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Uncertainty in the Money Supply Mechanism and Interbank Markets in Colombia☆

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ABSTRACT

We set a dynamic stochastic model for the interbank daily market for funds in Colombia. The framework features exogenous reserve requirements and requirement period, competitive trading among heterogeneous commercial banks, daily open market operations held by the Central Bank (auctions and window facilities), and idiosyncratic demand shocks and uncertainty in the daily auction. Analytical derivations of their decision making process show that banks involvement in the interbank market and open market operations depend on their individual requirement constraint and daily liquid assets. Our results do not show a linkage between the uncertainty in the money supply mechanism and activity in the interbank market. Equilibrium interest rate for the interbank market is derived, and is shown that it is distorted by uncertainty at the daily auction held by the monetary authority. Using data for Colombia, we test the main results of the model and corroborate the Martingale hypothesis for the interbank interest rate.

Incertidumbre en el mecanismo de oferta monetaria y mercados interbancarios en Colombia

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RESUMEN

En este documento se plantea un modelo dinámico estocástico para el mercado interbancario diario en Colombia. La configuración del modelo incorpora bancos comerciales heterogéneos que interactúan en un entorno competitivo, operaciones de mercado abierto (OMA) diarias realizadas por el Banco Central (subastas y ventanillas), incertidumbre en la obtención de recursos en la subasta diaria, choques de demanda idiosincráticos y requerimientos de reserva definidos exógenamente. Las derivaciones analíticas acerca del proceso de toma de decisiones de los bancos muestran que la participación de cada entidad en el mercado interbancario y en las OMA dependen de su requerimiento de reserva y del nivel de sus activos líquidos diarios. En los resultados obtenidos no se evidencia algún vínculo entre la incertidumbre en el mecanismo de oferta monetaria y la actividad en el mercado interbancario. En particular, se encuentra la tasa de interés de equilibrio para el mercado, y se muestra que está distorsionada por la incertidumbre en la obtención de fondos en la subasta diaria. Finalmente, utilizando datos para Colombia, se prueban los principales resultados del modelo y se corrobora la hipótesis de Martingala para la tasa de interés interbancaria.

1. Introduction

The correct functioning of interbank markets is important among other reasons because banks can redistribute cash reserves among its participants, and because interest rates reached in these markets provide a benchmark for other sectors of the economy.

Regarding liquidity management, banks can smooth liquidity shocks by borrowing or lending in the interbank market rather than prematurely cancel more profitable longer-term projects. Thus, due to these markets, it is possible to avoid inefficient hoarding of reserves as a precaution against unexpected liquidity shocks. In addition, interbank markets play a key role in the transmission mechanism of monetary policy through the credit channel under the inflation targeting regime.

We have two main motivations in writing this paper. First we aim to understand how interbank markets work, and second, how Central Banks mechanism to conduct monetary policy affects outcomes (interest rates and loans) in those markets. Even though

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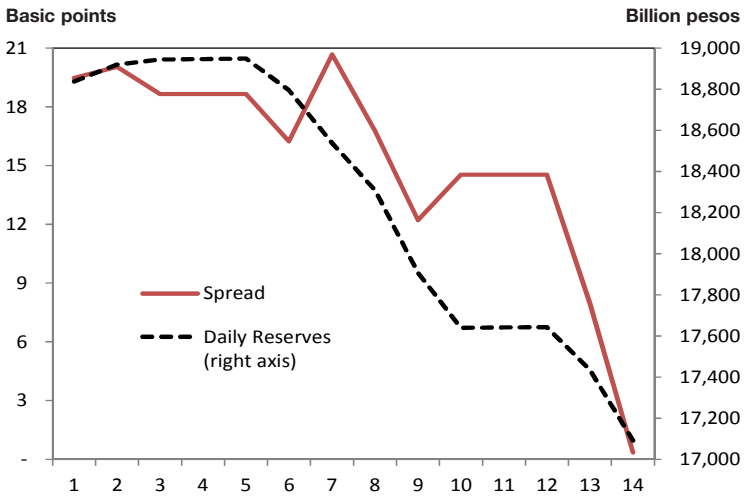

SOURCE: Superintendencia Financiera de Colombia, Banco de la República, Bolsa de Valores de Colombia and own calculations.

Figure 1 Spread between the interbank interest rate and policy rate, and daily reserves.

we focus our attention in the Colombian case, the analytical tools we develop here can be used to study a wide range of interbank markets from different economies since they have some common features.

This paper is composed by four sections, including this introduction that in what follows elaborates in our two main motivations. In section two we set a model for the interbank market in Colombia. The third section presents the data analysis for the case of Colombia in which we validate our analytical findings, and finally the fourth section concludes with some final remarks.

1.1. How Do Interbank Markets Work?

It is important to understand the monetary policy framework in which interbank activity takes place. As many other countries, Colombia established a floating exchange rate regime and started the process of converging towards an inflation targeting regime in the late nineteen nineties. During this process, monetary aggregates were replaced by the interest rate as the instrument used by the Central Bank.

The starting point is the announcement of an inflation target for a future period, usually one to two years ahead, which seeks to anchor inflation expectations of private agents in the economy. In this sense, theoretically, when there are shocks to the economy, the Central Bank changes the policy interest rate to bring inflation back into line with the target, and to maintain the economy around its long-term trend.

It is expected that when the Central Bank changes its policy interest rate, this immediately affects the interbank interest rate resulting in changes in short and long term interest rates in the markets. Therefore, the alignment between the policy interest rate and the interest rate in the interbank market is a necessary condition for the success of the monetary policy. It ensures the correct operation of the monetary transmission channels and, ultimately, the fulfillment of the inflation target as well as an output gap close to zero.

In Colombia, monetary policy works through auctions and window facilities. Instead of controlling the interest rate directly, the Central Bank supplies resources in a daily basis through auctions with amounts announced a day before; and administers deposit and lending facilities to allow financial institutions to let or get overnight resources at or from the Central Bank, respectively. The aim of the monetary authority is to supply just enough resources to keep the auction rate in line with the policy rate every day. The aim of commercial banks and other interbank market participants is understood to be to maximize profits subject to liquid asset holdings, obligations to other banks and the requirement constraint the Central Bank sets to diminish deposit default risks.

Trading day activity in the Colombian monetary market is not too simple. The complexity arises due to a variety of possible operations and counterparts. As explained by Cardozo, et al. (2011), there are collateralized and uncollateralized trading that takes place in electronic negotiation systems or in OTC (Over-the-counter) markets. Furthermore, a wide range of institutions are able to trade in these markets (banks, bank-like institutions, stockbrokers, among others) and the Central Bank holds open market operations (OMO) at certain and known hours in a day.

Trading days start at 7 a.m., when Colombia's large-value payment system (CUD, in Spanish) and SEBRA (electronic services provided by the Banco de la República) open. At 8 a.m., institutions start trading in electronic negotiation systems like SEN and MEC[1]. Operations in SEN go until 1 p.m., while those in MEC go until 5 p.m. Although banks can trade and negotiate until 5 p.m., most of the activity in the interbank market occurs before 1 p.m.

Central Bank holds two main OMOs: *a)* auctions for funds by REPOS (1 p.m.),[2] and *b)* lending and deposit facilities (4 p.m.). The amounts auctioned are bounded by the Central Bank. Commercial banks and bank-like institutions compete under a Dutch auction system. With the window facilities, the Central Bank lends or borrows funds without setting a maximum amount, but charging or paying interest rates different from the official policy interest rate.

In section 2, we present a model that tries to capture stylized facts shown in Figures 1 and 2:

Figure 1 shows average data for each of the 14 days in the requirement period in Colombia. Spread accounts for the difference between the aggregate (collateralized and non-collateralized operations) interbank interest rate and the policy rate (left axis). Daily reserves shows average holdings of liquidity by institutions, to contribute to their reserve requirement constraint (right axis).

1. SEN stands for *Sistema Electrónico de Negociación* (Electronic Trading System) and is administrated by Banco de la República. On the other hand, MEC stands for *Mercado Electrónico* (Electronic Market) and it is administrated by the Colombian Stock Market *(Bolsa de Valores de Colombia)*.
2. Regulation allows the Central Bank of Colombia to hold expantionary and contractionary auctions for funds by REPOS.