The role of the reference rate in an interbank market with imperfect information

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ABSTRACT

This study investigates the potential role of the reference rate in an interbank market where individual banks cannot fully identify the nature of underlying shocks affecting their interbank transactions. We find that the reference rate does not always mitigate the market distortion arising from imperfect information. When the number of sample transactions is smaller than a certain threshold, the reference rate magnifies the distortion even if the reference rate is not affected by any reporting noise. The threshold depends on the relative size of aggregate and idiosyncratic shocks. Noise in the reported interest rates, which is potentially increased by banks' manipulations, distorts individual banks' inferences about the underlying shocks, and thereby raises the threshold. When noise is highly correlated among multiple sample transactions, perhaps owing to collusive manipulations, it is possible that increasing the number of sample transactions may never mitigate the market distortion.

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1. Introduction

The roles of the reference rate in interbank markets (henceforth the "interbank reference rate") have become a major concern for various agents active in financial markets in light of the recent LIBOR manipulation problem. The interbank reference rate represents only a limited number of interest rates reported by panel banks, not interest rates in all transactions throughout the interbank market. However, it provides financial market participants, including panel banks, with precious information concerning the price developments and market conditions of the interbank market. In addition, the interbank reference rate is widely used as a benchmark interest rate in many kinds of financial transactions, such as corporate loans, mortgage loans, and derivative transactions. This means that its developments influence financial transactions engaged in by various entities and can ultimately affect real economic activities. Therefore, understanding the economic functions of the interbank reference rate is important to financial stability as well as monetary policy making. Nevertheless, since the roles of the interbank reference rate have not received much attention until recently, in the aftermath of the LIBOR manipulation problem, academic studies have not sufficiently investigated this topic.

There exist at least three issues to be explored. The first is the informational role of the interbank reference rate. It is most fundamentally important to investigate the mechanism through which information provided by the interbank reference rate enhances (or, under some conditions, deteriorates) the efficiency or stability of the interbank market. The second issue is the

incentive for panel banks to manipulate the market in reporting their individual interest rates. It would certainly be important to investigate why banks have such incentives, how manipulations distort the efficiency or stability of the interbank market, and what kinds of institutional arrangements prevent manipulation. The third issue is the impact of variations of the interbank reference rate, possibly due to manipulations by panel banks, on financial transactions outside the interbank market and on real economic activities. Although these issues are potentially interrelated, to reach clear-cut conclusions, it is better to focus on some specific aspect of the reference rate, rather than to take into account all the issues simultaneously.

This study mainly addresses the first issue, that is, the informational (or signaling) role of the reference rate, although it also to some degree investigates the influence of banks' manipulations. The interbank reference rate should ideally apprise individual banks, which have specific information only on their own transactions, of the aggregate financial conditions that exist throughout the market. By doing so, is should help these banks set more appropriate interest rates for individual interbank transactions, thereby allocating resources more efficiently. We analyze (i) the mechanism by which the interbank reference rate contributes to stabilizing the interbank market, (ii) conditions under which the interbank reference rate might actually serve to destabilize the interbank market, and (iii) the specific properties that might allow a reference rate to help stabilize the interbank market and thereby the effectiveness of monetary policy.

We introduce a simple interest rate model in which the individual interbank interest rate is determined by two kinds of components: idiosyncratic shocks and aggregate shocks. This kind of setup with two kinds of shocks is traditional in theoretical studies on the functioning of interbank markets (for example, Allen, Carletti, & Gale, 2009; Allen & Gale, 2000; Freixas, Martin, & Skeie, 2011). However, we additionally assume that banks engaged in individual interbank transactions cannot correctly distinguish the two kinds of shocks. Although this kind of imperfect information environment is similar to the famous island economy modeled in a macroeconomic context (Lucas, 1972, 1973; Phelps, 1970), our study is the first to apply the setup to the interbank market and to examine the role of a reference rate in such an imperfect information environment. It is indeed a realistic setup, because banks usually obtain information on aggregate market conditions by observing the reference rate and thereby learn the reasonable interest rate that should be applied in their own transactions. We choose to use a simple interest rate model, mainly because of the lack of widely accepted canonical models for analyzing the interbank market. Because of its simplicity and generality, our setup is potentially applicable to many theoretical models of interbank markets.

In our study, the interbank reference rate is defined as the sample average of interest rates reported by individual banks. The sample size is limited because in reality the number of banks contributing to the panel of interbank reference rates is small–according to Gyntelberg and Wooldridge (2008), between 10 and 20 in many cases (see Table 1). Even in the case of the euro interbank offered rate (Euribor), which has the largest panel of banks, selected from all countries in the Euro area, the panel size is only around 45. Because of such limited sample size, it is possible that individual bank interest rate data, which are largely influenced by idiosyncratic factors such as the bank's credit risk or liquidity, can significantly influence market transactions in general.

Even more seriously, the small sample size potentially allows panel banks to influence the interbank reference rate by manipulating their reports on their individual interest rates. This influence can be magnified if multiple banks simultaneously manipulate their reported interest rates in the same direction. To capture these features, we assume that the interest rates reported by panel banks can deviate from the rates actually used in their transactions through reporting noise, which can be increased by banks' manipulations and can be correlated among interest rates reported by multiple banks. Since this study

Table 1
Number of contributor banks for the interbank reference rate.

Currency	Reference rate	Number of contributor banks
AUD	Libor	8
CAD	Libor	12
CNY	Shibor	16
DKK	Libor	8
	Cibor	12
EUR	Libor	16
	Euribor	45
HKD	Hibor	20
IDR	Jibor	18
INR	Mibor	33
JPY	Libor	16
	Tibor	16
KRW	Koribor	14
MYR	Klibor	11
NZD	Libor	8
PHP	Phibor	17
SGD	Sibor	13
THB	Bibor	16
USD	Libor	16
	Sibor	15

Source: Gyntelberg and Wooldridge (2008).