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# The effectiveness of non-standard monetary policy in addressing liquidity risk during the financial crisis: The experiences of the Federal Reserve and the European Central Bank

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## ABSTRACT

A number of studies sought to measure the effects of non-standard policy on bank funding markets. This paper carries those estimates a step further by looking at the effects of bank funding market stress on the volume of bank lending. By separately modeling loan supply and demand, we determine how non-standard central bank measures affected bank lending by reducing stress in bank funding markets. Our results suggest that non-standard policy measures lowered bank funding volatility in the US and the Euro Area. Lower bank funding volatility in turn increased loan supply in both regions, contributing to sustained lending activity.

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## 1. Introduction

In response to the financial crisis that began in the summer of 2007, central banks around the world have increasingly resorted to non-standard policy measures. The non-standard policies have taken many forms, but all have tried to ease credit and liquidity constraints that ultimately might disrupt the flow of credit to the real economy. The Federal Reserve implemented a range of new lending facilities, often with a wider set of counterparties than before. The ECB changed the maturity profile of its already relatively large financing operations. It started to provide unlimited amounts of reserves in its auctions, and it began to purchase securities outright. Given the plethora of new tools to address the challenges of the financial crisis, it is natural to ask whether and how these tools worked.

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In this paper, we analyze the effectiveness of non-standard policy measures in affecting bank loans by reducing bank liquidity risk. Liquidity risk was a central concern among market participants and central banks during the crisis, reaching unprecedented levels, and much of the response of central banks can be seen as, at least in part, an effort to reduce this risk.

We proceed in two steps. We first measure the response of bank loans to liquidity risk, discussing in detail the relative merits of available measures of liquidity risk. We then measure the effectiveness of policy measures in reducing banks' liquidity risk, using the same metric. Combining these two steps allows us to measure the impact of central bank measures on bank loans by easing liquidity risk. We call this mechanism "bank liquidity risk channel". It can be perceived as an additional channel of monetary transmission mechanism that works through stimulating bank loans by reducing liquidity strains in the bank funding market during times of elevated stress levels. A decline in the liquidity risk should result in a greater willingness for a bank to lend funds, especially if loan officers exhibit risk aversion. No-arbitrage conditions in term interest rates imply that the efficient pricing of term lending should reflect the expected overnight rate plus a term premium, where the latter reflects the risk of borrowing overnight to fund the longer position. This relationship holds for short-, medium-, and long-term interest rates. The longer the term, however, typically the greater the uncertainty over the expected path of overnight rates. By providing ample liquidity to markets during the crisis period, thereby assuring that overnight rates would be consistently low and predictable, central banks made term lending for banks less expensive for any given average level of the overnight rate. Put differently, low and stable overnight rates are more conducive to lending than rates that are volatile but low on average.

We model the demand and supply of bank loans jointly and subject our findings to a variety of robustness checks. One gap in the literature that investigates the impact of non-standard measures on bank loans is that the demand for bank loans is usually not fully modeled. As a result, it is hard to distinguish whether the observed pattern of bank loans is driven by supply or demand factors. We fill this gap by modeling the supply and demand for bank loans in a simultaneous equations framework.

There are a growing number of studies concerned with the assessment of non-standard measures in both the US (see e.g. [McAndrews et al., 2008](#); [Taylor and Williams, 2009](#); [Wu, 2011](#)) and the euro area (see e.g. [Lenza et al., 2010](#); [Fahr et al., 2013](#); [Gambacorta and Marqués-Ibáñez, 2011](#)). Most of these studies, however, have either focused more narrowly on the effects of non-standard measures on interest rate spreads, or they adopted a reduced form approach by directly relating proxies for non-standard measures with economic outcomes such as bank lending volumes. Other authors have investigated how the non-standard measures affected the risk exposure of banks (e.g. [Black and Hazelwood, 2012](#); [Puddu and Waelchli, 2012](#)). Puddu and Waelchli find that the Term Auction Facility (TAF) program in the US reduced the liquidity risk of the borrower banks. Our approach provides a natural link between the findings of Puddu and Waelchli and the effects of the non-standard measures on bank loans. Our findings suggest that non-standard measures may have stimulated bank loans in part by reducing the liquidity risk.

In order to separate fiscal from monetary policy, we distinguish between direct capital injections provided by national governments and non-standard measures (e.g. specific lending facilities) provided by central banks. Capital injections are expected to have a direct impact on bank lending. Central bank non-standard measures, on the other hand, are expected to affect bank lending either directly through the additional funds provided through these measures and incorporated into bank liabilities, or indirectly through their impact on bank liquidity risk. We thereby contribute to the growing literature on the assessment of non-standard measures by outlining and testing the specific channels through which the measures are thought to have been effective.

The link between the policy measures and any measure of bank credit or liquidity risk is important because both types of risks matter for the transmission of monetary policy through their influence on loan volumes and prices. We provide ample evidence of this latter claim for both the euro area and the US. We find that most non-standard measures were successful in reducing bank liquidity risk and in doing so have significantly contributed to safeguard the transmission of monetary policy to the respective economies. We find that non-standard measures adopted by the Federal Reserve appear to have had a somewhat higher impact on loan growth than the measures taken in the euro area. One plausible reason for this finding is the difference in monetary policy implementation frameworks at the start of the crisis in August 2007. The Federal Reserve started the TAF in December 2007, extending loans against illiquid collateral to banking institutions. In the euro area, by contrast, operations with largely similar features were already a part of the standard policy framework. Another potential explanation for the difference is the pace of recapitalization of banks. While this process in the US was considered by and large complete at the end of 2009, the recapitalization of euro area banks was still underway.

The paper is organized as follows. The first section provides a generic overview on the non-standard policy measures adopted in the US and the euro area. The empirical analysis that establishes the link between market and bank liquidity risk and bank loans is contained in the first part of the following section. We then proceed to estimate the impact of the non-standard policy measures on different measures of bank liquidity risk. Finally, we obtain numerical estimates of the effects of the non-standard measures on bank loan volumes by reducing bank liquidity risk.

## 2. Non-standard policy measures in the US and the euro area

Central banks around the world have responded to the unfolding financial crisis with standard interest rate policy as well as with so-called non-standard measures. Since the beginning of the financial crisis, the Federal Reserve and the ECB have

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