

# FRBSF ECONOMIC LETTER

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## Behavior of Libor in the Current Financial Crisis

One of the key features of the financial turmoil of the past year has been the credit crunch. For borrowing of many kinds, terms are tougher and interest rates are higher, reflecting skyrocketing risk premiums. Of particular importance are the elevated risk premiums on interbank loans—loans that banks make to each other. The higher rates at which banks fund themselves can raise the interest rates borne not just by bank borrowers, but also by nonbank borrowers whose loan rates are tied to some of these interbank funding costs. One consequence of these higher rates is that they partially offset the effects of the monetary easing that the Federal Reserve has implemented since the fall of 2007.

The London interbank offered rate, or Libor, is such a rate, and it is widely used. Estimates are that, worldwide, a total of around \$150 trillion of financial products—in both the business and consumer sectors—are indexed to the Libor. In addition, derivatives based on the Libor are traded on futures exchanges.

As important as it is, the Libor is an indicative rate rather than a true transaction rate. The Libor Fixing evolved in the early 1980s when the British Bankers' Association (BBA) developed it to measure interbank funding costs at a fixed point in time every day. Currently, the Libor Fixing is set every business day at 11 a.m. U.K. time in 10 currencies and for several maturities. A panel of banks, chosen by the BBA, reports the rate at which they *perceive* they could raise unsecured funds in a market of reasonable size just before the 11 a.m. fix time. The average is calculated after screening out high and low rates and is published as the BBA Libor Fixing at 12 noon U.K. time.

This *Letter* explores the behavior of the risk premium in Libor rates during the current crisis, considering both the credit risk portion and the liquidity risk portion. Specifically, it examines the short-term (three- to six-month) Libor, because the interbank funding market is most active in

shorter maturities. In addition, the focus is on the U.S. dollar (USD) Libor, which is expected to be different from the Libor denominated in other currencies due to differences in the general levels of interest rates across countries. However, the discussion here applies to other major currencies, including the pound sterling, the euro, and the yen.

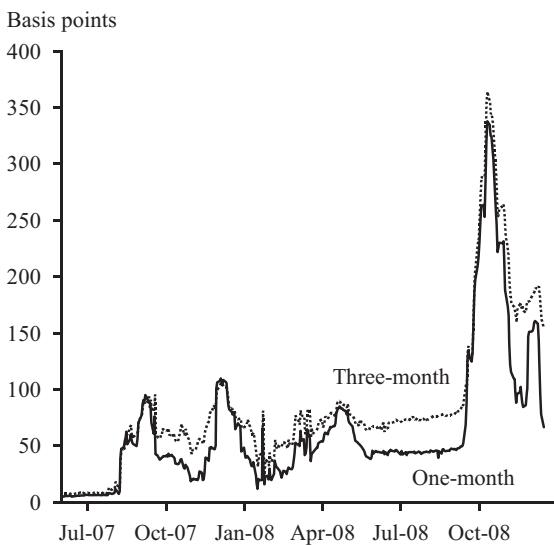
### Recent developments

To study the risk premium in Libor rates, I first compare the Libor to the expected overnight interest rate over the same term. For example, to make loans in the interbank market for 30 days, a bank could make a one-month loan at the prevailing one-month Libor rate. Alternatively, the bank could make an overnight loan at, say, the federal funds rate and keep rolling it over for the next 30 days; the expected cumulative interest rate for this alternative is given by the 30-day Overnight Index Swap (OIS) rate. (This is the rate underlying the derivative contract between two parties swapping overnight federal funds with one-month federal funds.)

The difference between the two lending strategies is that the bank using the one-month Libor is committed to lending the funds for one month and therefore has little control over them during the period. In the alternative strategy, the bank has full control in deciding whether to roll the overnight loan over each day. This rollover option safeguards the lender against unforeseen developments in the next 30 days, including an unexpected deterioration in the creditworthiness of the borrowing bank and other unexpected changes in the demand for liquidity both at the lending bank and in the market. Hence, the one-month Libor is always higher than the one-month OIS rate, and this spread reflects the risk premium for committing the funds for the full month.

Figure 1 shows both the one-month and the three-month Libor-OIS spread from mid-2007 to mid-December 2008. Before the financial crisis began, the one-month Libor-OIS spread was about 5 to

**Figure 1**  
Yield spreads of USD Libor over OIS rates



6 basis points, and the three-month spread was about 7 to 9 basis points. The three-month spread is above the one-month spread because the risk premium rises with the term-to-maturity. In the first half of 2007, both spreads were small.

In August 2007, both the one-month and the three-month Libor-OIS spreads skyrocketed to almost 100 basis points, coinciding with other problems in money markets, notably the unraveling of the market for asset-backed commercial paper (ABCP), of which a significant portion was backed by subprime mortgages. Some financial firms issued ABCP directly; others sponsored many of the structured investment vehicles (SIVs) that invested in ABCP. Financial firms also provided liquidity support to SIVs in many cases. The dislocation in the ABCP market and general concerns about exposure to subprime mortgages set off alarm bells in the interbank loan market. First, market participants became highly uncertain about the creditworthiness of financial institutions and the extent of their exposure to SIVs, ABCP, and, most importantly, subprime mortgages. Second, liquidity in the term-funding market (that is, other than overnight) dried up almost instantly.

Why did this happen? Liquidity is the lifeblood of banking, because banks do business by borrowing short-term funds to make longer-term loans. Normally, banks can count on the bulk of their deposits and other short-term funding to be rolled over continuously. But, as bankers well know, concerns about creditworthiness can lead depositors

and other short-term creditors (including other banks) to minimize their risk by withdrawing deposits and not rolling over their funding. Such actions can put stress on even a healthy institution and force it to sell assets at fire-sale prices. Thus, banks had strong incentives to manage liquidity very carefully. As a result, some banks may have chosen not to lend in the interbank market, even though they had excess liquidity, while others may have wanted to secure additional funds for precautionary reasons. The increased demand for liquidity plus the sudden drop in supply exerted strong upward pressure on interest rates, contributing to the widening of the Libor-OIS spreads.

The combination of heightened uncertainty about bank creditworthiness and evaporating liquidity in the interbank market was a huge drag on the banking sector and, in turn, on the economy. As liquidity is the lifeblood to banks, bank credit is the lifeblood to many small to medium-sized businesses as well as households. Thus, the tightening of bank credit availability in particular, and financial conditions in general, further strained the already fragile economy that was on the cusp of a severe downturn.

#### **Federal Reserve actions**

Part of the Federal Reserve's response to the crisis has been to reduce the federal funds rate target, the traditional policy tool, and it now stands at almost zero. In addition, the Fed has faced challenges in restoring liquidity to the interbank market. On the one hand, the widening of the risk premium in debt securities due to heightened counterparty risk may not warrant central bank intervention, because doing so will hinder the market's functioning. On the other hand, the portion of the risk premium due to liquidity risk represents a pure financial friction in the capital market that the monetary authority should try to minimize. To address the liquidity concerns in short-term funding markets directly, in December 2007 the Fed resorted to more nontraditional measures—it established a temporary Term Auction Facility (TAF) in the U.S. and foreign exchange swap lines with the European Central Bank (ECB) and the Swiss National Bank (SNB) to provide U.S. dollar funding to depository institutions. To address broader liquidity issues, the Fed also expanded its securities lending program by introducing a Term Securities Lending Facility and the Primary Dealer Credit Facility. As the grip of the financial crisis tightened in the spring and then became vise-like in late

summer, the Fed took several steps to enhance the effectiveness of these liquidity facilities, including boosting the size and lengthening the maturity of loans made by some facilities, expanding the set of acceptable collateral in others, and raising both the size and scope of the swap lines with foreign central banks.

### **Credit and liquidity risks?**

Although the Libor-OIS spreads narrowed somewhat following the introduction of the liquidity facilities in late 2007, they remained elevated throughout 2008 and spiked up to uncharted territories amid the sharp deterioration in the financial sector in October. To examine how much of the movement in the spread is driven by changes in credit risk, I examined the statistical relationship between Libor-OIS spreads and credit default swap (CDS) spreads of the banks in the Libor panel to examine the explanatory power of credit risk on the Libor spreads, using daily data from July 2007 to most recently available. The CDS spreads are the cost of buying credit insurance against the default of the bank on its debts, and they are used here to proxy for the underlying default risk of the banks in the Libor panel. The regression explained about 44% of the variation in Libor-OIS spreads, and the CDS spread had a highly statistically significant effect. Thus, the median CDS spreads clearly had explanatory power for the movements in the Libor-OIS spreads, confirming that changes in counterparty risk appear to be an important force in driving up the Libor spreads. Taylor and Williams (2008) reached a similar conclusion. However, the remaining 56% of the variation in the Libor-OIS spreads cannot be explained by the credit risk proxy, suggesting that other factors are in play. One likely factor, as discussed earlier, is the liquidity premium in the interbank term-funding market. To study the liquidity premium, researchers have examined whether the liquidity facilities introduced by the Fed in general, and the TAF in particular, have had any effect on the Libor spreads. The empirical evidence to date is mixed; for example, Taylor and Williams (2008) do not find robust evidence of a significant effect, while McAndrews, Sarkar, and Wang (2008)

conclude that a cumulative reduction of more than 50 basis points can be associated with the TAF announcements and its operations. Testing or identifying the pure TAF effects on spreads is challenging, because credit risk and liquidity risk are most likely intertwined. As discussed earlier, an illiquid but otherwise solvent bank could become insolvent due to the inherent maturity mismatch between assets and liabilities in its portfolio.

### **Conclusions**

The term Libor rates in excess of the expected future short rates have been unusually high during the current financial market turmoil, raising the costs of borrowing for many nonbank borrowers whose financing costs are indexed to them. The increase in the Libor-OIS spreads reflects a heightened credit risk premium and, most likely, an elevated liquidity risk premium demanded by lenders. While charging a credit risk premium is consistent with market functioning, the elevated liquidity premium represents market friction that provides a rationale for action by policymakers.

Since December 2007, a series of initiatives by the Federal Reserve were introduced to address the liquidity in the short-term funding markets. Whether these facilities have any effects on Libor rates and spreads remains unresolved. Perhaps one could rephrase the question: Without any of the new liquidity facilities, would we expect the Libor rates to be at about the same levels they have been since the onset of the financial crisis?

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