

## **Volatility in International Financial Market Issuance: The Role of the Financial Center**

Marco Cipriani  
George Washington University  
Washington, DC 20052  
e-mail: [marco.cipriani@gwu.edu](mailto:marco.cipriani@gwu.edu)  
<http://home.gwu.edu/~mciprian>

Graciela L. Kaminsky\*  
George Washington University and NBER  
Washington, DC 20052  
e-mail: [graciela@gwu.edu](mailto:graciela@gwu.edu)  
<http://home.gwu.edu/~graciela>

September 2006

### **Abstract**

We study the pattern of volatility of gross issuance in international capital markets since 1980. We find several short-lived episodes of high volatility. Over the long run, however, volatility has declined, suggesting that international financial integration has not made financial markets more erratic. We use VAR analysis to examine the determinants of the time-varying pattern of volatility, focusing in particular on the role of financial centers. Our results suggest that a significant portion of the decline in volatility of issuance in international capital markets can be explained by the reduction in the volatility of U.S. interest rates. (JEL F3)

Keywords: Volatility, Issuance, International Financial Markets.

\*This paper was in part written while Cipriani was visiting the European Institute in Florence and Kaminsky was a visiting scholar at the Hong Kong Monetary Authority. We thank both institutions for their hospitality. We thank the Center for the Study of Globalization at George Washington University for financial support. We also thank Pablo Vega-Garcia for excellent research assistance. The views expressed here are those of the authors and not necessarily those of the Hong Kong Monetary Authority.

There is a vast literature in international finance arguing that the increase in financial globalization over the last 30 years has made capital markets more erratic. This literature has highlighted how sequences of booms and busts in capital flows and in asset prices have become the norm rather than the exception, often wreaking havoc upon the economies of the affected countries. As a result, many economists in academia and in policy institutions have argued in favor of the imposition of controls on the capital account to reduce the volatility of capital flows and limit the impact that financial turmoil has on real economic activity.<sup>1</sup>

In this paper, we examine further whether, in fact, international capital markets have become more erratic. Contrary to most of the studies in this area, we do not focus on net international capital flows, but on gross issuance. We do so to better capture the ability of countries to gain access to international capital markets.<sup>2</sup> Moreover, whereas most of the literature has focused on the analysis of volatility in the access to international markets by emerging economies and the public sector, in this paper we analyze emerging- and mature-economy issuance as well as private and public issuance. Also contrary to most of the literature, we do not restrict ourselves to the bond market, but describe the behavior of issuance in the three main international financial markets: The international bond, equity, and syndicated-loan market.

The focus of this paper is the behavior of volatility of gross issuance in international financial markets over the last three decades. We show that, although international issuance has experienced several episodes of booms and busts, over the last thirty years there has been a substantial reduction in the degree of market volatility. Markets are more stable now than they were at the beginning of the 1980s, thus providing a rationale for the elimination of controls on capital flows.

Our paper also relates to a strand of literature in international finance that emphasizes the role of financial centers and their monetary and economic policies in affecting capital flows and price movements in the periphery (see, for example, Calvo, Leiderman, and Reinhart (1993)). Using VAR analysis, we show that the time-varying volatility of issuance in international financial markets can be explained in part by the behavior of macroeconomic and financial fundamentals in the United States. We find that, overall, economic and financial fundamentals in

---

<sup>1</sup> See, for example, Kaplan and Rodrik (2001) and Stiglitz 1999.

<sup>2</sup> The evidence provided by net capital inflows presents an incomplete picture of financial integration. For instance, although zero net capital inflows may reflect no international financial integration, they may also reflect complete integration with international diversification, where inflows are just offset by outflows.

the United States explain about 25 percent of the movements in volatility of issuance around the world, whereas volatility of U.S. interest rates alone explains, on average, about 10 percent of volatility of issuance. Since the volatility of U.S. interest rates has diminished substantially over the last thirty years, our results suggest that such reduction in interest rate volatility can explain part of the reduction of volatility of issuance in international markets.

The rest of the paper is organized as follows. Section 1 describes the dataset. Section 2 analyzes the pattern of volatility of issuance across countries. Section 3 presents the results of the VAR analysis. Section 4 concludes.

## **1 The Data**

This section discusses the data sources for bond, equity, and syndicated-loan issuance in international markets as well as the construction of the volatility of the issuance series used in our estimations.

### *1.1 Sources*

We use data gathered by Dealogic, a data analysis firm that produces two datasets on financial asset issuance: Bondware, containing information on issuance in the international bond and equity markets; and Loanware, containing information on the syndicated-loan market.<sup>3</sup> Both databases start in 1980, although coverage of equity in Bondware only starts in 1983. Both datasets cover issuance by over 110 countries. For the bond and the syndicated-loan markets, the databases include borrowing by both the private sector and the government.

Bondware contains information on issuance of bonds and equity, both in the international and in the domestic markets. In the paper we restrict our analysis to issuance in international markets. Following the BIS classification, for the bond market, our definition of international issuance comprises all foreign currency issues by residents and non-residents in a given country and all domestic currency issues launched in the domestic market by non-residents. In addition,

---

<sup>3</sup> For a more detailed description of the Bondware and Loanware datasets, see Cipriani and Kaminsky (2006).

domestic currency issues launched in the domestic market by residents are also considered international issues if they are specifically targeted at non-resident investors.<sup>4</sup>

The equity portion of Bondware covers several types of placements: Issuance of common or preferred equity in the international market, issuance targeted at a particular foreign market, registered stocks traded in foreign exchanges as domestic instruments (for example, American depositary receipts (ADRs)), and issuance by residents in the domestic markets. Since in this paper we focus only on international issuance, we only include the first three types of offerings.

The Loanware dataset contains information on syndicated loans, issued both in the international and in the domestic market since the 1980s. Syndicated loans are credits granted by a group of banks to a borrower. In a syndicated loan, two or more banks jointly agree to make a loan to a borrower. Although there is a single contract, every syndicate member has a separate claim on the debtor. All participating banks have earnings based on a spread over a floating rate benchmark (typically Libor). Some of the banks also have earnings related to various types of fees.<sup>5</sup> As for the case of bonds and equities, in our analysis we are only interested in syndicated loans issued in the international market. According to the BIS classification, international loans include all syndicated loans where the nationality of at least one of the syndicate banks is different from that of the borrower.

## ***1.2 Measuring Volatility in International Capital Markets***

The focus of our paper is the role of the financial center in determining the pattern of volatility in international capital markets. Thus, we are interested in the relationship between the center and the periphery. For the purpose of our analysis, we consider the United States as the main financial center. The periphery consists of eight groups of countries: The emerging periphery, including four regional groups of countries (Asia, Latin America, Middle East and

---

<sup>4</sup> This definition covers Euro-market offerings (i.e., bonds issued and sold outside the country of the currency in which they are denominated, like dollar-denominated bonds issued in Europe or Asia), global bonds (i.e., single offerings structured to allow simultaneous placements in major markets: Europe, U.S., and Asia), and foreign offerings (i.e., bonds issued by firms and governments outside the issuer's country, usually denominated in the currency of the country in which they are issued. Foreign bonds include Samurai and Yankee bonds.

<sup>5</sup> The description of syndicated loans is based on Gadanecz 2004.

Africa, and Transition Economies); and the mature periphery, consisting of three countries and one group of countries (Germany, Japan, the United Kingdom, and Other Mature Economies<sup>6</sup>).

In order to build our volatility series, we aggregate the individual issuance data in quarterly issuance by the financial center (the United States) and by each of the eight groups/countries in the periphery.<sup>7</sup> For each country or group, we construct three volatility measures, one for each financial instrument (bonds, equities, and syndicated loans). Volatility in each market<sup>8</sup> is measured as the annualized<sup>9</sup> standard deviation of the quarterly growth rate of international issuance. The standard deviation is computed over a moving window of four quarters.

## 2 Volatility of Issuance: Short- and Long-Run Patterns

Figure 1 reports the behavior of our measure of financial volatility of total world issuance in the bond, equity, and syndicated-loan markets. As the existing literature on international capital flows has highlighted, there are several short lived episodes of market turmoil. Some of these episodes of market turbulence are clearly related to currency crises in emerging economies. For example, volatility of issuance in the bond and the syndicated-loan market increases sharply during the Asian and Russian crises. Sharp increases in world volatility are also linked to heightened volatility in mature economies. For instance, the increase in volatility in the syndicated-loan market in the late 1980s (shown in more detail in Figure 2) is linked to the shocks that followed the German reunification in 1989 and the burst of the Japanese bubble in the late 1980s.

Figure 1, however, also shows that over the long run, there has been a marked reduction in volatility in the three financial markets that we examine. The first column of Table 2 shows the average levels of volatility in the 1980s, 1990s and 2000s in the three markets. Over this

---

<sup>6</sup> This last group includes all OECD countries with the exception of Germany, Japan, the United Kingdom and the United States. Table 1 shows the countries included in each of the five regional groups.

<sup>7</sup> To filter out seasonal fluctuations, we take four-quarter moving averages of issuance.

<sup>8</sup> In the remainder of the paper, we will use the words “instrument” and “market” interchangeably.

<sup>9</sup> As is standard in the finance literature, the annualized quarterly variance is the variance that would be measured over a year if the quarterly returns were iid; that is, the annualized quarterly variance equals the raw quarterly variance multiplied by four. The annualized standard deviation is its square root.

period, volatility declined from 16 to 8 percent in the bond market, from 58 to 23 percent in the equity market and from 15 to 7 percent in the syndicated-loan market. This suggests that, over the long run, markets have become less, not more erratic. Such decline in issuance volatility since the 1980s is similar to that observed in many macroeconomic real variables, the so-called Great Moderation.<sup>10</sup> Note that the behavior of issuance volatility contrasts with that of financial price volatility. While U.S. interest rate volatility has declined substantially since the 1980s (from an average of 2 percent in the 1980s to an average of 0.05 percent in the 2000s), exchange rate volatility and stock market volatility have mostly remained unchanged.<sup>11</sup>

In order to examine in more detail the causes of the time-varying pattern of issuance volatility around the world, Figures 2 and 3 show issuance volatility by mature and emerging economies separately, whereas Table 2 summarizes the evidence in these figures by showing the average levels of volatility in the three markets in the 1980s, 1990s, and 2000s.

As shown in Figure 2, volatility of issuance by mature economies in the three markets declines almost continuously for all countries and regions, with the exception of Japanese bond issuance and U.S. equity issuance. Overall, volatility of issuance in the three markets halves from the 1980s to the 2000s. Nevertheless, we observe episodes of high financial turmoil. For example, volatility of German equity issuance increases four-fold around the time of the German reunification. The combination of an expansionary fiscal policy and a tight monetary policy in Germany around the early 1990s<sup>12</sup> dramatically affected German equity issuance, with issuance collapsing from 1.8 billion dollars in 1988 to 400 million dollars in 1989. Equity issuance remained low (on average 700 million dollars per year) until after the 1992-1993 ERM crises. By 1994, issuance had rebounded to about 4.5 billion dollars. Interestingly, turbulences in German equity-market issuance did not affect issuance by other European countries. Similarly, volatility of European issuance did not increase dramatically during the crises of 1992-1993.

An episode of extreme volatility of issuance in the syndicated-loan market occurred during the height of the bubble in Japan. International loan issuance by Japan increased from an

---

<sup>10</sup> See for instance, Kim and Nelson (1999) and McConnell and G. Perez-Quiros (2000).

<sup>11</sup> For an analysis of the relationship between asset price volatility and real economy volatility, see the remarks by Federal Reserve Board Vice Chairman Roger W. Ferguson, Jr. to the Banco de Mexico International Conference, Mexico City, Mexico. Note, however, that a decline in volatility has been observed in investors' forecasts, which should be one of the determinants of asset price volatility (see Campbell, 2005).

<sup>12</sup> See Buiter, Corsetti, and Pesenti (1998) for an analysis of fiscal and monetary policies in Germany following the reunification.

average of 700 million dollars in the mid-1980s to 4 billion dollars in 1989, to then fall to 2 billion dollars in 2000, and to finally collapse to 200 million dollars in 2001. As in the case of Germany, this episode of volatility did not spill over to other countries.

Finally, let us note that volatility of United States issuance in international bond markets sharply increased during the 1981-82 recession. On average, volatility during 1981-1982 is twice as high as volatility in the mid-1980s.

Figure 3 reports volatility of emerging-economy issuance. As in the case of mature economies, volatility of issuance shows a downward trend. Such a decline in volatility, however, is less pronounced than that of mature economies. As observed in mature economies, there are short-lived episodes of high volatility, mostly linked to currency and banking crises in the various regions. For example, between 1996 and 1998, volatility of Asian issuance increased from 22 to 44 percent in the bond market, from 26 to 35 percent in the equity market, and from 5 to 25 percent in the syndicated-loan market. During this episode, Asian international issuance declined 65 percent on average in the bond, equity, and syndicated-loan markets. Volatility in emerging economies is also related to terms of trade shocks; for example, bond issuance in the Middle East collapsed during the sharp decline in oil prices in 1986 and volatility in the bond market increased from 52 percent in 1985 to 142 percent in 1986.

Table 3 complements the findings in Figures 2 and 3. In this table, we formally test for the presence of clusters of volatility over time. We estimate a GARCH(1,1) model for each of the issuance series and test the restriction that the GARCH and ARCH coefficients are equal to zero using a Maximum Likelihood test.<sup>13</sup> As shown in Table 3, we reject the null hypothesis of no heteroscedasticity at all conventional significance levels for all the series with the exception of those of the bond market in Japan and the Middle East.

Finally, it is important to remark that volatility is significantly higher in the equity than in the bond and syndicated-loan markets. Over the whole sample, total annualized volatility is on average 12 percent in both the bond and syndicated-loan markets and 33 percent in the equity market (see Table 2).<sup>14</sup> This observation also holds true if we look at each region and country

---

<sup>13</sup> Autoregressive volatility models, like the ARCH and GARCH models, were first introduced by Engle 1982 and Bollerslev 1986, respectively.

<sup>14</sup> Note, however, that the very high level of volatility in the equity markets at the beginning of the sample (see Figures 2 and 3) is due to the fact that in those early years the international equity market was very thin.

separately. Such an empirical regularity is similar to what we also observe in price data (where stock market volatility is higher than interest rate and bond price volatility).

### **3 The Role of the Financial Center**

There is an extensive literature on the role of financial centers, and in particular U.S. financial markets, in the transmission of international shocks. For instance, Ehrmann, Fratzcher, and Rigobon (2005) analyze the comovement among stock returns, interest rates, and the exchange rate in the United States and the European Monetary Union and find that U.S. financial markets are one of the main driver forces of the euro-area financial markets, explaining, on average 25 percent of the variance in financial prices. Also, Calvo, Leiderman, and Reinhart (1993) have shown the importance of developed countries macroeconomic performance (growth and interest rates) on the fluctuations of capital inflows to emerging markets. More recently, Kaminsky and Reinhart (2003) have argued that the financial markets in developed countries act as a transmission mechanism of financial turmoil among emerging economies.

To have a preliminary reading on the role of the financial center on the volatility of financial markets around the world, we estimate the correlations between the volatility of issuance by the periphery (both mature and emerging economies) and the volatility of issuance by the financial center (the United States). As shown in Table 4, the correlation between the volatility of issuance of all the regional groups and countries in the periphery and that of the United States is mostly positive and quite high. Interestingly, issuance volatility is much more highly correlated in the bond market than in the equity and syndicated-loan market (the average correlation is 0.41 in the bond market and 0.19 and 0.15 in the loan and equity markets, respectively). Two countries stand out in the table. The first is the United Kingdom, whose pattern of volatility is very close to that of the United States (the correlation in the bond market almost reaches 0.70); the other is Japan, with basically no comovement of volatility with that of the United States.<sup>15</sup>

Since volatility of issuance in the bond, equity, and syndicated-loan markets in most countries or regions is positively correlated with that of the United States, in the remainder of

---

<sup>15</sup> Although not shown in the Table, the volatilities of Japanese issuance in all markets are basically uncorrelated with volatilities around the world. Even in the bond market, the average correlation of each country's or region's volatility with that of Japan is -0.08.

this section we try to shed light on which economic links exist between U.S. issuance volatility and that of the other regions in the world.

There is an extensive theoretical and empirical literature on the determinants of financial market volatility. A large number of studies have devoted their attention to U.S. monetary policy and have shown that it plays a key role in explaining fluctuations in asset prices, both in the United States and in the rest of the world.<sup>16</sup> Following this strand of literature, we examine the effect of U.S. monetary policy on the ability of emerging and developed countries to gain access to international financial markets.

Monetary policy in the United States can be transmitted directly to the rest of the world or indirectly by affecting prices of assets in the United States. To capture this indirect linkage and also to examine the possible spillovers of turbulence in financial markets in the United States to markets around the world, we include the volatility of U.S. equity prices in our analysis.

The relationship between inflation and financial prices has also been the focus of attention of both theoretical and empirical research over the past 20 years. Most of this research relates the uncertainty generated by higher inflation to increases in financial risk and therefore to lower asset prices. For this reason, we also investigate the spillover effects of U.S. inflation on financial markets around the world.

Finally, the literature on financial crises has pointed out that turmoil in financial markets (or at least in emerging economies) often happens during episodes of slowdown in world economic activity. For example, the debt crisis in Latin America in 1982 occurred in the midst of a profound recession in the United States and other industrial economies. In contrast, the empirical research on mutual fund markets suggests that volatility in financial markets may increase in good times. For example, Grinblatt, Titman, and Wermers (1995) examine whether U.S. mutual funds follow momentum strategies –buying past winners and selling past losers. They find that mutual funds do in fact buy past winners but do not sell past losers, suggesting that good news may generate higher volatility in financial markets. Therefore, we also examine the connection between episodes of higher economic growth and volatility of international issuance.

---

<sup>16</sup> See, for example, Ehrmann, Fratzcher, and Rigobon (2005) for a study of the effect of U.S. monetary policy on asset prices in the European Union and Ehrmann and Fratzscher (2006) for an analysis of the effect of U.S. monetary policy on equity prices around the world.

Table 5 looks in more detail at the relationship between U.S. economic and financial variables and volatility of issuance in international markets. Volatility of the U.S. monetary policy is captured with the volatility of the three-month U.S. Treasury Bill rate, U.S. stock market volatility is the volatility of the Dow Jones Industrial Index, U.S. inflation is the annual U.S. CPI inflation rate, and the fluctuations in economic activity in the United States are captured by the annual U.S. GNP growth rate. As shown in the first column of Table 5, volatilities of issuance in all markets are positively correlated (and with relatively high correlation coefficients) with interest rate volatility. Although with smaller coefficients, volatility of issuance is overall also positively correlated with U.S. stock market volatility, U.S. inflation, and U.S. growth.

In order to understand better the transmission of volatility shocks from the center to the periphery, we estimate a Vector Autoregression model separately for emerging and mature economies.<sup>17</sup> We estimate three VARs separately for each market (bond, equity, and syndicated-loan issuance volatilities). Each estimated VAR has five variables: volatility of issuance, interest-rate volatility, volatility of U.S. stock market returns, U.S. CPI inflation rate, and U.S. GNP growth rate. Each VAR model includes two lags of all the variables. The  $R^2$  for each of the VARs that we estimate, reported on Table 6, are all above 0.80.

Figures 4 to 6 show the impulse responses<sup>18</sup> of issuance volatility in the bond, equity, and syndicated-loan market to a one-percentage point shock in the U.S. growth rate, U.S. inflation, U.S. interest rate volatility, and U.S. stock market volatility. Tables 7 to 9 show the corresponding variance decomposition.

As shown in Figures 4 to 6, overall volatility of issuance in the three markets increases with higher volatility of interest rates and of stock prices, as well as with a higher U.S. inflation rate.<sup>19</sup> Overall, volatility of issuance also increases in good times (times of high growth in U.S. output). Nevertheless, not all shocks in U.S. indicators have statistically significant effects on

---

<sup>17</sup> In the present model, mature-economy issuance volatility includes that of the United States. In order to isolate the effect of U.S. variables on other mature economies, we also re-estimated the same model having volatility of U.S. issuance and volatility of the mature-periphery issuance as two different variables. The results are similar and are available upon request.

<sup>18</sup> We use the Cholesky decomposition to identify the shocks. The ordering of the variables is: Output growth, inflation, stock market volatility, interest rate volatility, and volatility of issuance. We checked for different orderings and the results do not change significantly.

<sup>19</sup> Note, however, that the response of loan issuance volatility to increases in the U.S. inflation rate is hump-shaped.

issuance volatility. For example, shocks to U.S. inflation do not have statistically significant effects on turmoil in bond issuance of emerging economies.

Shocks to U.S. interest-rate volatility are the ones that affect volatilities of gross issuance more strongly. Moreover, they have far stronger effects on emerging than on mature economies.<sup>20</sup> This evidence supports those findings in the international financial literature that suggest that fluctuations in U.S. monetary policy have triggered dramatic boom-bust patterns in international capital flows to Asia and Latin America.<sup>21</sup>

Figures 4 to 6 also show that turbulences in issuance of mature economies are also affected by U.S. stock market volatility and fluctuations in U.S. economic activity. This is also the case, but to a lesser extent, for emerging economies. For mature economies, the results indicate that higher volatility in equity prices fuels turbulence in both bond and equity market issuance. Finally, the results of these figures suggest that volatility of mature-economy issuance tends to be procyclical, increasing in times of higher U.S. output growth; this could be due to positive momentum in investors' strategies, as suggested in Grinblatt, Titman, and Wermers (1995).

Tables 7 to 9 complement the results in Figures 4 to 6, by showing the variance decomposition of volatility of issuance in bond, equity, and syndicated loans for mature and emerging economies. These tables highlight the importance of the volatility of U.S. interest rates, which explains on average 10 percent of the variance across instruments in both mature and emerging economies. In contrast, the volatility of the U.S. stock market explains a high proportion of variance in mature, but not in emerging economies (10 percent versus 2 percent<sup>22</sup>). A similar picture emerges for U.S. GNP growth (9 and 4 percent of variance explained in mature and emerging economies). U.S. inflation, instead, explains a relatively small proportion of variance both in mature economies and in emerging ones (4 percent and 2 percent).

Overall, as shown in the last columns of Tables 7 to 9, shocks to U.S. real and financial fundamentals explain a significantly higher proportion of the variance of issuance of mature economies than of that of emerging economies (34 percent versus 18 percent, on average). This evidence suggests that domestic shocks and not external disturbances are more important in

---

<sup>20</sup> The exception is the syndicated-loan market.

<sup>21</sup> See, for example, Calvo, Izquierdo and Mejía (2003)

<sup>22</sup> These numbers are the averages across markets (for all horizons) of the numbers reported in Figures 6 to 8.

explaining the changes in the ability of emerging economies to gain access to international capital markets. This evidence agrees with the results in Kaminsky (2006), which classifies crises in a variety of emerging and mature economies. In that paper, it is shown that crises in emerging markets tend to be of a different variety than those in mature markets. In particular, it is found that all crises in emerging economies occur in the midst of multiple domestic vulnerabilities: A fragile banking sector, bubbles in stock and real estate markets, liability-dollarization, and debt problems. Naturally, a devaluation in these circumstances triggers a collapse of the economy. In contrast, domestic vulnerabilities are much less pronounced in mature economies. For this reason, a currency crisis in mature economies tends to promote growth, as competitiveness improves following the devaluation.

#### **4 Conclusions**

In this paper, we have analyzed the time-varying pattern of volatility of gross issuance in the international bond, equity, and syndicated-loan markets between 1980 and 2005. These are our main findings:

1. There is a boom-bust pattern in the volatility of issuance over the short run both in emerging and mature economies. Outbursts of volatility of emerging-economy issuance in international markets are mostly linked to currency crises.
2. In the long run, volatility of issuance has significantly declined in all the markets and regions that we study. Such a decline, however, has been more pronounced for mature economies.
3. There is evidence that the time-varying volatility of issuance around the world can in part be explained by real and financial developments in the financial center. In particular, the lower volatility of U.S. monetary policy and interest rates has significantly contributed to stabilize the pattern of issuance in financial markets throughout the world.
4. Shocks in the financial center explain a large share of volatility of mature-economy issuance in international markets. In contrast, most of the volatility of the emerging-periphery issuance in international markets is explained by domestic factors. This

result agrees with the findings of the literature on financial crises, which indicate that financial turmoil in emerging economies is mainly triggered by domestic and financial vulnerabilities and not by external shocks.

From a policy point of view, the implications of our findings appear to be significant. In particular, our results indicate that more stable monetary policies in mature economies have contributed not only to more stable economies in industrial countries<sup>23</sup> but also to less erratic international financial markets.

Nevertheless, our results for emerging economies suggest that in order for these economies to gain continuous access to international capital markets, they should address domestic vulnerabilities. Therefore, international institutions have correctly stressed that emerging economies should follow conservative macroeconomic policies and reform institutions. It has also been pointed out that emerging economies tend to follow procyclical macroeconomic policies,<sup>24</sup> fueling increases in the volatility of economic activity and triggering lending booms that often end up in financial crashes. To avoid instability of the domestic economy, emerging countries need to find arrangements that will enable policy makers to conduct neutral or even counter-cyclical policies.<sup>25</sup>

---

<sup>23</sup> See, for instance, Clarida, Galí, and Gertler (2000) and Romer and Romer (2002). See also the remarks by Vice Chairman Roger W. Ferguson, Jr. to the *Banco de Mexico International Conference*, Mexico City, Mexico.

<sup>24</sup> In contrast, mature economies tend to follow countercyclical policies, which tend to stabilize the business cycle. See, for example, Kaminsky, Reinhart, and Végh (2004).

<sup>25</sup> There is some evidence that some emerging economies have been able to “graduate” from the procyclical group and conduct neutral or even countercyclical fiscal policies (see Calderón and Schmidt-Hebbel (2003)). In the particular case of Chile, the adoption of fiscal rules specifically designed to encourage public saving in good times may have helped in this endeavor.

## References

- Bollerslev, Tim (1986) "Generalized Autoregressive Conditional Heteroscedasticity," *Journal of Econometrics*, 31, pp. 307-27.
- Buiter, Willem, Giancarlo Corsetti, and Paolo Pesenti (1998) "Interpreting the ERM Crisis: Country-Specific and Systemic Issues," *Princeton Studies in International Finance* No. 84.
- Calderón, Cesar and Klaus Schmidt-Hebbel (2003) "Macroeconomic policies and performance in Latin America," *Journal of International Money and Finance*, 22(7), pp. 895-923 .
- Calvo, Guillermo, Leonardo Leiderman, and Carmen Reinhart (1993) "Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors," *IMF Staff Papers* No. 40(1), pp. 108-51.
- Calvo, Guillermo, Alejandro Izquierdo, and Luis Fernando Mejía (2003) "On the Empirics of Sudden Stops," Inter-American Development Bank Working Paper.
- Campbell, Sean (2005) "Stock Market Volatility and the Great Moderation," FEDS Working Paper 2005-47, Board of Governors of the Federal Reserve System.
- Cipriani, Marco and Graciela Kaminsky (2006) "A New Era of International Financial Integration: Global, Market and Regional Factors," George Washington University mimeo.
- Clarida, Richard, Jordi Galí, and Mark Gertler (2000) "Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory," *Quarterly Journal of Economics*, 115(1), pp. 147-180.
- Ehrmann, Michael, Marcel Fratzcher, and Roberto Rigobon (2005) "Stocks, Bonds, Money Markets and Exchange Rates: Measuring International Financial Transmission," European Central Bank Working Paper No. 452.
- Ehrmann, Michael and Marcel Fratzcher (2006) "Global Financial Transmission of Monetary Policy Shocks," European Central Bank Working Paper No. 616.
- Engle, Robert (1982) "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation," *Econometrica* 50(4), pp. 987-1007.
- Ferguson, Roger Jr. (2005) Remarks to the Banco de Mexico International Conference, Mexico City, Mexico. (<http://www.federalreserve.gov/boarddocs/speeches/2005/200511152/default.htm>)

- Gadanecz, Blaise (2004) "The Syndicated Loan Market: Structure, Development, and Implications," *BIS Quarterly Review*, December, pp. 75-89.
- Grinblatt, Mark, Sheridan Titman, and Russ Wermers (1995) "Momentum Investment Strategies, Portfolio Performance, and Herding: A Study of Mutual Fund Behavior," *American Economic Review*, 85(5), pp. 1088-1105.
- Kaminsky, Graciela (2006) "Currency Crises: Are They All the Same?" *Journal of International Money and Finance*, 25, pp. 503-527.
- Kaminsky, Graciela and Carmen Reinhart (2003) "The Center and the Periphery: the Globalization of Financial Turmoil," National Bureau of Economic Research Working Paper No. 9479.
- Kaminsky, Graciela, Carmen Reinhart, and Carlos Végh (2004) "When it Rains, it Pours: Procyclical Capital Flows and Macroeconomic Policies," *NBER Macro Annual*.
- Kaplan, Ethan and Dani Rodrik (2001) "Did the Malaysian Capital Control Work?" National Bureau of Economic Research Working Paper No. 8142.
- Kim, Chang-Jin and Charles Nelson (1999) "Has the U.S. Economy Become More Stable? A Bayesian Approach Based on a Markov-Switching Model of the Business Cycle," *Review of Economics and Statistics*, 81(4), pp. 608-616.
- McConnell, Margaret and Gabriel Perez-Quiros (2000) "Output Fluctuations in the United States: What Has Changed Since the Early 1980s?" *American Economic Review*, 90(5), pp. 1464-1476.
- Romer, Christina and David Romer (2002) "The Evolution of Economic Understanding and Postwar Stabilization Policy," in *Rethinking Stabilization Policy*. Kansas City: Federal Reserve Bank of Kansas City, pp. 11-78.
- Stiglitz, Joseph (1999) "Bleak Growth for the Developing World," *International Herald Tribune*, April 10-11, p. 6.
- Stulz, Rene (1999) "Globalization of Capital Markets and the Cost of Capital," *Journal of Applied Corporate Finance*, 12(3), pp. 8-25.

**Table 1  
Countries in Each Region**

<b>Asia</b>	<b>Latin America</b>	<b>Middle East and Africa</b>	<b>Transition Economies</b>	<b>Other Mature Economies</b>
China	Argentina	Algeria	Belarus	Austria
Hong Kong	Bahamas	Bahrain	Bulgaria	Australia
Indonesia	Bolivia	Congo	Czech Republic	Belgium
India	Brazil	Egypt	Czechoslovakia	Canada
Macau	Barbados	Ghana	Croatia	Cyprus
Malaysia	Belize	Israel	Estonia	Denmark
Papua New Guinea	Cayman Islands	Ivory Coast	Hungary	Ireland
Singapore	Chile	Jordan	Kazakhstan	Finland
South Korea	Colombia	Kuwait	Latvia	France
Sri Lanka	Costa Rica	Lebanon	Lithuania	Greece
Thailand	Dominican Republic	Liberia	Moldova	Iceland
Taiwan	Ecuador	Morocco	Poland	Italy
	El Salvador	Mauritius	Russian Federation	Liechtenstein
	Grenada	Oman	Slovenia	Luxembourg
	Guatemala	Pakistan	Slovak Republic	Malta
	Honduras	Qatar	Ukraine	Netherlands
	Jamaica	South Africa	USSR	Norway
	Mexico	Turkey		New Zealand
	Panama	Tunisia		Portugal
	Peru	United Arab Emirates		Spain
	Trinidad and Tobago			Sweden
	Uruguay			Switzerland
	Venezuela			

**Table 2**  
**Volatility of International Issuance<sup>a</sup>**  
**(in Percent)**

**Bonds**

<b>Periods</b>	<b>World</b>	<b>Mature Economies</b>	<b>Emerging Economies</b>	<b>United States</b>	<b>Germany</b>	<b>Japan</b>	<b>United Kingdom</b>	<b>Other Mature Economies</b>	<b>Asia</b>	<b>Latin America</b>	<b>Middle East and Africa</b>	<b>Transition Economies</b>
<b>1980s</b>	16	12	25	33	63	23	38	17	48	--	81	59
<b>1990s</b>	10	10	24	12	19	22	16	9	32	29	61	43
<b>2000s</b>	8	8	19	10	12	31	12	13	22	23	32	43
<b>Average</b>	12	10	23	19	33	24	23	13	36	27	61	47

**Equities**

<b>Periods</b>	<b>World</b>	<b>Mature Economies</b>	<b>Emerging Economies</b>	<b>United States</b>	<b>Germany</b>	<b>Japan</b>	<b>United Kingdom</b>	<b>Other Mature Economies</b>	<b>Asia</b>	<b>Latin America</b>	<b>Middle East and Africa</b>	<b>Transition Economies</b>
<b>1980s</b>	58	61	129	81	105	--	140	64	104	108	141	--
<b>1990s</b>	23	22	49	29	113	75	41	32	42	95	65	94
<b>2000s</b>	23	21	40	84	54	50	56	22	44	122	64	74
<b>Average</b>	33	33	70	56	95	62	73	38	54	105	87	87

**Syndicated Loans**

<b>Periods</b>	<b>World</b>	<b>Mature Economies</b>	<b>Emerging Economies</b>	<b>United States</b>	<b>Germany</b>	<b>Japan</b>	<b>United Kingdom</b>	<b>Other Mature Economies</b>	<b>Asia</b>	<b>Latin America</b>	<b>Middle East and Africa</b>	<b>Transition Economies</b>
<b>1980s</b>	15	20	14	51	87	106	37	16	14	39	20	61
<b>1990s</b>	9	11	13	16	63	77	23	15	14	25	34	46
<b>2000s</b>	7	8	10	8	38	50	22	15	21	22	25	24
<b>Average</b>	11	13	13	27	66	81	28	15	15	29	27	46

<sup>a</sup> Volatility in each market is measured as the (annualized) standard deviation of the quarterly growth rate of international issuance. The standard deviation is computed through a moving window over four quarters. This table shows the average for each decade.

**Table 3**  
**Likelihood Ratio Test for the Presence of Time-Varying Volatility in Issuance**

Region	Market	Restricted Likelihood	Unrestricted Likelihood	P-Values
United States	Bonds	58.2	90.0	0.00
	Equities	-38.6	-16.9	0.00
	Syndicated Loans	21.4	57.4	0.00
Germany	Bonds	-10.0	57.4	0.00
	Equities	-72.3	36.5	0.00
	Syndicated Loans	-42.5	13.7	0.00
Japan	Bonds	46.3	46.8	0.64
	Equities	-14.4	-6.5	0.00
	Syndicated Loans	-70.6	-53.1	0.00
United Kingdom	Bonds	47.8	72.9	0.00
	Equities	-51.4	-29.7	0.00
	Syndicated Loans	36.5	49.0	0.00
Other Mature Economies	Bonds	111.9	125.0	0.00
	Equities	10.6	15.6	0.01
	Syndicated Loans	96.2	100.5	0.01
Asia	Bonds	18.0	24.9	0.00
	Equities	-22.4	8.9	0.00
	Syndicated Loans	84.3	89.8	0.00
Latin America	Bonds	-10.1	4.6	0.00
	Equities	-66.1	-59.6	0.00
	Syndicated Loans	29.5	32.6	0.04
Middle East and Africa	Bonds	-41.2	-41.1	0.95
	Equities	-57.0	-47.7	0.00
	Syndicated Loans	46.2	54.2	0.00
Transition Economies	Bonds	-8.8	-3.7	0.01
	Equities	-46.0	-39.6	0.00
	Syndicated Loans	-17.1	-12.1	0.01
Total	Bonds	118.6	133.6	0.00
	Equities	20.6	36.6	0.00
	Syndicated Loans	119.6	122.8	0.04

**Table 4****Correlation of Volatility of Issuance by all Regions and Countries with Volatility of Issuance by the United States**

<b>Markets</b>	<b>Germany</b>	<b>Japan</b>	<b>United Kingdom</b>	<b>Other Mature Economies</b>	<b>Asia</b>	<b>Latin America</b>	<b>Middle East and Africa</b>	<b>Transition Economies</b>	<b>Average</b>
<b>Bonds</b>	0.74	0.16	0.66	0.53	0.66	0.08	0.20	0.24	0.41
<b>Equities</b>	0.06	-0.29	0.43	0.13	0.12	0.43	0.37	-0.06	0.15
<b>Syndicated Loans</b>	0.16	0.17	0.52	0.12	-0.10	0.56	-0.04	0.17	0.19

**Table 5**  
**Correlation of Issuance Volatility with Selected U.S. Indicators**

**Mature Economies**

<b>Market</b>	<b>Volatility in</b>		<b>U.S. Growth</b>	<b>U.S. Inflation</b>
	<b>U.S. Interest Rates</b>	<b>U.S. Stock Market Prices</b>		
<b>Bonds</b>	0.67	0.28	-0.20	0.26
<b>Equities</b>	0.39	0.05	0.22	0.24
<b>Syndicated Loans</b>	0.31	-0.16	0.24	0.21

**Emerging Economies**

<b>Market</b>	<b>Volatility in</b>		<b>U.S. Growth</b>	<b>U.S. Inflation</b>
	<b>U.S. Interest Rates</b>	<b>U.S. Stock Market Prices</b>		
<b>Bonds</b>	0.29	0.05	0.12	-0.06
<b>Equities</b>	0.41	0.17	0.04	0.03
<b>Syndicated Loans</b>	0.13	-0.10	0.08	0.20

**Table 6**  
**The R<sup>2</sup> in the VAR estimation**

<b>Market</b>	<b>Mature Economies</b>	<b>Emerging Economies</b>
<b>Bonds</b>	0.87	0.87
<b>Equities</b>	0.84	0.84
<b>Syndicated Loans</b>	0.86	0.87

**Table 7**  
**Variance Decomposition of Volatility of Issuance in the Bond Market**  
**(in Percent)**

**Mature Economies**

<b>Quarter</b>	<b>U.S. Growth</b>	<b>U.S. Inflation</b>	<b>U.S. Interest Rate Volatility</b>	<b>U.S. Stock Market Volatility</b>	<b>Total U.S.</b>
<b>1</b>	0	1	2	12	15
<b>2</b>	0	2	1	17	21
<b>3</b>	1	4	2	19	26
<b>4</b>	1	4	5	19	29
<b>5</b>	1	5	7	18	32
<b>6</b>	1	5	9	18	33
<b>7</b>	2	5	9	18	34
<b>8</b>	2	6	9	18	35
<b>9</b>	2	6	10	18	35
<b>10</b>	2	6	10	18	36
<b>11</b>	2	6	10	18	36
<b>12</b>	2	6	11	18	36
<b>Average</b>	1	5	7	17	31

**Emerging Economies**

<b>Quarter</b>	<b>U.S. Growth</b>	<b>U.S. Inflation</b>	<b>U.S. Interest Rate Volatility</b>	<b>U.S. Stock Market Volatility</b>	<b>Total U.S.</b>
<b>1</b>	0	0	4	0	5
<b>2</b>	0	0	11	1	12
<b>3</b>	0	1	14	1	16
<b>4</b>	0	1	16	1	18
<b>5</b>	0	1	16	2	19
<b>6</b>	0	1	16	2	20
<b>7</b>	0	1	16	2	20
<b>8</b>	0	1	16	3	20
<b>9</b>	0	1	16	3	21
<b>10</b>	0	1	16	3	21
<b>11</b>	0	1	16	3	21
<b>12</b>	0	1	16	3	21
<b>Average</b>	0	1	15	2	18

**Table 8**  
**Variance Decomposition of Volatility of Issuance in the Equity Market**  
**(in Percent)**

**Mature Economies**

<b>Quarter</b>	<b>U.S. Growth</b>	<b>U.S. Inflation</b>	<b>U.S. Interest Rate Volatility</b>	<b>U.S. Stock Market Volatility</b>	<b>Total U.S.</b>
<b>1</b>	0	0	1	0	2
<b>2</b>	1	1	2	0	4
<b>3</b>	3	1	8	2	15
<b>4</b>	6	1	15	7	29
<b>5</b>	8	2	17	11	39
<b>6</b>	10	3	17	14	44
<b>7</b>	12	3	17	17	48
<b>8</b>	13	3	16	19	50
<b>9</b>	13	3	16	20	52
<b>10</b>	14	3	15	21	53
<b>11</b>	14	3	15	22	54
<b>12</b>	14	3	15	23	54
<b>Average</b>	9	2	13	13	37

**Emerging Economies**

<b>Quarter</b>	<b>U.S. Growth</b>	<b>U.S. Inflation</b>	<b>U.S. Interest Rate Volatility</b>	<b>U.S. Stock Market Volatility</b>	<b>Total U.S.</b>
<b>1</b>	0	0	4	2	6
<b>2</b>	1	0	3	3	8
<b>3</b>	3	0	4	3	10
<b>4</b>	5	0	7	3	14
<b>5</b>	6	1	10	3	19
<b>6</b>	7	1	12	3	23
<b>7</b>	8	2	14	3	26
<b>8</b>	10	2	14	3	29
<b>9</b>	11	3	15	2	31
<b>10</b>	12	3	15	2	32
<b>11</b>	12	3	15	3	33
<b>12</b>	13	3	15	3	33
<b>Average</b>	7	2	10	3	22

**Table 9**  
**Variance Decomposition of Volatility of Issuance in the Syndicated-Loan Market**  
**(in Percent)**

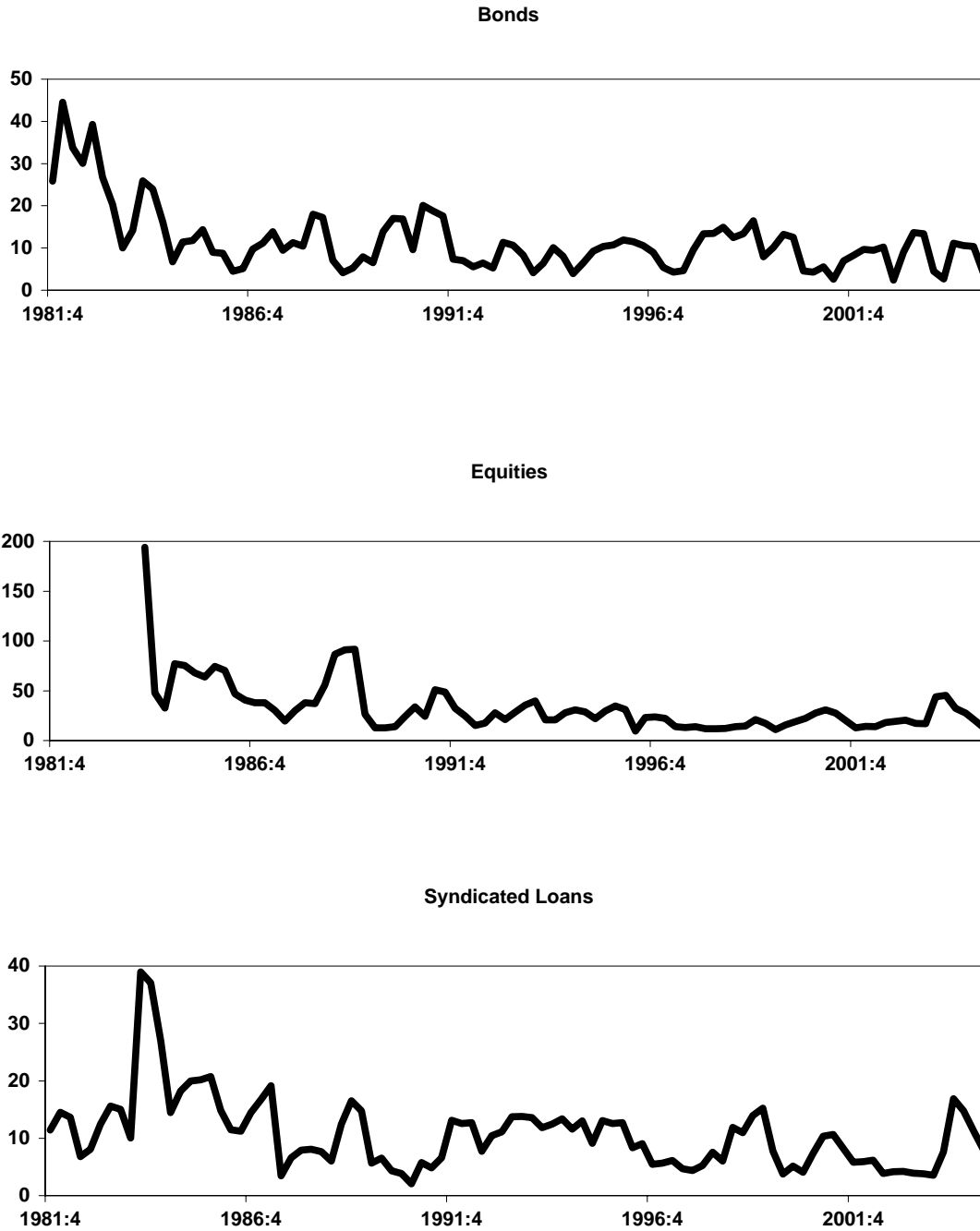
**Mature Economies**

Quarter	U.S. Growth	U.S. Inflation	U.S. Interest Rate Volatility	U.S. Stock Market Volatility	Total U.S.
1	7	2	4	0	13
2	9	2	3	1	14
3	13	2	3	1	19
4	17	3	5	1	26
5	20	4	7	1	32
6	22	5	10	1	37
7	23	6	11	1	40
8	23	6	13	1	42
9	23	6	14	1	43
10	23	6	14	1	43
11	22	6	15	1	44
12	22	6	15	1	44
<b>Average</b>	19	4	9	1	33

**Emerging Economies**

Quarter	U.S. Growth	U.S. Inflation	U.S. Interest Rate Volatility	U.S. Stock Market Volatility	Total U.S.
1	0	0	2	0	3
2	2	3	1	0	6
3	3	4	1	0	9
4	5	4	1	1	11
5	6	4	2	1	13
6	6	4	2	1	14
7	7	4	3	2	15
8	7	4	3	2	16
9	7	4	4	2	17
10	7	4	4	2	18
11	7	4	5	3	18
12	7	4	5	3	18
<b>Average</b>	5	4	3	2	13

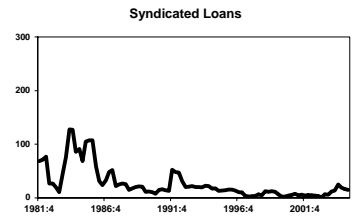
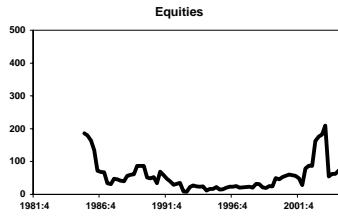
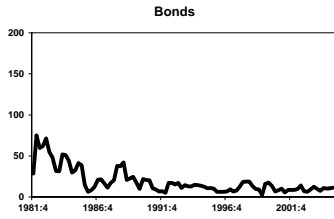
**Figure 1**  
**Volatility of Total Issuance in the Bond, Equity and Syndicated-Loan Markets<sup>a</sup>**  
**(in Percent)**



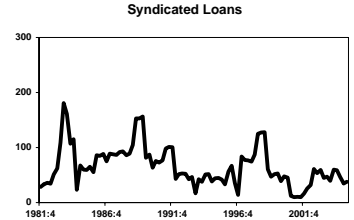
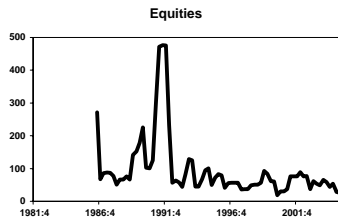
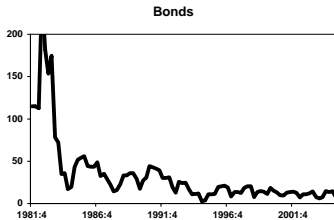
<sup>a</sup>Volatility in each market is measured as the (annualized) standard deviation of the quarterly growth rate of international issuance. The standard deviation is computed over a four-quarter moving window.

**Figure 2**  
**Volatilities in Bond, Equity, and Syndicated-Loan Issuance by Mature Economies<sup>a</sup>**  
**(in Percent)**

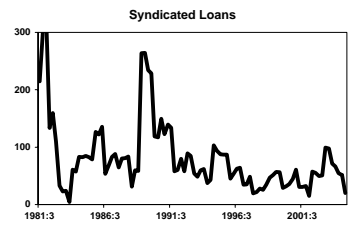
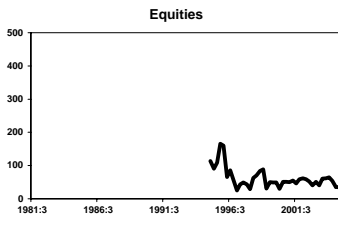
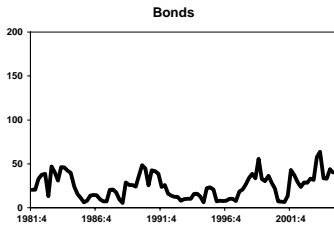
**United States**



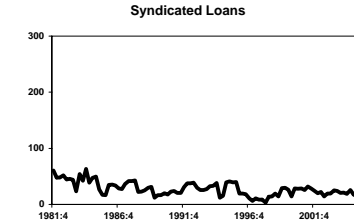
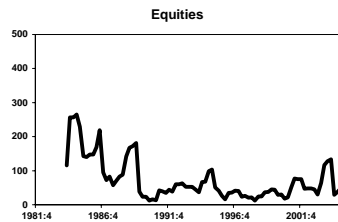
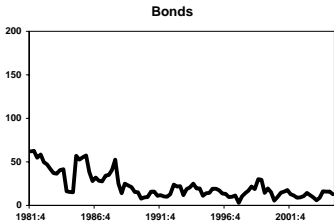
**Germany**



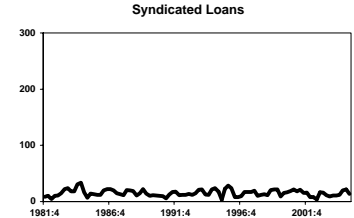
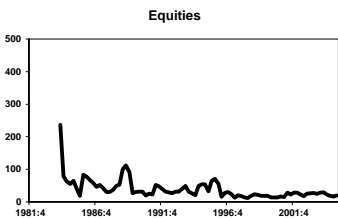
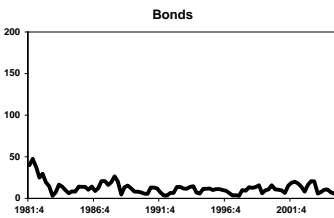
**Japan**



**United Kingdom**



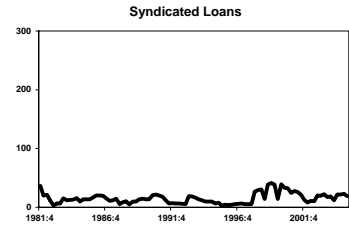
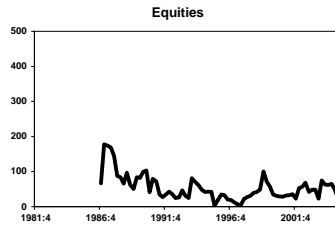
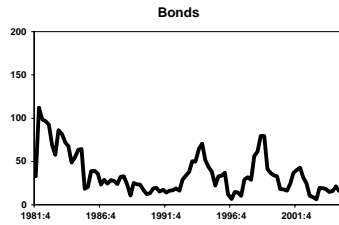
**Other Mature Economies**



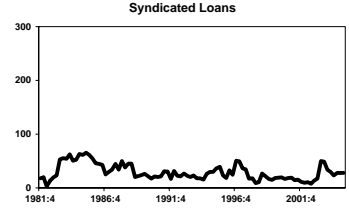
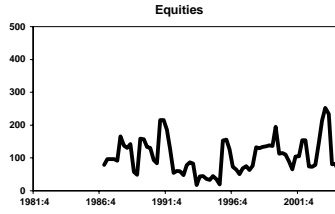
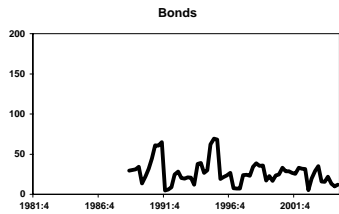
<sup>a</sup> Volatility in each market is measured as the (annualized) standard deviation of the quarterly growth rate of international issuance. The standard deviation is computed over a four-quarter moving window.

**Figure 3**  
**Volatilities in Bond, Equity, and Syndicated-Loan Issuance by Emerging Economies<sup>a</sup>**  
**(in Percent)**

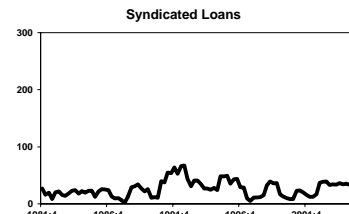
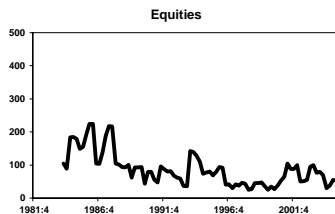
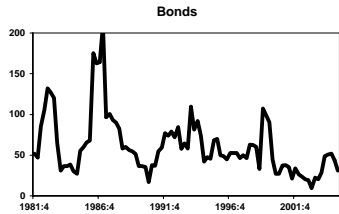
**Asia**



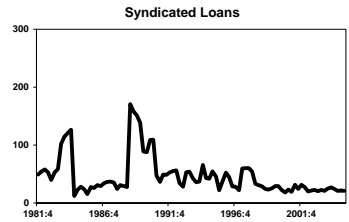
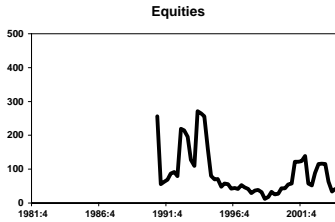
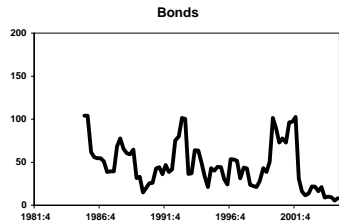
**Latin America**



**Middle East**



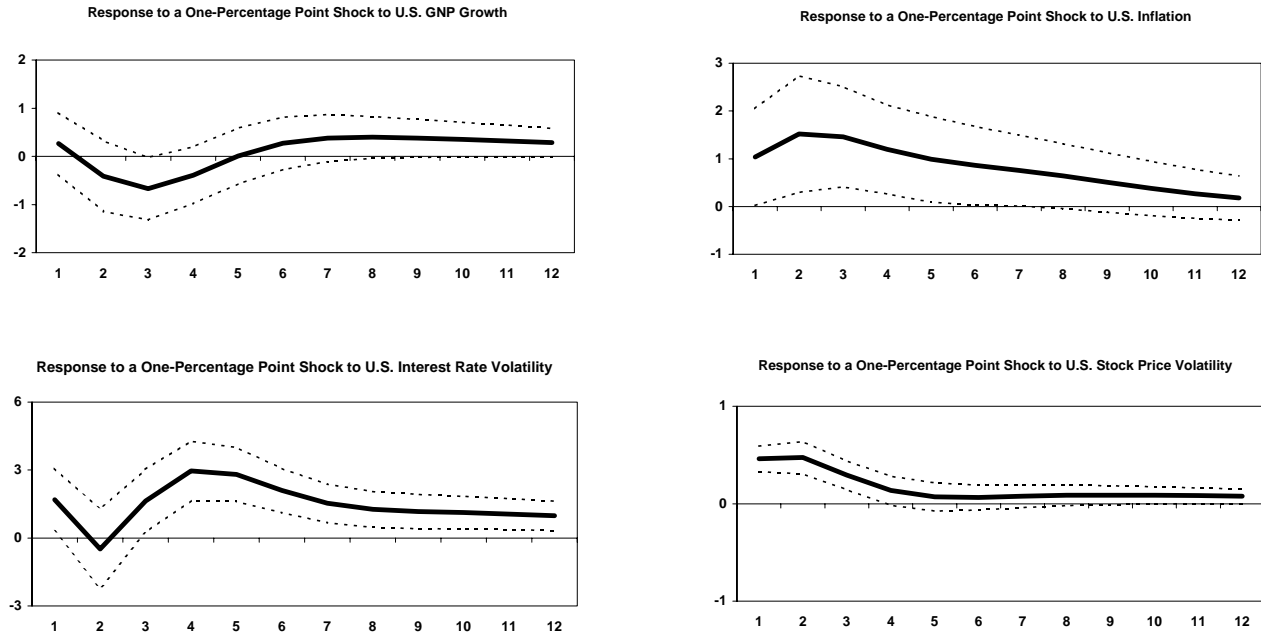
**Transition Economies**



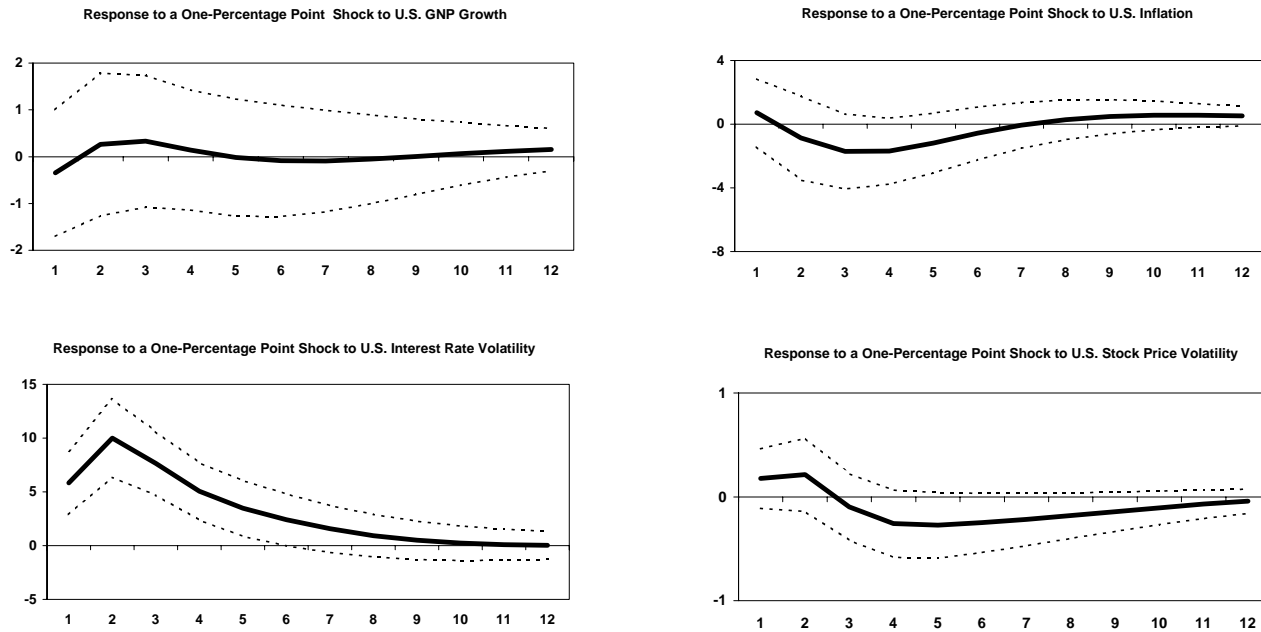
<sup>a</sup> Volatility in each market is measured as the (annualized) standard deviation of the quarterly growth rate of international issuance. The standard deviation is computed over a four-quarter moving window.

**Figure 4**  
**Impulse-Response Functions of Volatility in Bond Issuance<sup>a,b</sup>**  
**(in Percent)**

**Mature Economies**



**Emerging Economies**

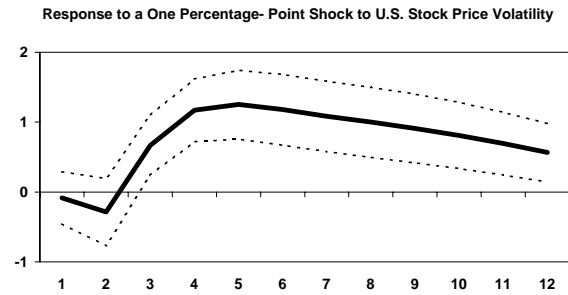
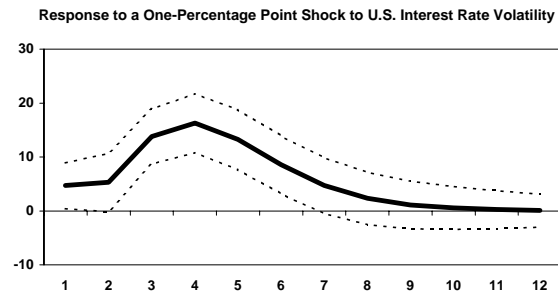
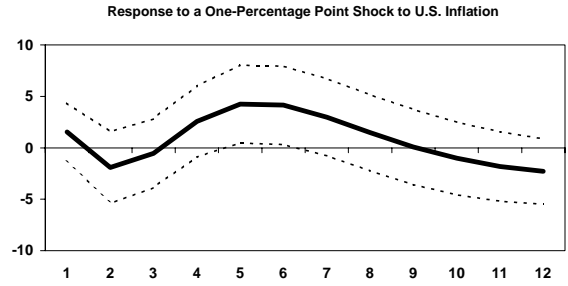
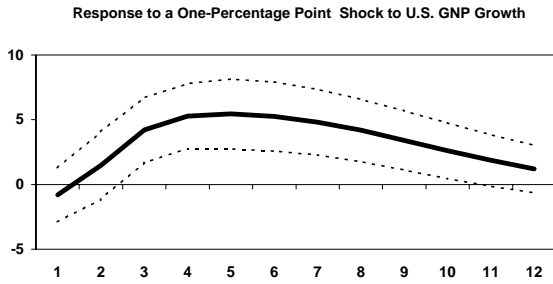


<sup>a</sup> Dotted lines represent 90-percent confidence intervals.

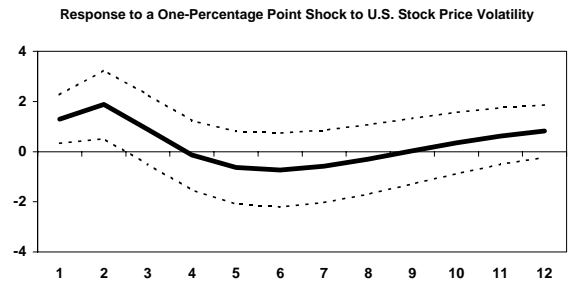
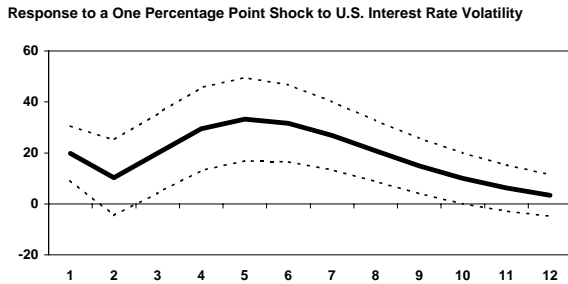
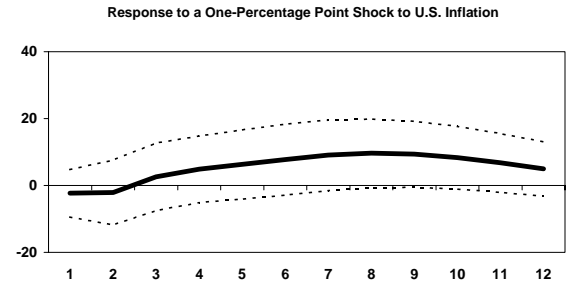
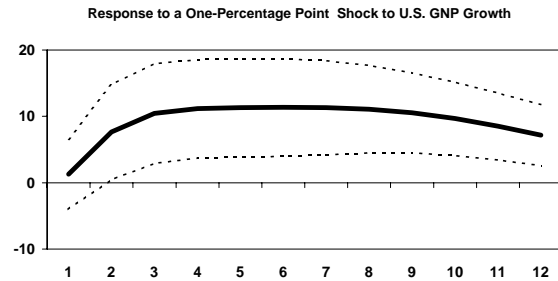
<sup>b</sup> Impulse responses are measured as the response of volatility to a one-percentage point increase in the variable being shocked (e.g., if U.S. growth increases by one-percentage point, mature economies' issuance volatility increases by half-percentage point on impact).

**Figure 5**  
**Impulse-Response Functions of Volatility in Equity Issuance<sup>a,b</sup>**  
**(in Percent)**

**Mature Economies**



**Emerging Economies**

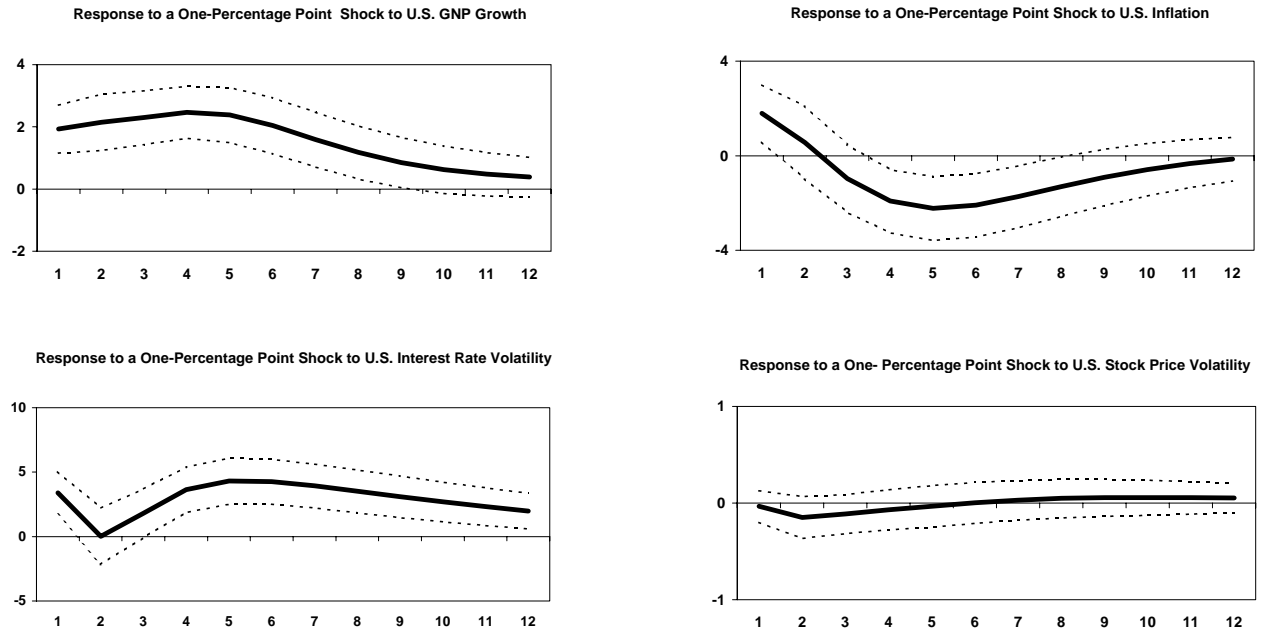


<sup>a</sup> Dotted lines represent 90-percent confidence intervals.

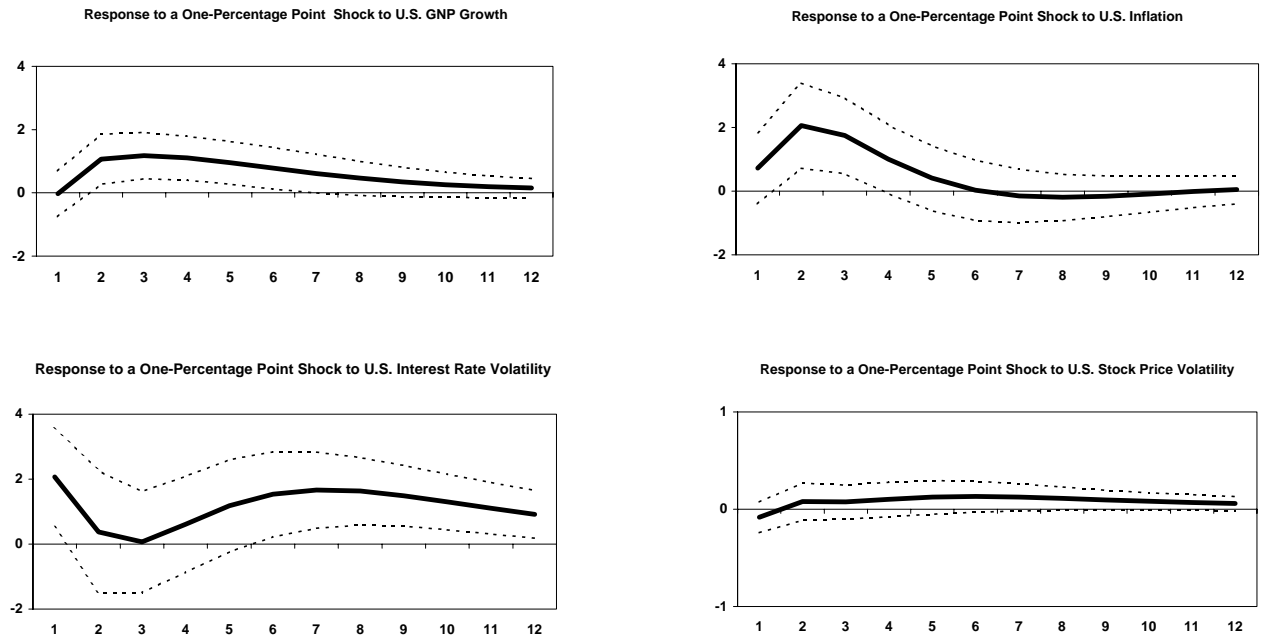
<sup>b</sup> Impulse responses are measured as the response of volatility to a one-percentage point increase in the variable being shocked (e.g., if U.S. growth increases by one percentage point, mature economies' issuance volatility increases by five percentage points after a year).

**Figure 6**  
**Impulse-Response Functions of Volatility in Syndicated-Loan Issuance<sup>a,b</sup>**  
**(in Percent)**

**Mature Economies**



**Emerging Economies**



<sup>a</sup>Dotted lines represent 90-percent confidence intervals.

<sup>b</sup> Impulse responses are measured as the response of volatility to a one-percentage point increase in the variable being shocked (e.g., if U.S. growth increases by one-percentage point, mature economies' issuance volatility increases by two-percentage points on impact).