Discussion of "Testing the Portfolio Rebalancing Channel of Quantitative Easing"

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Disclaimer: Views are those of the author and should not be attributed to the BIS.

(How) Does QE Work?

- Multiple channels, but arguably most importantly:
  1. Portfolio rebalancing channel
     - CB buys bonds, lower yields, investors rebalance and shift into other assets.
  2. Signaling channel
     - Signal commitment to maintaining loose MP.
  3. Liquidity channel
     - QE increases the liquidity in the financial system.

- Isolating channels and studying the effects of QE is **HARD.**

- QE is implemented over long horizons. Ideally, we need the time dimension, but:
  - the timing of QE is endogenous to the state of the economy.
  - isolate what is anticipated, what is not.

- Literature mostly focuses on high-frequency event studies.
  - Market expectations, mixes all channels, cannot look at long-term effects

This paper: QE shocks at security, fund and issuer level over time

1. At individual CUSIP-level: $QEShock_{CUSIP,t} = \sum_{o \in t} \frac{Actual_{CUSIP,o} - Predicted_{CUSIP,o}}{Treasury\ Coupons\ Out._t}$
   - Use operational details of QE to construct a security-level shock
   - Show that the shock indeed has impact on Treasury yields

2. At fund-level: $QEShock_{f,t} = \sum_{CUSIP} w_{CUSIP,f,t-1} \times QEShock_{CUSIP,t}$
   - Provide direct evidence on the portfolio rebalancing channel

3. At the issuer-level: $QEShock_{i,t} = \sum_{f \in MF} \frac{Holdings_{f,i,t-1}}{AmountOutstanding_{i,t-1}} \times QEShock_{f,t}$
   - To study issuer-level outcomes, e.g. bond issuance, investment...

A significant contribution: impressive ambition & diligent execution

- **What the paper does:**
  - **Local average treatment effects:** how unexpected Fed purchases affect securities, and funds/issuers that are more exposed, *holding policy fixed*
    - **Micro estimates:** *Security-level surprises* around each QE operation
    - **Treatment intensity:** *Cross-sectional* heterogeneity in exposures to surprises
  - **Bridge micro to macro in a structural model:**
    - Fund-level own- and cross-asset elasticities and the persistence of price impacts at micro level
    - Embed these in a general equilibrium across all investors
- **What the paper does not do:**
  - The paper does not *directly estimate* macro effects of QE
  - Identification comes from cross-sectional differences in exposure at the operation date
  - No time variation in QE size

This discussion: Three comments on three QE shocks

1. **CUSIP-level shock validation:** isolation of Fed demand shocks from liquidity
2. **Fund level shocks:** make sure to rule out possibly mechanical effects
3. **Issuer level shocks:** mutual funds are relatively small holders of corporate bonds. MF portfolio rebalancing $\rightarrow$ firm/real outcomes: big leap

Validating CUSIP QE shocks: Fed demand vs liquidity

$$\Delta y_{CUSIP,\, t-1 \to t+\tau} = \sum_{\ell=-6}^{6} \beta_\ell \; QEShock_{CUSIP,t} \, \mathbf{1}\{\tau = \ell\} \; + \; \sum_{\ell=-6}^{6} \gamma_\ell \, \mathbf{1}\{\tau = \ell\} \; + \; \lambda_{CUSIP} \; + \; \lambda_t \; + \; \varepsilon_{CUSIP,t,\tau} \, . \tag{1}$$

- This regression pools all CUSIPs: not all CUSIPs have the same liquidity.
- Possibly conflate Fed demand vs liquidity effects
  - Relative value calculation does not account for liquidity
  - Similar USTs, one is less liquid: lower price due to liquidity premium
  - *Claim:* Illiquid securities disproportionately populate the *predicted* "cheapest 60% by RV"
  - But the Fed, in reality, seems to take this into account (Song and Zhu, 2018). So $Actual_{CUSIP,o} << Predicted_{CUSIP,o}$
  - *Claim:* Liquidity is an omitted variable: Illiquid securities get disproportionately more QE Shocks & their prices move more
  - No pre-trends = market does not front run the Fed, but $\neq$ no liquidity-driven pred. errors

But this would seem to create a bias against validating the shocks...

Suppose the true relationship is:

$$\Delta y = \beta_{\text{true}} QEShock + \gamma_L Liquidity + \epsilon \tag{2}$$

But we estimate

$$\Delta y = \beta_{\text{OLS}} QEShock + \mu \tag{3}$$

By the omitted-variable-bias formula,

$$\beta_{\text{OLS}} = \beta_{\text{true}} + \frac{Cov(QEShock, Liquidity)}{Var(QEShock)} \gamma_L.$$

$$Cov(QEShock, Liquidity) > 0 \quad \text{and} \quad \gamma_L > 0 \quad \Rightarrow \beta_{OLS} > \beta_{true}$$

Bottom line: Omitting liquidity would create a bias against finding that shocks are relevant.

Some further suggestions for $QEShock_{CUSIP,t}$

1. Regress $QEShock_{CUSIP,t}$ on liquidity metrics and QE operation variables
   Report R^2. Use the residuals as $QEshock_{CUSIP,t}$. This should improve the results

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   Are results similar across different maturities?
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4. Need to cluster std errors by operation (by the relevant time dimension)
   Every auction affects multiple CUSIPs
   Any omitted factors (e.g. a liquidity squeeze, macro announcements, dealer-wide inventory shifts) will induce correlated residuals across all those CUSIPs and overstate the significance of the estimated coefficient

Fund QE shocks: do funds w/ higher share of USTs rebalance more?

- Construct fund-level QE shocks as:

$$QEShock_{f,t} = \sum_{CUSIP} w_{CUSIP,f,t-1} \times QEShock_{CUSIP,t} \tag{4}$$

- Then regress $\Delta Holdings_{f,t}$ on $QEShock_{f,t}$

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Possible omitted variable bias:

- Funds with a larger share of USTs ($\sum_{CUSIP} w_{CUSIP,f,t-1}$) rebalance more.
- $Cov(\sum_{CUSIP} w_{CUSIP,f,t-1}, QEShock_{f,t}) \neq 0$ and
  $Cov(\sum_{CUSIP} w_{CUSIP,f,t-1}, \Delta Holdings_{f,t}) \neq 0$
- Think of the extreme case of uniformly distributed CUSIP-level shocks
- Simple, but important robustness check: Control for $\sum_{CUSIP} w_{CUSIP,f,t-1}$

Issuer-level shocks: From mutual funds to firms is a big leap

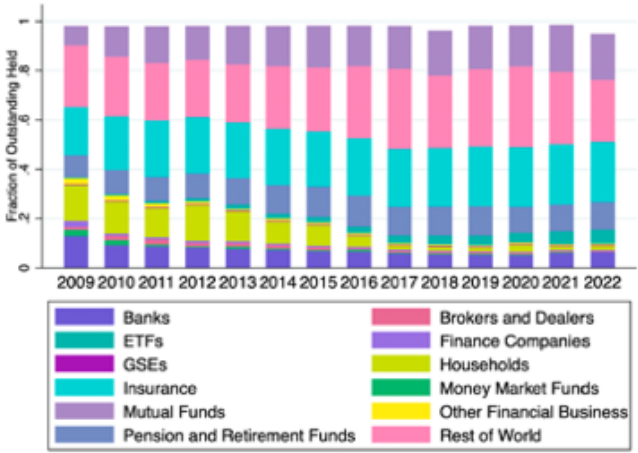

Figure B.2: Fraction of corporate bonds outstanding held, broken down by investor type, between 2009-2022

Measurement error: the issuer-level QEShock

$$\text{QEShock}_{i,t}^{MF} = \sum_{f \in Mutual\ Fund} \left(\frac{H_{f,i,t-1}}{A_{i,t-1}} \right) \times \text{QEShock}_{f,t}$$

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Case 1: Mutual funds are the only rebalancers, others only add noise (attenuation bias).

$$\text{QEShock}_{i,t}^{true} = \text{QEShock}_{i,t}^{MF} + \eta, \eta \sim \mathcal{N}(0, \sigma^2)$$

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Case 2: Mutual funds are representative rebalancers (amplification bias).

$$\text{QEShock}_{i,t}^{true} = s \times \text{QEShock}_{i,t}^{MF}, \quad s > 1 \quad \text{then} \quad |\beta_{OLS}^{MF}| > |\beta^{true}|$$

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Case 3: Other rebalancers matter, their shocks are correlated with MFs and elasticities differ (unknown bias).

$$\text{QEShock}_{i,t}^{true} = \text{QEShock}_{i,t}^{MF} + \text{QEShock}_{i,t}^{PF}$$

Omitted variable bias with an unknown sign: These shocks are likely correlated. Short-run and long-run elasticities of mutual funds and other investors are likely different.

Some suggestions

- Add life insurance holdings to try to gauge the true $QEShock_{i,t}$ better
- Restrict attention to bonds held mostly by MFs

Conclusion: Inspiring paper. It will be very influential.

Academic:

- There are many questions unanswered because identifying the effects of QE is hard.
- A major contribution of this paper:
  - Direct test of an important channel of QE
  - Removes roadblocks and paves the way for future researchers
  - We do not have to limit ourselves to high-frequency studies.
  - There are other ways of cleverly identifying QE effects.

Policy:

- We need to understand QE better if we are to include it as a permanent tool in the monetary policy toolkit.
- This paper is a massive step towards that.