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Market-specific and currency-specific risk during the global financial crisis: Evidence from the interbank markets in Tokyo and London

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ABSTRACT

This paper investigates how international money markets reflected credit and liquidity risk during the global financial crisis. After matching the currency denomination, we examine how the Tokyo Interbank Offered Rate (TIBOR) was synchronized with the London Interbank Offered Rate (LIBOR). We find remarkably asymmetric responses in market-specific and currency-specific risk during the crisis. The regression results suggest that market-specific credit risk increased the difference across markets, whereas liquidity risk caused the difference across currency denominations. They also support the view that liquidity shortage of the US dollar occurred in international money markets during the crisis. Coordinated central bank liquidity provisions were useful in reducing the liquidity shortage of the US dollar, but their effectiveness was asymmetric across markets.

1. Introduction

In a well-integrated market, assets with the same risk characteristics would yield identical expected returns. When controlling for regulatory treatments, the yield spreads among fixed-income assets denominated in the same currency should be equalized during the normal periods. However, reflecting risk characteristics, the spreads may show substantial differences during crisis periods. In this paper, we investigate how the Tokyo and London money markets reflected credit and liquidity risk during the global financial crisis in 2007–2009. After matching the currency denominations, we investigate how the Tokyo Interbank Offered Rate (TIBOR) was synchronized with the London Interbank Offered Rate (LIBOR), both of which are denominated in the US dollar and the Japanese yen. LIBOR, the world's most widely used benchmark for short-term interest rates, is calculated for 10 currencies, including the US dollar and the Japanese yen. To the extent that the Japanese market segment is highly integrated with global markets, TIBOR should show synchronization with LIBOR. However, as risk characteristics vary substantially, TIBOR may not be synchronized with LIBOR during crisis periods. In particular, it is not clear how well the synchronization with LIBOR persists when economies are experiencing a serious financial crisis.

The following analysis investigates the extent of TIBOR's synchronization with LIBOR in 2007–2009. In order to calculate this synchronization, dollar-denominated TIBOR (that is, Eurodollar TIBOR) is matched with dollar-denominated LIBOR (that is, Eurodollar LIBOR). Yen-denominated TIBOR (that is, Euroyen TIBOR) is also matched with yen-denominated LIBOR (that is, Euroyen LIBOR). The matches allow a comparison of their returns without exchange rate risk. The sample period of the analysis is noteworthy because it includes the periods before and after the global financial crisis. Regardless of the currency denomination, the Tokyo market was highly synchronized with the London market before the crisis occurred. However, during the global financial crisis, the interbank offered rates showed substantial deviations even when denominated in the same currency. More interestingly, they show remarkably asymmetric responses that reflect regional risk premiums.

During the global financial crisis, although the credit quality of European and US banks deteriorated substantially, that of the Japanese banks did not. We find that risk premiums raised LIBOR more than TIBOR when denominated in the Japanese yen, but increased TIBOR more than LIBOR in dollar-denominated markets. The asymmetric impacts in dollar-denominated and yen-denominated markets had a "home bias" feature, which reflected different risk premiums during the liquidity crisis. One possible reason for this feature is that panel banks may have acted strategically when quoting rates to the LIBOR survey during the global financial crisis. For

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example, Mollenkamp and Whitehouse (2008) argue that the LIBOR was too low because banks in the panel were intentionally quoting rates below their true borrowing costs in order to improve the markets' perception of their riskiness (see also Snider and Youle, 2009; Abrantes-Metz et al., 2012). Although this manipulation must be noted, the following analysis focuses on the role of liquidity risk and provides an alternative interpretation. Our regression results show that market-specific credit risk increased the difference across markets, whereas liquidity risk caused a difference across currency denominations. The results also support the view that the liquidity shortage of the US dollar occurred in international money markets during the global financial crisis.

Several studies have explored the degree of integration of world money markets during normal periods and crisis periods. Exploring the London and New York interbank markets, Bartolini et al. (2008) show that the two markets were highly integrated during 2002–2004. McAndrews (2008), on the other hand, finds that LIBOR was significantly higher than the US rates in times of market distress from August 2007 onwards. Baba and Packer (2009a,b) investigate dislocations in the foreign exchange swap market between the US dollar and three major European currencies during the global financial crisis, and found that deviations from covered interest parity were negatively related to the creditworthiness of European and US financial institutions (see also Genberg et al., 2009; Grioli and Ranaldo, 2010). In contrast, Michaud and Upper (2008) show that the cross-sectional dispersion of premiums was largely independent of banks' credit risk and was mainly driven by factors related to funding liquidity during the global crisis.

With regard to the integration between the London and Tokyo interbank markets, numerous studies investigated the source of upward deviations of TIBOR from LIBOR in the late 1990s (see, among others, Covrig et al., 2004; Ito and Harada, 2004; Peek and Rosengren, 2001). Galpin et al. (2009) find a strong positive relationship between risk premiums in LIBOR, Singapore Interbank Offered Rate (SIBOR), and TIBOR, whereas Fukuda (2011) explored how the relationships among various Asian interbank rates have changed over the last two decades. Analyzing the effects of the global financial crisis, Taylor and Williams (2009) show how the risk premiums of US dollar-denominated LIBOR were correlated to those of yen-denominated TIBOR. However, very few studies have explored the degree of integration between the Tokyo and London money markets during the global financial crisis.

The following analysis confirms some of the findings of previous studies. However, unlike previous studies, our analysis investigates how the global financial crisis affected risk premiums in the Tokyo money market during 2007–2009. In the late 1990s, the Japanese banking crisis seriously damaged the Japanese financial sector. Regardless of the currency denomination, TIBOR showed substantial upward deviations from LIBOR at the time, reflecting increased regional risk premiums. However, we find that the global financial crisis had asymmetric impacts on the risk premiums of the Tokyo interbank rates between the US dollar-denominated and yen-denominated rates. This suggests the importance of distinguishing not only between credit risk and liquidity risk in different markets but also between liquidity risk denominated in different currencies. Previous studies such as Goldberg et al. (2011) and Aizenman and Pasricha (2009) show the contribution of foreign exchange swap lines among central banks for reducing dollar funding pressures and limiting stresses in money markets during the global financial crisis. We confirm their results in US dollar transactions. However, unlike these studies, we find their effectiveness was asymmetric across markets.

The rest of this paper is organized as follows. Section 2 contains a brief description of the interbank offered rates used in this paper. Section 3 investigates the degree to which TIBOR has been integrated with LIBOR throughout the 1990s and the 2000s. Section 4 explores a simple model of our analysis, and Section 5 explains how to measure counter-party credit risk and liquidity risk. Section 6 provides an explanation of the basic framework of our econometric tests, and Sections 7 and 8 report the results of our regressions. Section 9 extends our analysis by using the interbank rates that have shorter and longer terms-to-maturity. Section 10 concludes this paper and lists the implications.

2. Interbank offered rates

In the following analysis, we use the daily offer rates for TIBOR and LIBOR. This section briefly describes the data of these interbank offered rates.

2.1. LIBOR

LIBOR is a daily reference rate based on the interest rates at which banks borrow unsecured funds from other banks in the London interbank market. As the world's most widely used benchmark for short-term interest rates, LIBOR is the benchmark rate at which the world's most preferred borrowers are able to borrow money. The British Bankers' Association (BBA) publishes LIBOR, after 11:00 am each day (Greenwich Mean Time). BBA maintains a reference panel of between 8 and 20 contributor banks for each currency calculated. The aim is to produce a reference panel which reflects the balance of the market – by country and by type of institution. However, even for the Japanese yen, the majority of the reference panel banks are non-Japanese banks.[1] Excluding the top two and bottom two reference rates, LIBOR is a trimmed average of interbank deposit rates offered by designated contributor banks, for maturities ranging from overnight to 1 year. Each currency panel comprises contributor banks, and the reported interest is the mean of the middle values (the interquartile mean).

LIBOR is calculated for 10 currencies: the Australian dollar, Canadian dollar, Danish krone, Euro, Japanese yen, New Zealand dollar, Pound sterling, Swedish krona, Swiss franc, and US dollar. The following analysis uses LIBOR denominated in either the US dollar or the Japanese yen. Because the US dollar traded on the offshore market is referred to as the "Eurodollar" and the Japanese Yen traded on the offshore market is referred to as the "Euroyen," we refer to LIBOR denominated in the US dollar as "Eurodollar LIBOR" and to LIBOR denominated in the Japanese yen as "Euroyen LIBOR." We downloaded their daily data series from Datastream.

2.2. TIBOR

The Japanese offshore market is an unregulated market that was established in December 1986 to further liberalize and internationalize Japanese financial markets. TIBOR is a daily reference rate based on the interest rates at which banks offer to lend unsecured funds to other banks in the Japan offshore market. The daily TIBOR data are available in denominations of the Japanese yen and the US dollar. Although there is a partial overlap of reference banks between LIBOR and TIBOR, the reference banks in TIBOR are dominated by Japanese banks.

The Japanese Bankers Association (JBA) has been publishing daily TIBOR denominated in the Japanese yen ("Japanese yen TIBOR")

[1] In 2009, reference panel banks for the US dollar were Bank of America, Bank of Tokyo-Mitsubishi UFJ, Barclays Bank, Citibank NA, Credit Suisse, Deutsche Bank AG, HSBC, JP Morgan Chase, Lloyds Banking Group, Mizuho Corporate Bank, Norinchukin Bank, Rabobank, Royal Bank of Canada, Royal Bank of Scotland Group, Société Générale, UBS AG, and WestLB AG. This implies that only 3 out of 17 banks were Japanese banks. Reference banks for the Japanese yen are almost the same; however, they include Mizuho Bank and Sumitomo Mitsui instead of Credit Suisse and Royal Bank of Canada.