



# Asymmetric information and term lending in the Euro money market: Evidence from the beginning of the turmoil<sup>☆</sup>



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## ABSTRACT

We address the role of information heterogeneity in the Euro interbank market for unsecured term lending. We use high-frequency quotes of bid and ask prices to estimate probabilities of informed trading for contract maturities from one month to one year. The dataset spans from November 2000 to March 2008, and includes the relevant events that characterize the developments of the euro area money market. We find that the probability of finding a trading counterparty with a wider information set has risen since the eruption of the turmoil. Our results also show that the probability of trading with a better-informed bank is higher on days when open market operations take place, and at the end of the maintenance period. This effect has strengthened during the turmoil. This suggests that the loose supply of money of the ECB has not dampened the distortions arising from asymmetric information in the unsecured money market.

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## 1. Introduction

The interbank market for funds is an integral part of the short end of the term structure of interest rates. Since the functioning of the money market plays a role for the monetary transmission mechanism, the formation of prices in the interbank market of

the euro area has been subject of thorough investigation. A large number of contributions focuses on the overnight segment, where interest rates are typically driven by temporary and idiosyncratic shocks to the demand for funds.<sup>2</sup>

In this paper, we investigate the role of asymmetric information for the determination of term lending between banks. We consider a market-microstructure interpretation of the money market whereby heterogeneity among market participants in the access to cash is a source of information asymmetries. This approach is based on the assumption that a fraction of banks finds it harder to borrow from the market. The remaining part of the banking system, instead, faces a more viable access to the supply of money. Through enhanced trading opportunities, this latter set of banks can acquire accurate information on the expected aggregate demand for cash, thus enjoying an information advantage.

The literature on market microstructure presents several models where trading patterns generate signals about the true

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<sup>2</sup> A non-exhaustive list includes Angelini, Nobili, and Picillo (2011), Baglioni and Monticini (2008), Beaupain and Durré (2008), Durré and Pilegaard (2003) and Heider and Hoerova (2009).

unobserved value of financial assets. [Easley and O'Hara \(1992\)](#) build on the sequential trading model of [Glosten and Milgrom \(1987\)](#) to propose a measure of information heterogeneity in populations of traders, the so-called probability of informed trading (PIN). This framework suggests that the pattern of buy and sell orders unveils the sources of information heterogeneity in the market. Hence, the model of [Easley and O'Hara \(1992\)](#) emphasizes the role of institutional arrangements and market organization for the dissemination of knowledge and the determination of prices (see e.g., [Grammig, Schiereck, & Thiessen, 2001](#)).

The probability of informed trading has been used to study price formation in several markets. A recent application to the overnight segment of the Euro money market is provided by [Idier and Nardelli \(2011\)](#). The institutional framework of the money market requires banks to hold reserves over a given period of time, called the reserve maintenance period. Since the overnight market allows banks to gather cash for very short-run needs, it is fair to assume that trading in this segment is initiated mainly for the purpose of complying with idiosyncratic money-demand shocks and reserve requirements. Since the banks that fail to comply with the reserve requirements face sanctions by the ECB, it can be argued that banks face an 'inventory constraint' in the demand for cash.

An additional key observation is that the ability to borrow from counterparties varies across banks. This happens because banks may lack the appropriate credibility or reputation to borrow in the interbank market, or because they may not have the assets needed to post collateral in collateralized borrowing contracts. Larger banks with solid balance sheets and diversified activities can engage more easily in bilateral trades. This also allows them to acquire information about the expected imbalance of money, and provides the source for asymmetric information. These features make the money market a natural field of application for the model of [Easley and O'Hara \(1992\)](#).

Consistently with [Idier and Nardelli \(2011\)](#), we assume that the demand for funds in excess of the supply is driven by the inventory constraints characterizing banks' balance sheets. In other words, the demand for money is not determined by the attractiveness of the asset in terms of yields. Rather, it arises from funding obligations contracted by banks. While [Idier and Nardelli \(2011\)](#) stress the role of short-lived and overnight shocks to the demand for cash, we suggest that the relation between demand and supply of interbank deposits with maturity above one month is determined by systematic patterns. These patterns are related both to constraints of institutional nature, and to rational choices made by banks.

First of all, banks are required to comply with the official reserve requirements in every maintenance period. Hence, they can choose a schedule for their borrowing commitments in such a way that the regulatory requirements on average reserve holdings are met. More generally, banks decide about the time horizons for their commitments in the money market based on strategies of asset–liability management. These 'strategies' consist of plans for managing cash flows over the long run. For instance, banks issue loans to their customers. The cash outflow at the beginning of the loan maturities generates a subsequent inflow of cash when loans are paid back by the borrowers. These funding flows correspond to different investment commitments. The asset–liability plans can be guided by rationales of cost minimization – in case a bank is a net borrower from the market – and profit maximization – in case a bank is a net lender. Asset–liability management plans are based on two key aspects. On one hand, they involve taking views on the future path of interest rates. On the other, they require to formulate expectations on both the ECB quantitative conduct of liquidity policy – i.e., how loose or tight money supply will be with respect to the average supply –, and the demand for money by the banking system.

We use high-frequency quotes of bid and ask prices of term-lending contracts to estimate probabilities of informed trading. This dataset provides information on trading patterns in over-the-counter segments. In this part of the market, banks' reputation is a key consideration in the choice of a trading counterparty. The dataset spans from November 2000 to March 2008, and covers the main events that characterize the euro area money market. In particular, in November 2005, the ECB introduced a policy of supply of money that is larger than the estimated demand of the banking system.

The results show that information asymmetries have decreased across the money-market term structure after the reform of the operational framework of 2004. However, the probability of finding a trading counterparty with deeper information has risen since the eruption of the turmoil in August 2007. This implies that larger banks with better market reputation have been capable of assessing the evolution of the aggregate money demand and supply better than the rest of the banking system during the turmoil. On days when open market operations are carried out, and at the end of the maintenance period, banks obtain additional information. This pattern arises from the fact that the trading opportunities of informed banks increase. At the end of the maintenance period, the constraints of reserve requirements become binding. This leads to an increase in the market demand for funds. The open-market operations of the ECB, instead, affect the ability of the participating institutions to relax the bottleneck of the demand for funds from the rest of the banking system. These effects have strengthened during the recent financial turmoil.

Our analysis considers the role of the policy of loose money supply by the ECB. We argue that this practice has worsened the market distortions arising from heterogenous knowledge. In other words, the abundant provision of money has not removed the imbalances that give rise to a demand for term funding that exceeds the supply. This demand pressure can arise from the preference of lenders for contracts with shorter maturities. During times of uncertainty and large market volatility, this mechanism strengthens in segments where unsecured lending takes place. The reason is that counterparty risk becomes the key assessment factor for lending decisions. The recent experience of market turmoil has also been characterized by the propensity for banks to hoard cash. This takes place because banks try to secure their funding needs against the possibility of market breakdown (see e.g., [Heider, Hoerova, & Holthausen, 2009](#)). As a result, the supply of funds at longer maturities shrinks, and the short-term demand for cash is magnified. We also study the evidence of alternative explanations for the increase in the probability of informed trading during the turmoil. In particular, the buoyant money supply provided by the ECB since the beginning of the turmoil may hamper banks' incentives to trade in the market. This can lead to estimates for the probability of informed trading that do not reflect the underlying market dynamics.<sup>3</sup> Evidence from our dataset suggests that an increase in the bid-ask spread has taken place during the days of open-market operations throughout our sample for the turmoil. We also document that this market pressure can be reconciled with an increase in the number of buy-initiated trades and a fall in the number of sell-initiated trades. In other words, our evidence indicates that the dynamics of the probability of informed trading cannot be attributed to a fall in the market participation of banks.

This paper is organized as follows. Section 2 outlines the key characteristics of the money market that provide justification for

<sup>3</sup> We are very grateful to one anonymous referee for raising this point.

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