

The Network Structure of Money Multiplier

A Brief Summary

Link to the full paper: https://yeli-macrofinance.com/payment_network_multiplier.pdf

When extending loans, a bank conducts a debt swap: it acquires the borrowers' debts (loans) and issues its own debts (deposits) to the borrowers. This process of inside money creation through bank lending—banks issue deposits to fund new loans—is how money supply grows. It may appear that banks possess the ability to create money out of thin air. However, the ratio of loans funded by deposit issuance to a bank's liquidity buffer (the money multiplier in this paper) cannot be overstretched. When the newly issued deposits are withdrawn, often as a result of the loan borrowers making payments, the bank cannot liquidate the loans immediately and must rely on reserves or other liquid assets to cover the deposit outflows. Therefore, payment liquidity risk imposes a constraint on banks' money creation through lending.

However, a payment sending bank's liquidity loss is the payment-receiving bank's gain, and the payment inflows relax the liquidity constraint on the payment-receiving bank's money creation through lending (e.g., Bianchi and Bigio, 2022; Parlour, Rajan, and Walden, 2022). As a result, the payment-receiving bank may extend new loans funded by deposit issuance. Therefore, one bank's money creation through lending and the subsequent liquidity spillover to other banks are followed by another round of money creation by the payment-receiving banks, and so forth.

In this paper, we conduct a systematic analysis of the network structure of payment inflows and outflows and characterize these ripple effects of money creation as an equilibrium outcome. Here, the topology of payment-flow network determines the equilibrium money multiplier, i.e., the ratio of banks' loans funded by deposit issuance (the amount of liquidity transformation) to the value of liquid assets held by the bank (the liquidity base).

After structurally estimating the model and analyzing banks' positions in the network, we are able to identify the systemically important banks that drive the aggregate fluctuation of credit and money creation. These banks are not necessarily the largest ones, but their liquidity shocks strongly affect the aggregate capacity of the banking sector to conduct liquidity transformation for any given amount of liquidity buffer held by banks.

This paper contributes to several strands of literature on money and banking. Bank lending and liquidity percolation via payments are known to be the key ingredients of money multiplier, but little has been done in modern literature to formalize the mechanism. Our paper fills in the gap. Recent studies on money and near-money assets focus on quantities and prices, i.e., estimating the money demand curve and the money premium (e.g., Krishnamurthy and Vissing-Jørgensen, 2012; Lucas and Nicolini, 2015; Nagel, 2016). Our paper goes beyond quantities and prices to analyze the circulation of money and its network structure. Finally, we show that the payment system redistributes reserves among banks. The fact that such redistribution affects the aggregate liquidity transformation by the banking sector suggests reserves are not abundant.

References

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