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# Banks' responses to funding liquidity shocks: Lending adjustment, liquidity hoarding and fire sales<sup>☆</sup>



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### ABSTRACT

The crisis of 2007–2009 has shown that financial market turbulence can lead to huge funding liquidity problems for banks. This paper provides empirical evidence on banks' responses to market funding shocks, using data of seventeen of the largest Dutch banks over the period January 2004–April 2010. The dynamic interrelations among instruments of bank liquidity management are modelled in a panel Vector Autoregressive (p-VAR) framework. Orthogonalized impulse responses reveal that banks respond to a negative funding liquidity shock in a number of ways. First, banks reduce lending, especially wholesale lending. Second, banks hoard liquidity in the form of liquid bonds and central bank reserves. Third, banks conduct fire sales of securities, especially equity. Fourth, fire sales are triggered by liquidity constraints rather than by solvency constraints. Finally, there is some causality running from fire sales of equity to wholesale lending and liquidity hoarding.

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## 1. Introduction

The recent financial crisis has shown that if wholesale funding dries up, banks face huge funding liquidity problems. The freeze of wholesale funding markets was an essential characteristic of the crisis (IMF, 2010). In particular, the part of wholesale funding that is linked to asset markets, i.e. repo funding, issuance of securities and asset-backed finance, was hit hard. This activated the liquidity channel of financial transmission through which market funding liquidity shocks are propagated to bank lending and the real economy (BCBS, 2011). Financial market related funding sources are the focus of this paper.

This paper contributes to the growing literature on how banks adjust to a funding liquidity shock originating from financial market volatility, using unique monthly supervisory data on Dutch banks' liquidity positions during the financial crisis. Dutch banks are highly dependent on financial market funding, which makes them especially suitable for an empirical study of banks' responses to funding liquidity shocks originating from financial and interbank markets. The monthly frequency of our data is an advantage for the analysis at hand, as financial market shocks can have an immediate effect on bank liquidity.

The rich detail of our data also allows us to address three types of adjustment on the asset side of the bank balance sheet: (1) reduced lending, (2) liquidity hoarding, and (3) fire sales. Fig. 1 shows a stylised bank balance sheet illustrating these three types of responses. If a bank is confronted with a negative shock in financial market funding (depicted by a downward pointing arrow), it has the following options. First, it can cut down lending, either retail or wholesale. Second, it can sell securities from its investment portfolio, which is known as 'fire sales' if the bank is under pressure to do so. Third, it can hoard liquidity by accumulating deposits at the central bank, which is the safest store of liquidity. If the bank fears that its future access to liquidity is uncertain, it may even borrow extra from the central bank and hold these funds as a buffer in deposit at the central bank. Liquidity buffers could also be strengthened by holding more highly liquid bonds. These precautionary saving measures can be classified as 'liquidity hoarding'.

Aspects of the above mentioned three behavioural responses to funding liquidity shocks have been addressed in the recent literature on bank liquidity, both empirically and theoretically (see Section 2).

To the best of our knowledge the link between fire sales and funding constraints has not been researched for European banks. This is taken up in the present paper. Thereby, the effects of both liquidity and capital constraints on fire sales will be examined. Our contribution is that we address all three responses at the same time. For this, we employ a multi-equation framework instead of a single-equation framework, thus taking into account the dynamic interrelations among instruments of bank liquidity management. To investigate bank liquidity management strategies in more detail, our paper uses disaggregated balance sheet data. A multi-equation approach has been used before. Spindt and Tarfan (1980), for example, model US banks' liquid assets and liabilities as a system of equations. In their model, liabilities are qualified as (weakly) exogenous and assets as endogenous, based on the idea that banks can determine their investment and lending strategies, while the availability of funding is predominantly given. We adopt similar assumptions in this paper. However, there are several differences between their and our approach. Spindt and Tarfan estimate separate models for five large US money-centre banks and then average the coefficients. In contrast, we estimate a multi-equation model while pooling our sample of banks, so that the model describes the banks'

Claims on Central Bank	↑	Retail deposits	
Retail credit	↓	Market funding	↓
Wholesale credit	↓	Liabilities to Central Bank	↑
Securities holdings	↓	Capital	
- of which: Liquid securities holdings	↑		

Note: A downward (upward) pointing arrow denotes a decrease (increase).

Fig. 1. Stylised bank balance sheet: possible responses to a shock in market funding.

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