The Reserve Supply Channel of Unconventional Monetary Policy

William Diamond, Zhengyang Jiang and Yiming Ma

Discussion

David Skeie
Warwick Business School
University of Warwick

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Overview

- Important topic
- Very elegant model
- Exhaustive estimation, using two established instruments for identification
- Intriguing results
- Important for policy

Paper

- Model
  - Banks take insured/retail deposits, provide corporate loans and mortgages, hold reserves and risk-free securities (i.e. Treasuries), and have other liabilities.
  - Banks have a quadratic balance sheet cost for each of their main types of liabilities and assets.
  - Solved for an equilibrium fixed point that determines rates and volumes given an exogenous supply of reserves.
- Structural estimation
  - Two instrumental variables to identify arguably exogenous demand shocks for:
    - loans and mortgages based on regional natural disasters
    - deposits based on local average deposit growth rates.

Estimation results

- Volumes
  - For a 10bps increase in deposit rates, or decrease in mortgage and loan rates
  - For a single bank:
    - Mortgages and loans increase by 58% and 49%
    - Deposits increase 5%, interpreted as depositors less attentive than borrowers to rates
  - For all banks in a county or state:
    - Mortgages and loans increase by 4% and 16%
    - Deposits increase 1%
  - Based on 2007 aggregate levels
    - Mortgages and loans increase \$14bn and \$237bn, 52% and 47% for average bank branch.
    - Deposits increase \$37bn. 3% for average bank branch

Estimation results

- Rates
  - Increasing marginal cost for each liability and asset,
  - and for loans/mortages in securities, which gives presumption of also in reserves.
  - Decreasing marginal cost for loans, mortgages and securities in deposits.
- Reserves
  - Suggests $100mn increase in reserves held by each bank branch:
  - increases mortgage and loan costs by 0.8bp and 1.1bp
  - decrease deposit costs by 1.6bps

Counterfactual results

- Based on 2007 pre-QE bank balance sheets
- For 2007
  - $3 trillion reserves would increase loan rates by 7bp and decrease loans by $130bn.
- For 2008-2017
  - QE reserves reduce corporate loans by $611 billion.
- For 2007
  - $3 trillion reserves/securities would require 15bp rate increase on reserves and securities, matching IOER-FF spread during QE.
  - Deposits, mortgages and loans would have rates increase by 8bp, 4bp and 7bp, and volumes change by +$25bn, -$6bn and -$130bn.
- For 2008-2017
  - Reserves have a ~3% crowding out effect on loans each year on average.
  - $2 trillion reserves volume each year on average.
  - QE reserves reduce corporate loans by $611 billion.

Comments

Counterfactual deposit rates and IOER/securities rates

- It first appears there's a counterfactual to the paper's counterfactual result on deposit rates.
- Model and estimation of QE reserves require:
  - Deposit rates to increase, in order for deposit volume to increase
    - Counterfactual results. For 2007. Deposit rates increase by 8bp, and volumes increase by $25bn.
  - IOER rate to increase, for banks to hold the reserves.
  - Securities rate to increase, since it is set equal to IOER, for banks to hold securities
- IOER/securities rate increase is set to equal the IOER-FF spread during QE, with an average of 15bp
- However, in actuality, deposit and securities rates decreased as reserves increased, and IOER was maintained at 25bp during most of the period.

Zero lower bound on deposit rates

- Paper estimates deposit rate sensitivity to retail/insured depositor demand shocks during 2001-2017
- For most of the 2009-2017 estimation period
  - These retail deposit rates are at the zero lower bound (ZLB)
  - Consider this as a kink in the depositor's generally upward-sloping demand schedule
    - Depositors demand is flat at 0% below the kink
    - Depositor demand would be estimated at a rate that is very high, relative to depositor demand elasticity at above the zero bound kink
- Check: Is the deposit rate elasticity estimate much lower for 2001-2007 relative to 2009-2017
- Also: Retail deposit rates increase quickly but decrease slowly
  - A widely documented stylized fact in the empirical literature.
  - What are the implications of this for the paper?
    - Does the paper account for this, or contradict it, and what are the ramifications in terms of the model, estimation and counterfactual?

Alternative crowding out loans because of ZLB

- Paper: Above ZLB, could lower IOER by roughly 15bp to undo loan rate increase and volume decrease
  - So a key problem of QE crowding out loans appears to be the ZLB.
- Alternative to requiring IOER/securities/deposit rates to increase
  - Martin, McAndrews and Skeie (2016), Martin, McAndrews, Palida and Skeie (2021)
- Deposit rates can decrease, even while deposit volume increases, and with the IOER rate constant, under QE
  - Because securities risk-free rate also decreases with QE
  - Securities (e.g. through MMFs) are the outside option for depositors to hold.
  - General equilibrium of securities held by banks, households and the Fed in aggregate needs to be considered

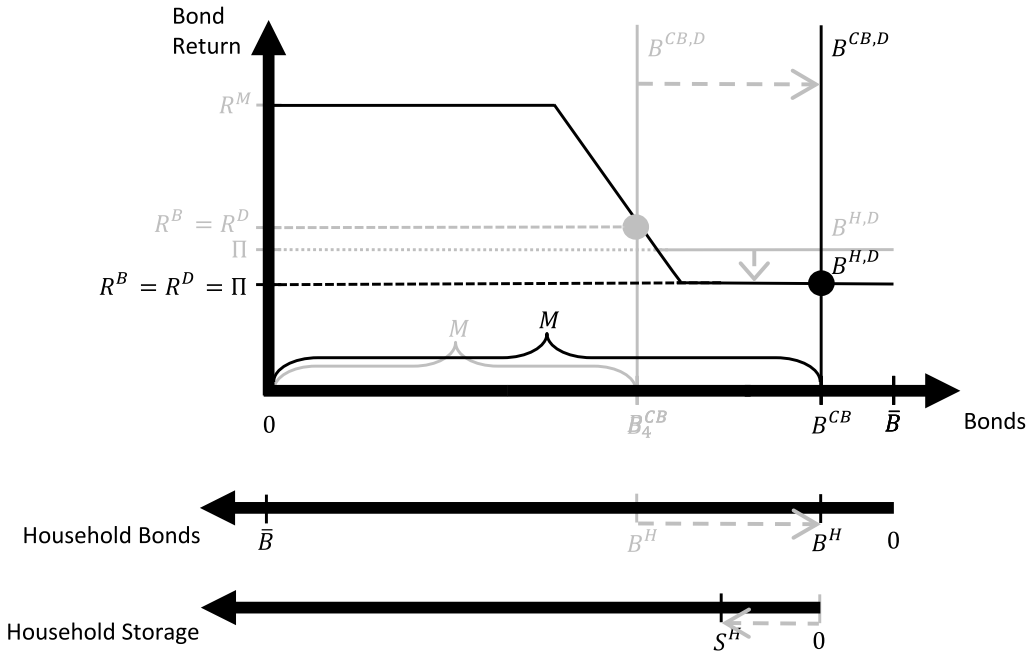
Alternative crowding out loans because of ZLB

- Crowding out of loans occurs with bank balance sheet costs and QE reserves, because deposit rates hit the ZLB
  - Deposits need to increase to fund reserves increase.
  - But deposits don't fully increase with reserves 1-to-1 at ZLB, and so loans are partially crowded out.
  - Also, efficiency costs are important: balance sheet costs are a deadweight cost.

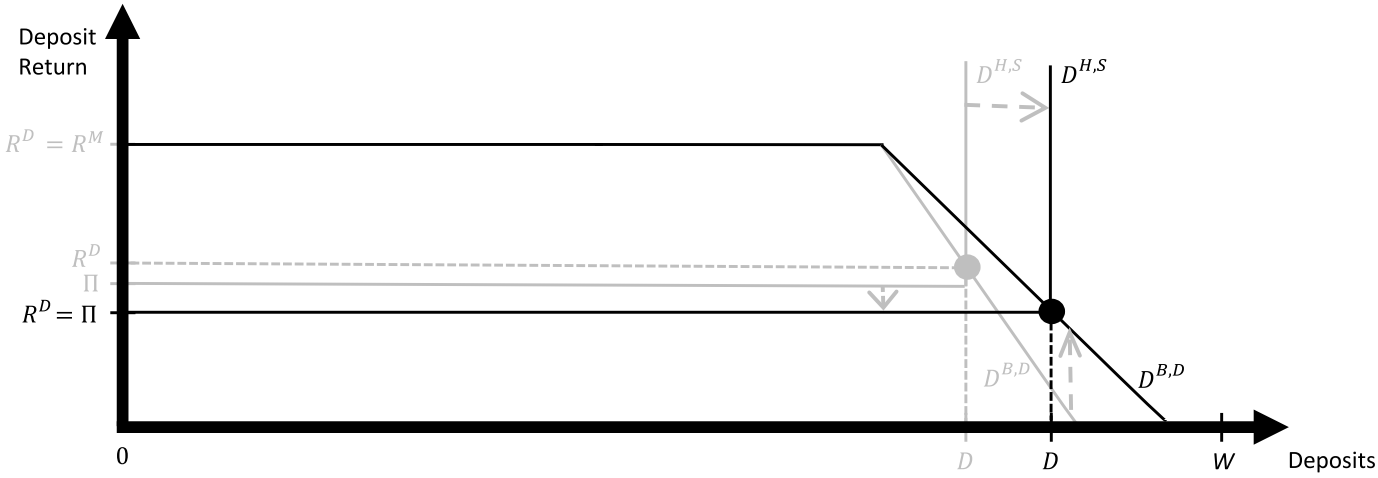
Large level of reserves and large balance-sheet costs

Martin, McAndrews and Skeie (2016) Figure 5 (simplified)

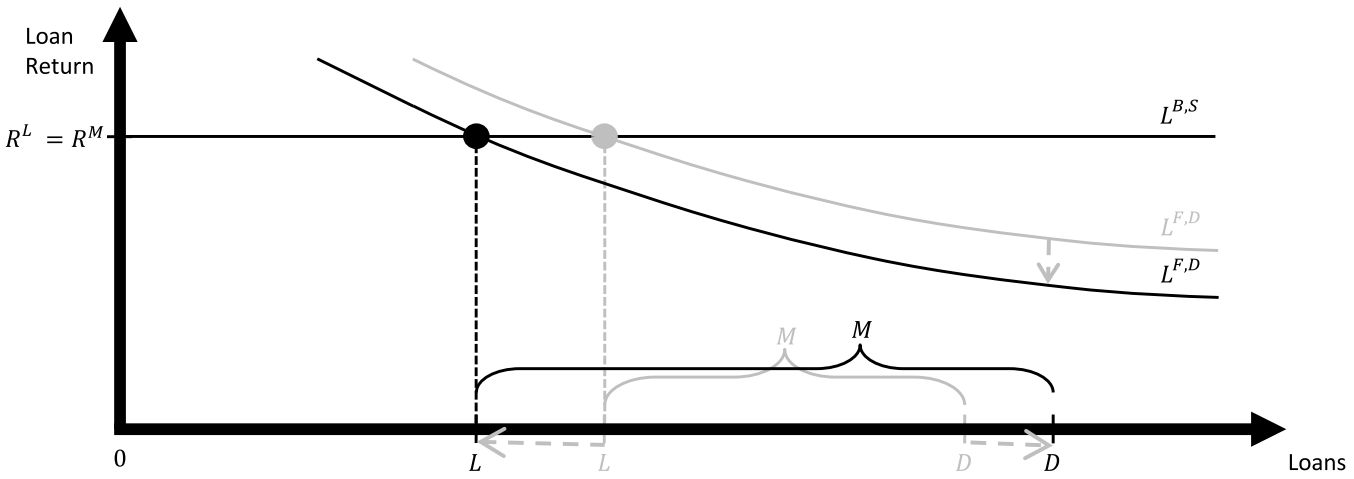
Bond Market



Deposit Market



Loan Market



Notes for Figure 5

A) Bond market. Once a household's downward-sloping bond demand $B^{H,D}$ falls to a low enough household-bond quantity B^H such that it receives an equilibrium bond return that falls to the level of inflation, $R^B = \Pi$, the household's bond demand becomes perfectly price elastic at the inflation level for any smaller quantities of household bonds. This price elasticity, as also illustrated in Figure 4, reflects that households prefer to hold storage S for a real return of one rather than bonds for a real return of less than one, which would occur for nominal returns of $R^B < \Pi$. When the central bank demand for bonds $B^{CB,D}$ increases enough to intersect with the elastic segment of household bond demand, households begin to hold positive amounts of storage. Storage is measured on the second x-axis below the bond-market graph from right to left. The zero value of the storage x-axis lines up with the quantity of bonds held by households, B_2^H, in order to indicate that the amount of storage held is equal to household wealth, shown by W on the deposit x-axis, that is not held in bonds or deposits.

B) Deposit market. Households' supply of deposits $D^{H,S}$ is perfectly elastic at $R^D = \Pi$ for deposit quantities below the amount of household wealth not held in bonds or storage in equilibrium, $W - B^H - S$, as also illustrated in Figures 2 - 4. This elasticity reflects, similarly to that of household bond demand, the preference to hold storage rather than deposits that pay a real return less than one. Hence, the increase in reserves push nominal deposit and bond returns down to the inflation level, $R_5^D = R_5^B = \Pi_5$, with their real returns hitting the real zero-rate lower bound. Since households replace the decrease in their bond holdings in part with storage, the increase in household deposits is less than the increase in reserves by the amount of storage: $\Delta D = \Delta M - \Delta S$.

C) Loan market. With reserves increasing by more than deposits, loans must decrease with the increase in reserves by an amount equal to the increase in storage: $\Delta L = \Delta D - \Delta M = -\Delta S$. A lower quantity of loans raises their marginal real return, which requires inflation to decrease to $\Pi_5 = \frac{R^M}{r(L_5)}$, as shown in panels A and B. Hence, for large enough balance-sheet costs, increases in reserves crowd out bank lending and decrease inflation. The decrease in inflation shifts firms' nominal loan demand leftward to $L_5^{F,D}$, such that the nominal return on marginal loans $\Pi_5 r(L_5)$ equates to the unchanged return on lending $R(L_2)$ and return on reserves R^M. At the zero lower bound, decreasing inflation allows deposits to expand partially with increasing reserves, so loans do not fall by the entire amount of the increase in reserves. Deposits partially increase with reserves because the perfectly elastic segments of household bond demand in panel A and deposit supply in panel B shift with the decrease in inflation down to $B_5^{H,D}$ and $D_5^{H,S}$, respectively. In addition, while the return on a bank's demand for any additional deposits would otherwise fall below the level of inflation from increasing marginal real balance-sheet costs, the decrease in inflation partially offsets this movement downward along $D_4^{B,D}$. This disinflation rotates the downward-sloping segment of the bank's deposit demand upward, pivoting around the kink in $D^{H,D}$, to D_5^D, which allows for slightly higher deposit returns, $R^D = R^M - \Pi c(D)$, and a further partial increase in deposits with reserves. (For simplicity, the corresponding upward pivot of $B^{H,D}$ with the fall in inflation in panel A is not shown).

Policy suggestions

- Supplementary leverage ratio (SLR) and reserves
- Overnight reverse repos held by non-banks to drain reserves without undoing QE