



Excess reserves and monetary policy implementation[☆]



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ABSTRACT

In response to the Great Recession, the Federal Reserve resorted to several unconventional policies that drastically altered the landscape of the federal funds market. The current environment, in which depository institutions are flush with excess reserves, has forced policymakers to design a new operational framework for monetary policy implementation. We provide a parsimonious model that captures the key features of the current federal funds market, along with the instruments introduced by the Federal Reserve to implement its target for the federal funds rate. We use this model to analyze the factors that determine rates and volumes under the new implementation framework, and to study the effects of changes in the policy rates and other shocks to the economic environment. We also calibrate the model and use it as a quantitative benchmark for applied analysis, with a particular emphasis on understanding the role of the overnight reverse repurchase agreement facility in supporting the federal funds rate.

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1. Introduction

The federal funds market is the first cog in the transmission of monetary policy in the U.S. As such, it has been extensively studied in the academic literature, from the seminal contribution of [Poole \(1968\)](#) to the recent work of [Afonso and Lagos \(2015\)](#). However, in the wake of the extraordinary measures taken in response to the 2007–2008 financial crisis, the Federal Open Market Committee (FOMC) now faces a vastly different federal funds market—one for which past experience and existing theory provide little guidance.

Prior to the financial crisis, most trades in the federal funds market were between depository institutions trying to achieve their optimal level of reserves. In particular, some depository institutions would be borrowing to satisfy reserve requirements, while others would be lending to avoid holding idle excess reserves. In this environment, monetary policy implementation was fairly straightforward: The Open Markets Trading Desk at the Federal Reserve Bank of New York would engage in open market operations, adjusting the supply of reserves available in the federal funds market until the rates traded at the target prescribed by the FOMC.

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In response to the Great Recession, the Federal Reserve resorted to a number of unconventional policies that have drastically changed the landscape of the federal funds market. More specifically, in the wake of the large-scale asset purchase programs, most depository institutions found themselves awash with excess reserves. As a result, only a small fraction of trades in the federal funds market are now *between* depository institutions, since virtually none of them need to borrow in order to satisfy reserve requirements. Instead, the market is now dominated by other investors (such as government-sponsored enterprises, or GSEs, and money market funds) looking for some yield on overnight cash balances. This environment poses a challenge for monetary policy implementation, since the size of the open market operations required to raise the federal funds rate is neither feasible nor desirable in the medium term.²

Recognizing this situation, the Federal Reserve has developed a new framework for implementing the desired target for federal funds rates in the current environment of excess reserves. As detailed by the FOMC in the September 17, 2014, press release, “Policy Normalization Principles and Plans,” the new framework relies on two tools to implement the desired policy rate. First, the committee “intends to move the federal funds rate into the target range [...] by adjusting the interest rate it pays on excess reserve balances.” Second, the committee also “intends to use an overnight reverse repurchase agreement facility [...] to help control the federal funds rate,” though the plan is to use this latter tool “only to the extent necessary.”

Unfortunately, policymakers have limited experience with this new framework and thus a number of important questions remain. First and foremost, will this framework be able to successfully implement monetary policy, particularly as target rates increase? What are the factors that could endanger the Desk’s ability to carry out the FOMC’s directives? In addition, the design of the framework itself is bound to evolve going forward. For example, in the September 17, 2014 press release, the FOMC indicated that it plans to eventually “phase [the overnight reverse repurchase facility] out when it is no longer needed” in order to minimize the Fed’s footprint in short-term money markets. What are the effects of reducing the capacity of the overnight reverse repurchase facility, or of removing it altogether? Are there other ways to reduce activity at this facility, encouraging trading within the federal funds market instead?

In order to address the questions raised above, and many more, we develop a tractable theoretical model that captures the key features of the current federal funds market, along with the instruments that the FOMC currently relies upon for monetary policy implementation. We solve the model and use it to identify the factors that affect the federal funds rate, and whether or not this rate will remain within the target range in response to changes in policy or in the economic environment more generally. Then, exploiting the few available moments in the data, we calibrate the model and use it as a quantitative benchmark for applied analysis, with a particular emphasis on understanding the role of the overnight reverse repurchase facility in supporting federal funds rates, and the ramifications of limiting its size or eliminating it entirely.

To capture the basic institutional arrangements in the federal funds market, as it currently operates, we start with a central bank that manages two separate facilities. The first facility pays interest on overnight excess reserves (IOER) to qualified depository institutions (DIs), while the second facility provides a lower, but positive rate of return for overnight reverse repurchase (ON RRP) agreements. The ON RRP facility is available to financial institutions with excess cash (who we call *lenders*) that do not qualify as DIs, i.e., the GSEs and money market funds. Hence, there are gains from trade between lenders and DIs, as they attempt to exploit the arbitrage opportunity between the ON RRP rate and the IOER rate. Consistent with the Federal Reserve’s current operational framework, the ON RRP rate is equal to the bottom of the FOMC’s target range for the federal funds rate (FFR), while the IOER rate is set at the top of the target range.

In addition to the relevant agents and policy instruments, we attempt to capture the key features of the federal funds market. The first thing to note about the federal funds market is that it is an “over-the-counter” market, where individual participants search for willing counterparties and ultimately borrow and lend at a variety of different interest rates. Second, DIs in the federal funds market earn substantial margins in their trades and thus appear to have some degree of market power.³ Lastly, it’s important to note that not all DIs are active in the federal funds market because there are nontrivial balance sheet costs associated with accepting deposits; these costs include both the direct expenses that a DI faces from expanding its balance sheet, like FDIC fees, as well as the indirect expenses associated with requirements on capital and leverage ratios.⁴ Moreover, these balance sheet costs vary substantially across DIs, due to differences in regulation by, e.g., jurisdiction or size.

To capture these features of the federal funds market, we add two ingredients to our model. First, we assume that the market is not perfectly competitive, but rather characterized by search frictions. In particular, we posit a *directed search* model; as we argue later, this model accounts nicely for the features of the federal funds market outlined above, it is flexible enough to match several key moments from the data, and yet it remains tractable enough to accommodate various extensions. Second, we assume that each DI incurs a cost when it accepts a deposit from a lender, and that these costs are heterogeneous across DIs. As a result, a typical equilibrium will exhibit a nondegenerate distribution of interest rates being traded between lenders and DIs, with the measure of DIs participating in the market (and hence the overall degree of competition) endogenously determined.

We provide a full analytic characterization of the equilibrium and study its key properties. We show that, within the context of this model, the new framework is successful at implementing monetary policy: traded rates between lenders

² While we focus on the federal funds market, the situation of excess reserves is far from unique to the U.S. Central banks in several advanced economies have also relied on large-scale asset purchases and will face similar challenges when they choose to start on their own path to policy normalization.

³ See, e.g., [Bech and Klee \(2011\)](#), for evidence that DIs have market power, along with estimates of how much.

⁴ See, e.g., [Potter \(2013, 2014\)](#) and [Martin et al. \(2013b\)](#), who cite balance sheet costs as an important barrier to entry for DIs.

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