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Leverage Pro-cyclicality and Bank Balance Sheet in Colombia[☆]

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ABSTRACT

The recent financial crisis has renewed the interest of economists, both at the theoretical and empirical level, in developing a better understanding of credit and its mechanisms. A rapidly growing strand of the literature views banks as facing funding restrictions that condition their borrowing to a risk-based capital constraint which, in turn, affects bank lending. This work explores the way banks in Colombia manage their balance sheet and sheds light into the dynamics of credit and leverage over the business cycle. Using a sample of monthly bank balance sheets for the period 1994-2011, we find not only that leverage is predominantly pro-cyclical in the Colombian banking sector, but also that heterogeneity matters, and thus, an aggregate measure of bank leverage can mask a fragile financial sector. In addition, although some banks display great dynamics on the right-hand side of their balance sheet during the upward phase of the leverage cycle, changes in the composition of liabilities between core and non-core do not seem to have a clear pattern. Still, more attention should be paid on this by policy makers, as these dynamics could convey information about the phase of the cycle of the economy and the financial vulnerability of the system as a whole.

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Prociclicidad del apalancamiento y balances de los bancos en Colombia

RESUMEN

La reciente crisis financiera ha renovado el interés de los economistas, tanto a nivel teórico como empírico, en desarrollar un mejor entendimiento del crédito y sus mecanismos. Una rama de rápido crecimiento en la literatura considera que los bancos enfrentan restricciones de financiamiento que condicionan su endeudamiento a una restricción de capital basada en el riesgo que asumen, y que a su vez, afecta la oferta de crédito. Este trabajo explora la forma en que los bancos en Colombia manejan sus balances y arroja luz sobre las dinámicas del crédito y el apalancamiento durante el ciclo económico. Utilizando una muestra de balances mensuales de los bancos para el período 1994-2011, encontramos no sólo que el apalancamiento del sector bancario colombiano es predominantemente procíclico, sino también, que la heterogeneidad importa, y por tanto, una medida agregada de apalancamiento puede estar ocultando un frágil sistema financiero. Además, aunque algunos bancos muestran una gran dinámica en el lado derecho de sus balances durante la fase ascendente del ciclo de apalancamiento, los cambios en la composición de los pasivos entre *core* y *non-core* no parecen tener un patrón claro. Aun así, se debe prestar más atención a este tema por parte de los hacedores de política, ya que estas dinámicas pueden proveer información sobre la fase del ciclo de la economía y la vulnerabilidad financiera del sistema como un todo.

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1. Introduction

This paper explores the way banks in Colombia manage their balance sheet and sheds light into the dynamics of credit. The idea is to see whether the link between credit dynamics, leverage and liability composition explains credit supply decisions. Evidence in this direction would help to understand credit fluctuations, identify

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possible signs of pro-cyclicality, and advance in the elaboration of a more appropriate view of the banking sector. This view is centered in the structural relationships between the two sides of the balance sheet, and would be a considerable improvement from the traditional interpretation that goes, mechanically, from money to credit. By using bank-level data, this work pays particular attention to the importance of heterogeneity within the banking system and the role it plays in the evolution of credit in the economy.

The recent financial crisis has renewed the interest of economists, both at the theoretical and empirical level, in developing a better understanding of credit and its mechanisms. A growing number of studies, drawing on a tradition that underscores the inherent instability of credit systems, show that credit lies at the heart of financial crises and that the latter may be the endogenous outcome of how credit is created in the context of decisions of numerous and heterogeneous agents (see Aikman et al., 2011, Jorda et al., 2011, and Taylor, 2012).

Very briefly, the inherent instability of credit results from the feedback between credit fluctuations and changes in collateral prices. This relationship is best approached in terms of what is known in the literature as leverage cycles (Geneakoplos, 2009; Jorda et al., 2011).

Various strings and lines of research can be pursued in order to test the validity of these ideas and try to find empirical support for them under different scenarios. Among such lines, the present paper follows recent strands of the literature that directly connect the dynamics of credit to the behavior of banks, going beyond mere quantities and looking at their entire balance sheet, including assets, liabilities, their composition, and leverage (Shularick and Taylor, 2010).

More specifically, recent interesting work builds on a formal model in which financial intermediaries manage their balance sheet in a way that is consistent with, and responds to, their credit supply decisions (see Adrian and Shin, 2010, Adrian and Boyarchenko, 2012, Adrian and Shin, 2011, and Adrian and Shin, 2012). The model in question is, briefly put, a model of credit supply and credit risk, where a bank maximizes profits subject to a value-at-risk constraint. This means that banks, and financial intermediaries in general, face funding restrictions that condition their borrowing to a risk-based capital constraint which, in turn, affects bank lending. Changes in the size and composition of balance sheets are derived from credit decisions taken by banks. Thus, there is a “lending” or “balance sheet capacity” of banks determined by risk and regulatory considerations, and banks expand their lending so as to make full use of this capacity when risk perceptions improve. As this happens, balance sheets grow, leverage increases and lending standards deteriorate. In other words, pro-cyclical leverage is closely tied to a risk-based capital constraint.

Along these lines, Hahm et al. (2011b) explain how lending booms coincide with changes in the compositions of bank liabilities or shifts from “core” (basically retail deposits) to “non-core” liabilities. The nature of non-core liabilities varies from country to country and depends, among other things, on the characteristics of the financial sector and the nature of the credit system. Some key insights about the notion of non-core liabilities in the literature can be highlighted briefly. What lies in the background of these ideas are two basic findings of previous research:

1. In credit booms, increases in lending outstrip the funds available to banks through retail deposits of household savers, or core liabilities, and banks have to resort to other types of funding.
2. This funding, which comprises non-core liabilities, is closely linked to financial vulnerability.

In light of these findings, the expansion of balance sheets, driven by the need to use up the enlarged lending capacity that results from more favorable measured risk perceptions, moves banks to resort to other sources of funding different from core liabilities, as the latter do not respond speedily enough to the needs of banks. Credit (or

the size of the balance sheet), leverage and the composition of bank liabilities are thus part of the same process.

In the case of emerging market economies, which is the focus of the paper by Hahm et al. (2011b), banks are the most important financial intermediaries and wholesale funding markets are not well developed. For these economies the authors underline the crucial role of international capital flows and short-term funding in foreign currency as a key component of non-core liabilities of banks, as well as the changes in their weight across the various phases of credit cycles.

The relevance of the link between credit dynamics and liability composition has also been highlighted by other authors. For example, Schularick and Taylor (2010) show how, for a sample of developed countries, the upward trend observed since 1945 in the ratio of bank assets to broad money is the other side of a simultaneous increase in funding of banks via non-monetary liabilities. Shin (2011a), on his part, finds that monetary aggregates, to the extent that they reflect the size of non-core and core liabilities, convey information on the stage of the financial cycle. Kim et al. (2012) study the relationship between cross-border banking and the composition of monetary aggregates in terms of core and non-core liabilities of banks. The authors derived from here information signaling vulnerability to financial crises.

The above setting has also been successfully applied in empirical studies of scenarios that may give rise to credit booms, financial instability and, eventually, financial crises. The key concept here is pro-cyclical leverage, a phenomenon that derives from the behavior of banks in their credit supply decisions along the lines of the model referred to above (Shin, 2011a; Adrian and Shin, 2012, and Adrian and Shin, 2010).

Hahm et al. (2011a), using aggregated information for a sample of emerging and developing economies, analyze the link between various definitions of non-core bank liabilities and different measures of crises. The authors find that non-core liabilities have a strongly predictive power for both currency and credit crises. These results indicate that credit booms are reflected in the composition of liabilities. In a related exercise, focused on pro-cyclicality of leverage in the Canadian banking system, Damar et al. (2012) find that banks that rely more on non-core liabilities (wholesale funding) exhibit a higher degree of leverage pro-cyclicality. Non-core liabilities are a sign of vulnerability in banks' balance sheets. Studies that rely on bank-level data, as is the case of this paper, are particularly suitable to exploit heterogeneity within the banking sector when conducting analyses of how banks manage their balance sheets. For these purposes, it is clear that heterogeneity refers to differences in the way banks manage their portfolio (Adrian and Shin, 2010). Two types of banks or bank behavior can be identified depending on the relationship between leverage and assets or balance sheet size:

- Banks that seem to target a constant leverage ratio.
- Banks that exhibit pro-cyclical leverage or a positive relationship between changes in leverage and changes in total assets.

This heterogeneity in balance sheet management practices has been linked in the literature with the degree of reliance on the capital market and mark-to-market practices. Pro-cyclical leverage might have more incidence in market-based than in bank-based credit systems (see Damar et al., 2012, for Canada, and Adrian and Shin, 2010, for the USA). In Colombia, with a credit-system centered in banks, bank heterogeneity, as defined above, could be explained from differential access to markets for funding (bank size, for example). This issue will be dealt with in the paper. The division of banks into those that target a leverage ratio and those with pro-cyclical leverage should not blur the fact that leverage ratios vary widely both between banks and in time, depending on the different phases of the business cycle.

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