



# A search-based model of the interbank money market and monetary policy implementation <sup>☆</sup>

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## Abstract

We present a search-based model of the interbank money market and monetary policy implementation. Banks are subject to reserve requirements and the central bank tenders reserves. Interbank payments redistribute holdings and banks trade with each other in a decentralized (over-the-counter) market. The central bank provides standing facilities where banks can either deposit surpluses or borrow to cover shortfalls of reserves overnight. The model provides insights on liquidity, trading volume, and rate dispersion in the interbank market – features largely absent from the canonical models in the tradition of [Poole \(1968\)](#) – and fits a number of stylized facts for the Eurosystem observed during the recent period of unconventional monetary policies. Moreover, it provides insights on the implications of different market structures.

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## 1. Introduction

We present a model of the interbank money market and monetary policy implementation in a corridor system like that used by the European Central Bank (ECB). The model is in line with a number of stylized facts concerning interbank market functioning in the euro area during the recent period of unconventional monetary policies. The facts are that a surge in excess reserves: (i) drives the overnight rate to the rate at which the central bank remunerates reserves; (ii) decreases trading volume; and (iii) reduces overnight rate volatility; but (iv) does not impact the end-of-day lending by the central bank.

To replicate these stylized facts, we model the over-the-counter (OTC) structure of the interbank market. In particular, we study the search for counter-parties using the sorting approach of [Matsui and Shimizu \(2005\)](#). Our set-up works as follows. First the central bank tenders reserves. Then during the normal course of business, interbank payments shuffle these reserves across banks. So banks may wish to trade with each other to satisfy reserves requirements. Prior to trading, banks endogenously sort themselves into borrowers and lenders. In equilibrium, banks with a shortfall of reserves opt to become borrowers while those with a surplus choose to become lenders. Borrowers and lenders are then matched at random but the matching can be more or less efficient – reflecting differences in market structure. Once matched, borrowers and lenders bargain over both the amount to trade and the rate but due to settlement risk they may abstain from trading. Banks trade heterogeneous amounts and rates, depending on their reserve holdings. Hence, the model allows us to compute – among other things – volume-weighted money markets statistics including the “effective” (average) rate, which is the operational target preferred by many central banks.

In addition to studying pricing, trading, and volatility in the interbank market, our model can be used to analyze monetary policy implementation, as we explicitly model how the central bank supply reserves to the banking system. We assume that the central bank uses a full-allotment tender, so that any bid is met at a fixed pre-specified tender rate. The tender rate disseminates through the system as follows. When the tender rate is low, banks bid aggressively and the aggregate amount of reserves in the system is large. Therefore, after the payment shocks, most banks will still be long in reserves and, as those banks choose to become lenders, there will be many lenders and few borrowers as a consequence of sorting. The matching process thus implies that there will be few trades and so market volume will tend to be low.<sup>1</sup> Moreover, as most lenders will tend to hold a lot of excess reserves while most borrower banks’ deficit will tend to be small, the interbank rate will tend to be low and the lending rate will not display much dispersion. Finally, even though there is a large amount of aggregate excess reserves, some borrower banks will still be unmatched and will have to use the central bank end-of-day lending facility.

The model closest to ours is [Afonso and Lagos \(2015a\)](#).<sup>2</sup> They study intraday trading dynamics in the federal funds market using multiple trading rounds and random search. They find equilibria with endogenous intermediation or speculative trading. That is some banks buy re-

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<sup>1</sup> With purely random search, it is possible that two banks both holding positive (or negative) excess reserves meet. In cases where they choose to trade, aggregate trading volume can be independent of the amount of reserves, which contradicts the second stylized fact.

<sup>2</sup> [Afonso and Lagos \(2015b\)](#) and [Bech and Monnet \(2013\)](#) present small-scale versions of the dynamic equilibrium over-the-counter theory of trade in the federal funds market developed in [Afonso and Lagos \(2015a\)](#). [Afonso and Lagos \(2015b\)](#) restricts feasible reserve holdings to a set with three values whereas [Bech and Monnet \(2013\)](#) present a version with two trading rounds.

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