



# The effectiveness of monetary policy in steering money market rates during the financial crisis

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## ABSTRACT

The financial crisis has deeply affected money markets and thus, potentially, the proper functioning of the interest rate channel of monetary policy transmission. Therefore, we analyze the effectiveness of monetary policy in steering euro area money market rates by looking at (i) the predictability of money market rates on the basis of monetary policy expectations and (ii) the impact of extraordinary central bank measures on money market rates. We find that during the crisis money market rates up to 12 months still respond to revisions in the expected path of future rates, even though to a lesser extent than before August 2007. We attribute part of the loss in monetary policy effectiveness to money market rates being driven by higher liquidity premia and increased uncertainty about future interest rates. Our results also indicate that the ECB's non-standard monetary policy measures as of October 2008 were effective in addressing the disruptions in the euro area money market. In fact, our estimates suggest that non-standard monetary policy measures helped to lower Euribor rates by more than 80 basis points. These findings show that central banks have effective tools at hand to conduct monetary policy in times of crises.

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## 1. Introduction

Since August 2007, financial markets around the world are severely impaired. In particular, money markets have contracted substantially with unsecured money market rates rising to unprecedented levels. This has caused serious disruptions in banks' short-term funding leading to a tightening of credit standards for both businesses and households. This has not only challenged the ability of central banks to effectively steer term money market rates via the setting of policy rates but also seriously impaired the transmission of monetary policy. Hence, central banks around the world have responded by substantial policy rate cuts and engaged in a series of non-standard monetary policy measures to alleviate the funding conditions in the money market.

This paper studies the effectiveness of the European Central Bank's monetary policy in steering short term money market rates during the crisis. Towards this aim, it explores the predictability of money market rates via the traditional policy rate expectations channel as well as the impact of the ECB's crisis-related (non-standard) monetary policy measures on term money market rates. For the U.S. a series of recent contributions have studied the impairment of money markets during the crisis, investigated the determinants and sources of elevated money market rates and, particularly, analyzed the effectiveness of the Fed's non-standard measures.<sup>1</sup> Empirical evidence for the euro area is rather scarce (Cecioni et al., 2011). We provide

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<sup>1</sup> For instance, D'Amico and King (2010), Gagnon et al. (2011), and Swanson (2011) study the effectiveness of the Federal Reserve's (Fed) first and second quantitative easing programs, respectively. McAndrews et al. (2008), Christensen et al. (2009), Taylor and Williams (2009), and Wu (2011) assess the impact of the Fed's term auction facility on the U.S. money market.

new evidence on the drivers of the euro area money market rates, in particular, the 3-month, 6-month and 12-month Euribor rates. Specifically, we investigate the importance of three determinants: (i) changes of monetary policy expectations attributed to changes in the policy rate, (ii) liquidity risk and credit risk factors as well as interest rate uncertainty and (iii) the ECB's non-standard monetary policy measures during the crisis. In what follows, we will motivate the choice of each factor in turn.

First, according to the expectations hypothesis, the term structure of money market rates should contain an implicit path of the expected future short term interest rate, i.e. the policy rate set by the central bank (e.g. Campbell and Shiller, 1991; Rudebusch, 1995). This path reflects how interest rates will change if new information about the economic outlook and monetary policy necessitates a revision of the path. Hence, for effectively steering money market rates, interest rate expectations are required to be in line with the central bank policy intentions and the dispersion of market expectations should be kept at the lowest level possible. To study the effectiveness of standard monetary policy, we investigate how policy rate expectations have driven the dynamics of the Euribor rates before and during the financial crisis. We follow the framework of Kuttner (2001) and analyze changes in Euribor rates as a response to revisions to the expected path of future interest rates as proxied by changes in the correspondingly dated overnight-indexed swap (OIS) rates.

Second, the surge of money market rates since August 2007 has often been attributed to a corresponding rise in risk premia (e.g. McAndrews et al., 2008; Christensen et al., 2009; Taylor and Williams, 2009; Schwarz, 2010; Wu, 2011). We provide evidence on the importance of liquidity and credit risk for the dynamics of money market rates in the euro area. In this context, we also look at how money market rates are affected by the uncertainty around the expected path of future interest rates as measured by implied volatility derived from Euribor futures, a factor that has not yet been accounted for in existing approaches.

Third, the ECB, like other major central banks around the world, has engaged in a set of non-standard monetary policy measures. The significant liquidity provision to financial institutions has expanded the ECB's balance sheet and has substituted for interbank intermediation. We analyze the impact of non-standard measures on term money market rates using the outstanding volumes associated with the ECB's open market operations. This approach differs from the existing literature in that it does not use binary variables to study the effectiveness of crisis-related monetary policy measures in reducing interest rates (e.g. McAndrews et al., 2008; Taylor and Williams, 2009). The analysis of the ECB's crisis-related monetary policy measures has so far been confined to assessing their effects on macroeconomic and financial aggregates (e.g. Lenza et al., 2010; Fahr et al., 2011; Giannone et al., 2011; Giannone et al., 2012). The quantification of the impact of non-standard measures on macro variables is usually based on underlying assumptions on changes in money market spreads implicitly attributed to the effect of non-standard measures. In providing evidence on the actual effect of non-standard measures on money market rates, we add to the very scarce empirical literature on the financial market impact of non-standard measures for the euro area.

Overall, our results indicate a loss in the effectiveness of standard monetary policy during the crisis compared to the pre-crisis period. In fact, while before the crisis Euribor rates significantly respond to revisions of market expectations for all maturities under consideration, this relationship – though still statistically and economically significant – becomes weaker between August 2007 and October 2008 and further weakens in the post-October 2008 period. We find that changes in euro area money market rates were driven by elevated liquidity premia and become more persistent during the crisis. The loss in policy effectiveness during the crisis, was to some extent compensated for by the use of non-standard monetary policy. Indeed, our results provide strong evidence that the ECB's crisis-related monetary policy measures were highly effective in reducing Euribor rates and the uncertainty around the prevailing term money market rates. Our estimates suggest that the significant increase in the outstanding amounts associated with open market operations as of October 2008 caused Euribor rates to decline by more than 80 basis points.

The remainder of the paper is organized as follows. The next section briefly elaborates on the importance of interbank money markets for the monetary transmission process. Variables that might determine the dynamics of Euribor rates are presented in Section 3. We present our empirical model in Section 4 and our results in Section 5. Section 6 concludes.

## 2. Money market rates, monetary transmission, and the expectations hypothesis

The ECB sets its policy rate – and in normal times provides liquidity according to the implied liquidity needs of the financial sector – to steer short term money market rates. As central bank actions anchor economic agents' expectations about the future path of longer-term interest rates, the monetary policy stance is subsequently transmitted through the money market yield curve ultimately affecting other segments of broader financial markets (Woodford, 2003).<sup>2</sup> The euro interbank offered rate (Euribor) is the standard reference rate for the unsecured money market, which also serves as the benchmark for the pricing of fixed-income securities throughout the economy and determines short-term retail bank interest rates as well as mortgage rates (e.g. Sorensen and Werner, 2006). In this regard, the interbank money market plays a crucial role for credit market conditions and longer-term interest rates and, hence, for the effectiveness of monetary policy and its transmission to the overall economy.

In economic theory, the specific relationship between longer-term money market rates and the expected path of future interest rates relies upon the expectations hypothesis of the term structure. Its weak form postulates the equality between current longer-term rates and the average expected overnight rate plus a constant maturity specific risk premium (e.g. Lit-

<sup>2</sup> For a detailed discussion of the transmission channels see e.g. Mishkin (1995). Boivin et al. (2010) review the core channels of policy transmission and provide new insights on how the transmission mechanism might have evolved in recent decades.

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