EMERGING MARKETS CONTAGION:  
EVIDENCE AND THEORY

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Resumen
Este trabajo muestra evidencia de contagio en mercados emergentes utilizando precios de deuda en mercados secundarios y ratings de crédito de países. El trabajo muestra que los fundamentales son capaces de explicar el comovimiento a través de países latinoamericanos de indicadores de probabilidad de repago de deuda. También muestra que este contagio no puede ser explicado por grandes eventos noticiosos y que es asimétrico, siendo mayor para innovaciones negativas de probabilidad de repago. Contrariamente a lo anterior, los fundamentales explican toda la correlación observada en grupos de control compuestos por precios de bonos de corporaciones estadounidenses y ratings de crédito de países medianos de la OECD.

El trabajo presenta un modelo simple que trata de explicar la correlación observada. Este combina países ilíquidos con inversionistas que potencialmente necesitan liquidez para cambiar sus portafolios. La intuición básica es que si los inversionistas requieren liquidez y no la encuentran en un país, entonces ellos la buscarán en un segundo país. Bajo dos definiciones alternativas de equilibrio el modelo muestra que el grado de liquidez de otros países -algo aparentemente idiosincrático a cada uno de esos países- afecta negativamente la probabilidad de repago de un país.

Abstract
Using secondary market debt prices and country credit ratings this paper provides evidence of contagion in emerging markets. It shows that fundamentals are unable to explain the cross-country comovement of creditworthiness in Latin American countries. It also shows that contagion cannot be explained by "big news" events, such as Brady announcements, and that it is asymmetric, being stronger for negative innovations in creditworthiness. In contrast, in a "control group" composed by US corporate bond prices and credit ratings of a group of medium size OECD countries, fundamentals explain all the observed correlation.

The paper presents a simple model trying to explain this puzzle. It combines illiquid countries with investors who potentially need liquidity in order to change their portfolio. The basic intuition is that if investors require liquidity and they do not find it in one country, then they will seek funds in a second country. Under two alternative equilibrium definitions the model shows that the probability of repayment of one country is negatively affected by the degree of illiquidity of other countries -an apparently country-specific characteristic.

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1 Introduction

After several years of being excluded from voluntary capital markets, Latin American and other developing countries received sizable capital inflows between 1990 and 1994. The funds involved in these transactions are even higher than those the region received during 1977–82.\textsuperscript{1} A remarkable fact about these inflows is that despite important differences in past performance, state and depth of structural reforms, and macroeconomic stability, they were quite widespread, with almost all countries seeing improvements in their capital balances. Figure 1 presents data of net capital inflows to major Latin American countries. It turns out that 7 out of 8 countries show a clear expansion of capital inflows after 1990 when compared to the situation in 1988–1989. Other indicators also make this surge evident. For example, Calvo et al. (1993) report that there was a widespread rise of both secondary market debt prices and total reserves between 1990 and 1993. Other emerging markets such as Asian countries have also received substantial inflows. More recently, the impact of the Mexican crisis at the end of 1994 on domestic interest rates in emerging markets gives further evidence about this comovement phenomenon.\textsuperscript{2} The subject of this paper is precisely to study one puzzling aspect of these capital flows that has to do with comovements in creditworthiness not explained by movements in fundamentals —what will be called 

\textit{contagion}.

The comovement phenomenon is not new. Both before and after the 1982 crises net capital movements to Latin America were highly correlated across countries. Figure 1 shows that all 8 countries had inflow surges before 1982. Some countries saw the end of the inflows before others, but, in general, almost all countries experienced a sudden shutdown in external financing, and actually started to see capital outflows. A similar situation happened during the 1920s, when movements in bond prices appeared highly correlated across countries.

An obvious explanation for why capital flows to developing countries are correlated

\textsuperscript{1}Its composition, however, is different. During 1977–1982 net foreign direct investment and net portfolio investment accounted for 26% of the total net capital inflows; during 1990–94 these type of flows account for more than 95% of the total (IMF ,1995). The size of the inflows has been such that the recent experiences of Chile, Colombia and Mexico have been studied as a policy problem. See, e.g., Schadler et al. (1993). The net external financing received by the Western Hemisphere in 1990–1993 is approximately equal to 35% of its external debt in 1989.

\textsuperscript{2}See, e.g., IMF (1995).
Figure 1: Capital Flows to Latin America: 1974–94 (Source: IFS)
is that the fundamentals determining these flows comove. In particular, changes in
the world capital supply may explain the correlation. For example, Calvo et al.
(1993) and Chuhan (1994) consider the low interest rates in the US as the leading
explanation for the recent surge of capital inflows in Latin America and Asia.\(^3\) In the
same way, one expects that the cross-country correlation of variables such as terms
of trade and fiscal discipline may help to explain the comovements.

The objective of this chapter is twofold. First, it investigates the existence of
contagion in emerging markets. For that purpose I empirically assess whether funda-
mentals are able to explain the observed comovement of capital flows, more specif-
ically, of creditworthiness of a group of Latin American countries. In particular, I
analyze the behavior of both debt prices in the secondary market and country credit
ratings, and try to relate it to the behavior of fundamentals.\(^4\) The main conclusion is
that there are significant contagion effects. I also attempt to characterize the form of
contagion, specifically investigating whether there are asymmetries between positive
and negative contagion and whether "big news" episodes in the international market
explain the excess comovement phenomenon. The conclusions in this case are that
"big news" events do not explain contagion, and that there is evidence of stronger
contagion of negative innovations in creditworthiness.

Second, the chapter attempts to provide a rationale for the existence of conta-
gion based on liquidity considerations. For that purpose I present a simple model
in which changes in apparently country-specific fundamentals in fact do affect the
creditworthiness of other countries. The central hypothesis is that comovement is a
natural consequence of the interaction of investors who are subject to liquidity needs
and who invest in a group of potentially "illiquid" assets that promise certain return
—as opposed to an irrational phenomenon.

Understanding whether and why there is capital movements contagion is an im-
portant aspect of international finance, especially regarding the role of international
financial institutions. In fact, if there is contagion, information disclosure standards
and other kinds of intervention may be desirable. Contagion is also a very important
issue in the context of an optimizing economy that tries to smooth out transitory

\(^3\)Fernandez-Arias (1994) claims that country-specific factors are important explanatory variables.
\(^4\)There are several reasons to choose debt prices and ratings rather than capital flows themselves
in order to analyze the issue of contagion. See section 3.1.
shocks. It is well known that credit constraints, for example, originating because of problems of sovereign risk, can completely change the result of the simple dynamic optimization problem, making a buffer stock desirable. Contagion goes further in that credit constraints may change throughout time without apparent justification, probably increasing the need for saved funds that can act as a buffer.

The chapter is organized as follows. Section 2 reviews some related literature about contagion. Section 3 presents empirical evidence about the existence of contagion, analyzing both debt prices in the secondary market and country credit ratings. It also discusses the existence of asymmetries in the contagion process and the role of "big news" episodes in explaining contagion. The question of how special is the contagion phenomenon to emerging markets is addressed by analyzing the comovement of US corporate bond prices and OECD country credit ratings as benchmarks. The result is that fundamentals explain all the observed comovement in these "control groups." Section 4 presents a simple model of capital flows and liquidity shocks in which comovements in repayment prospects emerge even after pure country-specific shocks. It also discusses reasons for having contagion as an emerging markets phenomenon and other alternative explanations. Finally, Section 5 presents some concluding remarks.

2 Contagion Literature

Contagion has primarily been defined and investigated in the context of the banking industry. It has been argued that imperfect information about the quality of a bank's portfolio from the part of depositors may support not only runs against that bank but also contagion among banks. In particular, if an investor encounters a "line" in a particular bank she could extract a signal about the bank's assets quality and decide to withdraw. The signal could be completely false—for example if the people "in line" needed more liquidity than expected rather than having negative information about the assets— but a run against the bank could start.\footnote{See, e.g., Chari and Jagannathan (1988).} Liquidity problems in a particular bank can then spread to other banks if the banks are financially (directly) related. This type of contagion has been called institutional. But contagion effects go further than the direct effect that a failing unit may have on a financially exposed
unit. Financial difficulties of a particular bank may induce runs against solvent banks because depositors lack bank-specific information. Thus, signals (possibly incorrect) about the quality of a bank portfolio may trigger a withdrawal decision from a second (institutionally unrelated) bank if the signal conveys information about the quality of the assets of the second bank. In fact, this type of contagion has been observed empirically. In a study of US bank panics, Park (1991) finds that these panics were stopped by the authority mainly by providing bank-specific financial information rather than liquidity. In these models, while lack of liquidity alone can start a run against a particular bank, its propagation to other banks requires some degree of imperfect information.

More in an international context, studying the stability of the Eurocurrency inter-bank market, Sounders (1987) has focused on potential contagion among international banks, both informational and institutional. Informational contagion includes the effects of a failing bank on how investors and depositors evaluate the riskiness of other banks. Institutional contagion includes both direct bank relations—in which a bank may withdraw deposits to pay to others—and settlement risk—that accounts for problems that arise from “undelivered” funds. Among other things, he examines evidence about contagion by checking the behavior of spreads and rationing. As for spreads, he looks at the correlations between LDCs’ and developed countries’ both pre- and post-debt crisis, and in a time-moving window. If there were contagion, one would expect spreads to be correlated across both types of countries. His conclusion is that there are no signs of contagion, except for the months immediately surrounding the Mexican 1982 moratorium. As for rationing, he tests for correlation among the capital movements to major borrowing groups, such as geographic areas and banking centers. He also analyzes the principal components of these flows. The conclusion, again, is that there has been no contagion in the inter-bank market.

Contagion among banks in an international context has also been investigated using event studies and excess returns in equities of US banks. In the case of the Mexican announcement, which happened at a time when there were no mandatory disclosures about exposure levels, studies have reached different conclusions. For instance, Smirlock and Kaufold (1987) provide evidence that the market was strong-form efficient (which is equivalent to say that there was no contagion). They showed that only banks with exposure showed negative excess returns after the announcement
and the negative returns were proportional to the level of exposition. Schoder and Vankudre (1986), on the other hand, conclude that there was no relation between excess return and exposure, showing therefore existence of contagion effects. In the case of the Brazilian 1987 default, which happened when disclosure was mandatory, studies have also given conflicting evidence. Musumeci and Sinkey (1990), on one hand, find no evidence of contagion; exposed banks showed negative returns proportional to their level of exposition. They also find no evidence of cross-country contagion—the subject of this paper—since negative returns “appear mainly related to Brazilian exposure.” Karafiath and Smith (1991), on the other hand, find some evidence of bank contagion effects related to size.

Few studies have tried to provide direct evidence of cross-country contagion. Doukas (1989) attempts to test whether innovations in a creditworthiness indicator of a sovereign borrower affects the spread charged to other countries. Using monthly data between 1978 and 1982 from Argentina, Brazil and Mexico, he concludes that, indeed, there were contagious effects of the innovations. The problem with this conclusion, however, is that he does not control for an eventual correlation in the innovations across countries. Also, spreads can potentially be a very poor indicator of the capital supply a country faces if credit constraints are binding. In particular, it is straightforward to show that the expected repayment of a risky loan may decrease with the spread charged if the likelihood of repayment decreases rapidly enough with the size of the repayment due to, for instance, sovereign default.

Lee (1993), in a study of the determinants of the credit ratings assigned by bankers, finds that there is a group level effect by region. More specifically, he finds that the inclusion of dummy variables for geographical location of the borrower yield highly significant coefficients in panel regressions using annual data. He does not test, however, whether innovations in the credit rating of one country are correlated to inno-

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6 Karafiath and Smith (1991) criticize this paper on three grounds. The standard errors might be biased (they use OLS); both the size and the date of the windows are too restrictive; and other explanatory variables are not included. Another explanation for the cross-country result is the high correlation (0.95) between Brazilian and other Latin American countries exposure across banks (which in the limit of perfect correlation makes the identification impossible).

7 In this study creditworthiness is measured by an index of production of the major exportable commodities (proxying for future growth opportunities that, in turn, would determine default decisions). Innovations are the residuals of an equation of a production index and changes in the domestic price level, the import price level, and the nominal money supply. Interestingly, the paper shows that only innovations—and not production itself—matter in the determination of the spread.