



# Volatility in the federal funds market and money market spreads during the financial crisis<sup>☆</sup>



Seth B. Carpenter<sup>a</sup>, Selva Demiralp<sup>b</sup>, Zeynep Senyuz<sup>c,\*</sup>

<sup>a</sup> U.S. Department of the Treasury, NW Washington, DC, United States

<sup>b</sup> Koc University, İstanbul, Turkey

<sup>c</sup> Federal Reserve Board, 20th and C Streets, NW Washington, DC 20551, United States

## ARTICLE INFO

### Article history:

Received 15 December 2014

Received in revised form 31 May 2015

Accepted 7 January 2016

Available online 27 January 2016

### JEL classification:

E43

E52

E58

### Keywords:

Federal funds rate volatility

Monetary policy

Money market spreads

## ABSTRACT

We analyze the role of federal funds rate volatility in affecting risk premium as measured by various money market spreads during the 2007–2009 financial crisis. We find that volatility in the federal funds market contributed to elevated Overnight Index Swap (OIS) spreads of unsecured bank funding rates during the crisis. Using OIS as a proxy for market expectations, we also decompose London Inter-Bank Offered Rate (Libor) into its permanent and transitory components in a dynamic factor framework and show that increased volatility in the federal funds market contributed to substantial transitory movements of Libor away from its long-run trend during the financial crisis.

Published by Elsevier B.V.

## 1. Introduction

Money markets facilitate short-term funding in the financial system through trading of highly liquid instruments, typically for less than a year. These markets have usually been very liquid and functioned smoothly, with rates moving in tandem, resulting in small and stable spreads over the long-run. However, at the onset of the crisis in the summer of 2007, conditions in global money markets changed considerably. Commonly-monitored funding stress indicators, such as the spreads between unsecured bank funding rates and relatively safe rates such as the overnight index swap (OIS) rate increased to unprecedented levels, and exhibited high volatility over the course of the financial crisis.

A strand of the literature aimed to explain the driving factors behind elevated money market spreads. Several studies argued

that the spread between London Inter-Bank Offered Rate (Libor) and OIS rate contains credit and/or liquidity risk premia<sup>1</sup>. Taylor and Williams (2009) find evidence that increased counterparty risk contributed to elevated spreads, while Wu (2008) and McAndrews et al. (2008) attribute a greater role for liquidity risk as suggested by the effectiveness of the Term Auction Facility (TAF) of the Federal Reserve in reducing financial strains in the inter-bank money market. Gefang et al. (2011) find that while each type of risk played a role in explaining the Libor–OIS spread during the crisis, spreads at shorter maturities are driven largely by liquidity risk. Although these studies shed light onto the risk factors that may have contributed to elevated money market spreads during the crisis, they did not consider the potential effects of the dynamics in the federal funds market on such spreads, which is the focus of this study.

We investigate the role of volatility in the federal funds market as an additional factor that may have led to elevated spreads during the crisis. We show that part of the increase in money market spreads can be attributed to higher volatility in the federal funds

<sup>☆</sup> The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System, the U.S. Department of the Treasury, or their respective staff members. This work was done primarily while Seth Carpenter was on staff at the Federal Reserve Board.

\* Corresponding author. Tel.: +1 2029737499.

E-mail addresses: [seth.carpenter@treasury.gov](mailto:seth.carpenter@treasury.gov) (S.B. Carpenter), [sdemiralp@ku.edu.tr](mailto:sdemiralp@ku.edu.tr) (S. Demiralp), [zeynep.senyuz@frb.gov](mailto:zeynep.senyuz@frb.gov) (Z. Senyuz).

<sup>1</sup> See for example, McAndrews et al. (2008), Wu (2008), Michaud and Upper (2008), Sengupta and Tam (2008), Taylor and Williams (2009), Christensen et al., 2009, Gefang et al. (2011), Angelini et al. (2011), and Eisenschmidt and Tapking (2009) in the context of Euribor–OIS spread.

market, which potentially reflects an additional risk premium component that is not captured by the commonly used measures of credit and liquidity risk.

The Federal Reserve always had an intended level for the federal funds rate (see [Bernanke and Blinder, 1992](#); [Rudebusch, 1995](#); [Meulendyke, 1998](#)), however, volatility in the funds market has not been constant. [Demiralp and Farley \(2005\)](#) documented the decline in federal funds rate volatility in 1990s, and attributed it to more frequent open market operations, improved reserve management by banks, and consolidations in the banking system. [Hilton \(2005\)](#) argued that further decline in the volatility after 2001 can be due to the improvements in the calculations of reserve demand by “The Desk” at the Federal Reserve Bank of New York, the decline in the level of the target, and the establishment of the primary credit facility. [Nautz and Schmidt \(2009\)](#) note that steps toward transparency since 1994 further stabilized the funds rate. As monetary policy in the U.S. became more transparent and predictable, anticipation of target rate changes led to movements in the funds rate, as shown by [Carpenter and Demiralp \(2006\)](#).

The recent financial crisis substantially hampered money market functioning and led to higher volatility due to dislocations in many market segments. Volatility in the overnight rate creates uncertainty in funding costs. If the term rate is expected to be above the future overnight rate, a bank can always borrow at the overnight rate to fund a term loan and earn the spread. However, uncertainty can lead potential arbitrageurs to demand a premium for funding a term loan through overnight funds. Moreover, increased uncertainty about counterparty risk during the recent crisis led banks to hoard reserves and stop lending to each other in the funds market, suggesting a correlation between liquidity risk and credit risk. If the excess reserves held by large banks are insufficient for late day liquidity shocks, funds rate is expected to spike. Alternatively, if the sizable amounts of reserves held by large banks are in excess of liquidity needs late in the day, large banks dump reserves in the market and drive the funds rate down (see for example [Ashcraft et al., 2011](#)).

We analyze the role of volatility of the federal funds rate in driving the OIS spreads of various money market rates during the 2007–2009 financial crisis. After controlling for the credit and liquidity risk measures commonly used in the literature, we find that part of the increase in these spreads during the crisis can be explained by increased volatility in the federal funds market.

One limitation of focusing solely on spreads such as the Libor-OIS spread while trying to identify temporary movements in the unsecured rate is the underlying assumption of a one-to-one relationship between the two rates that is likely to be hindered during a crisis. In addition to our models estimated for the rate spreads, we also decompose the representative Libor rate into its permanent and transitory components using a dynamic factor model. We find that higher volatility in the federal funds rate contributed to substantial movements in Libor away from its long-run component as measured by the OIS rate.

The relevance of our results is not limited to the crisis episode. The financial market reform is underway in the U.S., and the structure of money markets is being redefined, with possible implications on volatility in these markets. The Federal Reserve has new tools to implement monetary policy in this new environment of abundant reserve balances, which may affect the volatility of funding rates. For example, the federal funds rate has consistently been below the interest rate that the Federal Reserve pays on reserve balances (IOR), but the spread has not been stable<sup>2</sup>. If overnight

rates are volatile because of the operating framework, longer-term rates will be higher, suggesting tighter policy for a given level of the federal funds rate. In a recent study, [Gagnon and Sack \(2014\)](#) argue that potential volatility in the federal funds market during the transition to the new framework could have implications for the entire financial system, as the federal funds rate serves as a reference rate for a set of interest rate swaps.

The rest of the paper is laid out as follows. In Section 2, we present regression results that illustrate the role of volatility in explaining the OIS spreads of various bank funding rates. In Section 3, focusing on Libor as a representative funding rate, we estimate a dynamic factor model and analyze the role of federal funds rate volatility in driving the transitory component of Libor over the course of the crisis. We conclude in Section 4.

## 2. Empirical analysis

### 2.1. Data

Our sample spans from January 2007 through June 2009, which is the ending date of the U.S. recession as announced by the NBER. Starting our sample in January 2007 allows us to cover part of the period before the first signs of stress were observed in the financial markets in the summer of 2007. Our focus is on the crisis period for which the federal funds market was the most volatile and the risk premia had reached unprecedented levels. Conditions in money markets started to calm down in early 2009 and the recession was over in mid-2009. Therefore, the trough date of NBER provides a natural point to end our sample<sup>3</sup>.

We consider several money market rates for a 3-month term such as the federal funds rate (FFR), Libor, Eurodollar rate, the Treasury bill rate, and the rate on a 3 × 6 forward rate agreement (FRA)<sup>4,5</sup>. Using the OIS rate as a measure of expected average federal funds rate over the specified period, we calculate the spreads of the money market rates with respect to the OIS rate.

The difference between an unsecured term lending rate and the average expected overnight rate as measured by the OIS over the corresponding period likely reflects liquidity and/or credit risk in the unsecured transaction. For example, Libor is the commonly referenced benchmark short-term interest rate in the U.S. dollar market that is based on a survey from a panel of banks<sup>6</sup>. The OIS rate, which is regarded as the expected effective policy rate is a close approximation to a risk-free rate. This is due to the fact that the principal amount is not exchanged in the transaction, and the swap rate represents the expected average return of continuously rolling overnight loans over a specified period, which is naturally

policy. See the minutes of the June 2011 FOMC meeting: <http://www.federalreserve.gov/monetarypolicy/fomcminutes20110622.htm>. Also, the FOMC discussed alternate frameworks for the conduct of monetary policy, and the degree of rate control these frameworks would have. This discussion can be found in the transcripts of the April 2008 FOMC meeting:

<sup>3</sup> Money market rates have been near the zero lower bound since December 2008. The volatility of the federal funds rate has been minimal amid substantially reduced volume in the federal funds market during the zero lower bound period.

<sup>4</sup> FRA is the over-the-counter (OTC) equivalent of a Eurodollar futures contract, which is mostly entered as a hedge against interest rate changes. We consider the 3 × 6 FRA, for which the effective date is three months from today and the termination date is six months from today, with the 3-month Libor being the underlying rate.

<sup>5</sup> Data sources are included in Appendix.

<sup>6</sup> A series of fraudulent actions about the Libor rate made headlines when it was discovered that banks were falsely reporting their rates to increase their profit, or to show themselves as more creditworthy than they actually were. Any potential effect of this behavior on the Libor data is unlikely to affect our results as Libor appears to move in tandem with the other bank funding rates during the crisis (see [Fig. 1](#)). We also estimate our models using other unsecured funding rates and show that our results are robust to using alternative funding rates.

<sup>2</sup> In principles issued by the Federal Reserve for exiting from the current accommodative stance of policy and in other communications, the Federal Reserve has suggested that it will rely on IOR and temporary reserve draining tools to tighten

Download English Version:

<https://daneshyari.com/en/article/998812>

Download Persian Version:

<https://daneshyari.com/article/998812>

[Daneshyari.com](https://daneshyari.com)