The only exception seems to have been Malaysia, though mutual fund exposure fell considerably less than in Argentina and just a few months before the crisis.

Figure 5. International Mutual Fund Net Buying/Selling Before Crises
(As a Percent of Asset Holdings)



Source: EmergingPortfolio.com

Note: These figures show mutual fund net buying/selling (in percent) in crisis economies, prior to their respective crises. The numbers are relative to the total holdings at the beginning of the period. The net buying/selling is calculated by taking the total change in the market value of the holdings in a particular country (during the period under study) and adjusting it by the change in the MSCI or S&P/IFC stock market index for that economy. The first bar in each figure covers the change from the month of peak holding values to the crisis. These changes correspond to: Argentina (April 1999 – November 2001), Hong Kong SAR (May 1997 – June 1997), Indonesia (February 1997 – June 1997), Korea (August 1996 – June 1997), Malaysia (February 1997 – June 1997), Russia (September 1997 – July 1998), and Thailand (January 1996 – June 1997). The other two bars cover the periods of six and three months before each crisis. In all cases, the crisis month is excluded.

The distinction between anticipated and unanticipated crises might be a crucial factor in explaining contagion. Anticipated events may give investors time to re-balance their portfolios in an orderly way, avoiding overreaction in asset prices (Kaminsky, Reinhart, and Vegh, 2003). Unanticipated shocks, on the contrary, may generate large effects, with surprised investors unwinding their positions rapidly and liquidating their holdings in other markets in an attempt to cover losses in the crisis country. Moreover, the importance of the financial channel of contagion is supported by the presence of contagion effects during unanticipated crises in contrast with the absence of contagion in the aftermath of anticipated crises, such as the Argentine crisis. If trade were the dominant channel, it would not matter whether crises are anticipated or not; a crisis would be similarly transmitted to all countries connected through trade.

IV. CONCLUSION

This paper has argued that although contagion has not materialized in recent years, it would seem premature to conclude that it has vanished permanently from the international financial system, for two reasons. First, the factors underlying the channels that generated contagion during the crises of the 1990s, notably trade and finance, seem to be potentially at least as strong today as they were a decade ago. In particular, the degree of international integration has deepened significantly. Second, widespread anticipation of recent episodes, notably the Argentine crisis, may help explain the near-absence of contagion. These observations suggest that a crisis in an open economy might generate contagion through the trade channel; and that a large unanticipated adverse shock in a country whose assets are held by international investors might again generate contagion through financial links, particularly if the present conditions of abundant global liquidity are reversed.

More generally, it would be difficult to argue that contagion has vanished based just on the recent experience. While contagion is not a necessary feature of integrated global financial markets and was limited, for example, in 1870-1913 (Mauro, Sussman, and Yafeh, 2006), contagion seems to have occurred at various times during the past three centuries (Kaminsky, Reinhart, and Vegh, 2002; and Schnabel and Shin, 2004).

Additional research and evidence are probably needed to help determine whether the low incidence of contagion in recent years reflects a permanent change compared with the contagious crises of the 1990s. In the meantime, however, a prudent working assumption would seem to be that contagion could well re-emerge in the medium term.

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