The history of liquidity requirements as monetary policy tools

Lessons for today

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Motivation

- How is the LCR going to affect money market rates and lending conditions?
- How do liquidity regulations and monetary policy implementation interact?
- B.Coeure (2013):

  > *"In my view, the interaction is expected to be complex and liquidity regulation may require adjustments to central banks' operational frameworks."*

- Theoretical discussions in Bech and Keister (2013, 2017), Greenwood, Hanson and Stein (2016).

A historical perspective

- More and more papers about "macroprudential policies" in history (Elliott et al. 2013, Kelber and Monnet 2014, Monnet 2014, Calomiris and Carlson 2015, Aikman et al. 2016).
- But only empirical. No investigation of detailed mechanisms.
- Liquidity regulation, similar to LCR, was used in the past by central banks (1930-1970s)... as a monetary policy tool ! (Goode, Thorne 1959, de Kock, 1974, Hodgman 1974, Monnet 2014, 2018)
- We document history of these tools and build a new model to explain their effects.

Our contribution: mechanisms

- A model of "securities-RR" (ratio of liquid over total assets) and "cash-RR" (deposits with the CB).
- Both impact money market rates through different channels.
- Based on historical uses of "securities-RR", we introduce a new mechanism in the literature ($\neq$ Bech and Keister 2017)
- "securities-RR" prevent banks from borrowing more at CB. **A collateral constraint.** Akin to quantity rationing.

Our contribution: policy implications

- LCR $=$ securities RR, when excess reserves $= 0$
- Our theoretical effect is stronger when excess reserves with the CB are scarce
- In the postwar context of large public debt held by banks, and CB supporting low rates on public debt $\Longrightarrow$ "reconcile monetary policy and public debt management" (Miller 1950, etc.)
- Paradox of liquidity regulation: increase the role of CBs

History of cash and securities reserve requirements

- ”cash-RR” born in the US (Carlson 2015). First as a prudential tool. Then for Fed’s monetary policy, starting mid-1930s (Carlson, Wheelock 2016).
- Similar story for "securities-RR" in Switzerland and Sweden in the interwar
- From WWII to 1970s, most countries used either one or both. Formal or informal. Proposals to introduce them in the US, but failed.
- > *“since WWII, [cash] reserve requirements have been a preferred tool of monetary control in most industrially advanced countries [...] In several leading industrial countries where [cash] reserve requirements were introduced relatively recently, they have been integrated with the existing fairly complex systems of monetary control, notably liquidity ratios.”(Garvy, 1973, p.256)*

History of cash and securities reserve requirements

- Two types of liquidity requirements. Similar effects:
- *"If the reserves take the form of government bonds or other securities than must be obtained from the central bank, their credit-limiting function is identical with that of cash reserves." (Goode and Thorn, 1959, p.10-13)*
- but not perfect substitutes. Different mechanisms.

- Securities-RR excluded deposits with the CB ($\neq theLCR$)$.Independentfromtheuseofcash RR$.

History of cash and securities reserve requirements

- Main rationale for using securities-RR (as a complement to cash-RR):
- *Banks can always sell securities to increase reserves and thus nullify [cash] reserve requirements. With its existing legal powers over reserve requirements the Federal Reserve is powerless to halt the process as long as it must stand ready to purchase government securities at prices which will keep yields and interest rates at their present low levels. (Burkhead 1947)*
- $\Longrightarrow$ prevent banks from selling (or discount) government securities to the CB.
- $\Longrightarrow$ interact with public debt management. Reconcile 2 objectives: monetary restraint and low rates on gov.debt

History of cash and securities reserve requirements

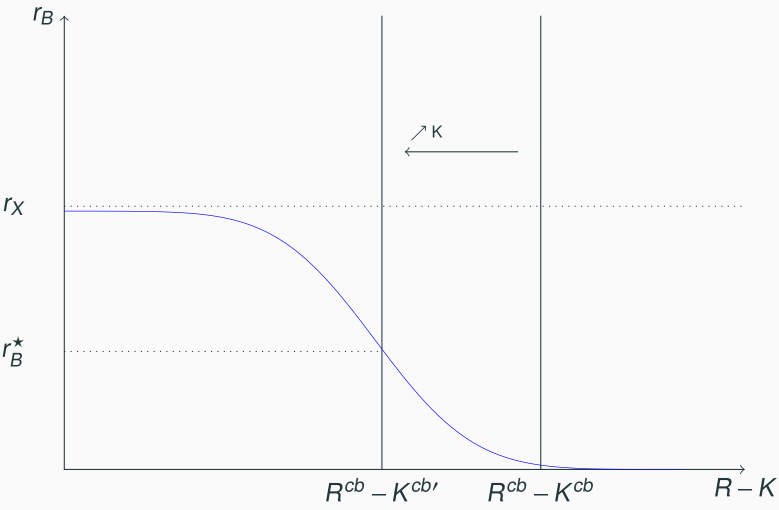
Other justifications and uses:

- a tax on banks (Fousek 1957)
- "selective" credit policy (Monnet 2014)
- capital controls (Katz 1969)

A model of cash and securities reserve requirements

- Set up similar to Poole (1968), Ennis and Keister (2008), Bech and Keister (2013, 2017), Vari (2015)
- Basic model of cash-reserve requirements: $r_B^\star = r_X(1-G(R-K))$
- $r_B^\star$ is the equilibrium interbank overnight rate (i.e the money market rate)
- r_X is the interest of the discount window of the central bank (standing facility)
- K is the aggregate amount of required reserves
- $R-K$ is the level of excess reserves
- banks experience a payment shock P after the closure of the interbank market. $[P_-, P^-]$. With cumulative distribution function G(.)
- between $R-K-P_-$ and $R-K+P^-$ the demand for reserves will vary inversely with the market interest rate

Figure 1: Changing money market rates through increase of reserve requirements



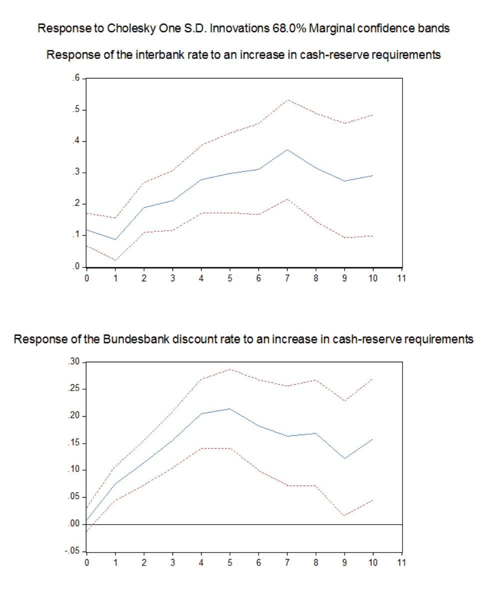
Borrowing at the central bank's discount window

- We introduce C, the collateral required to borrow at the discount window, and r_H, a penalty rate for banks borrowing with insufficient C
- Maximizing the profit of banks, we find:
- $r_B^\star = (1 - G(R - K + C))r_H + (G(R - K + C) - G(R - K))r_X$
- k is the "cash-RR", defined as $K = kD$
- τ is the "securities-RR", defined as $C = D(\lambda_S - \tau)$
- where λ_S is the share of bank deposits invested in securities

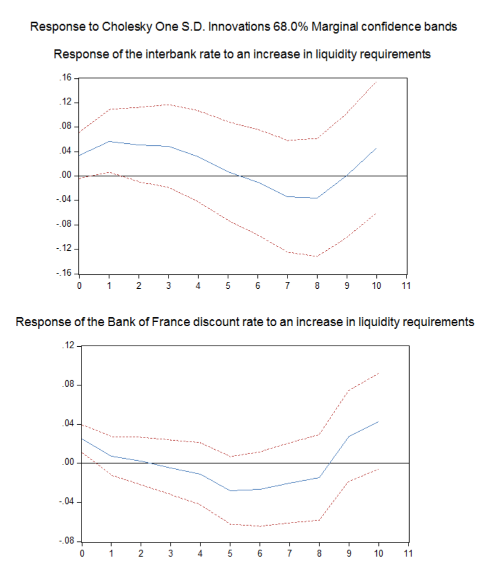
A model of cash and securities reserve requirements

- Both k and τ increase the money market-rate
- $r_B^\star = r_H \frac{p - R/D + k}{2p} + (r_H - r_X)\frac{(\tau - \lambda_S)}{2p}$
- τ affects the MM rate because it reduces the collateral of banks and force them to borrow at the penalty rate. No effect if $r_H = r_X$.
- Similar effect as bank-by-bank rediscount ceilings (quantity rationing).
- as in Poole model, $r_B = 0$ when excess reserves are large, so no effect of securities RR in this case. (flat demand curve, no opportunity cost of holding reserves)

Empirical investigation: cash-RR in Germany, 1957-1975



Empirical investigation: securities-RR in France, 1960-1967



Conclusion

- Previous articles on LCR (Bech and Keister 2013, Greenwood et al. 2016): interaction with monetary policy because higher demand of banks for safe assets (provided by CB)
- Our model (consistent with historical practices): LCR prevents banks from selling government securities in times of credit restrictions = a collateral constraint on borrowing at the CB's discount window
- Securities-RR increases money market rates
- Our model does not need to assume that government securities (safe assets) are scarce. On the contrary, consistent with large holding of public debt by banks.

Conclusion

- Direct implications:
  1. a binding liquidity ratio implies higher money market rates
  2. liquidity ratios strengthen the effects of other instruments
- If central banks want to offset such effects, they can:
  - adjust LCR, consistent with the monetary policy stance (as they used to do)
  - offset effects through their balance sheet (Greenwood, Hanson and Stein 2016)
- Interactions with public debt management.This is why securities-RR were finally abandoned by CB
- Historical evidence shows blurred lines between monetary and macroprudential policies (Monnet 2014, Kelber and Monnet 2014, Goodfriend 2015, Aikman et al. 2016).

Appendix

- Cash reserve requirements, impose that the end-of-day balance of bank “i” is greater than some number K^i.
- $$R^i + B^i - \epsilon^i + X^i + H^i \geq K^i \tag{1}$$
- Where R^i is the amount of central bank liquidity that bank “i” holds at the central bank before the interbank market starts. B^i is the amount of interbank borrowings of bank i. ϵ^i is the random deposit shock to which bank “i” is subject to after the interbank market has closed. X^i is the amount borrowed by bank “i” at the discount window. H^i is the amount of borrowings at the “hell rate” (i.e. a penalty rate).

Appendix

- Let C^i be the amount of collateral of bank i that is pledged to borrow at the normal discount rate.
- Using equation (1):

$$X = max\{0; min\{C^i; K^i - (R^i + B^i - \epsilon^i)\}\} \tag{2}$$

- $$H = max\{0; K^i - (R^i + B^i - \epsilon^i) - C^i\} \tag{3}$$

- The profit of the bank then writes:

$$\Pi^i = Lr_L + r_s S^i - r_D(D^i - \epsilon^i) - r_B B^i - r_H H^i - r_X X^i \tag{4}$$

- Where r_L, r_s, r_D, r_B, r_X, r_H are respectively the rate on loans,

- Profits will vary as a function of the late payment shock, which is a random variable with mean 0. Thus, combining (2), (3) and (5) and taking expectations yields:
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$$E(\Pi^i) = Lr_L + r_s S^i - r_D(D^i) - r_B B^i - r_H \int_{R^i-K^i+B^i+C^i}^{\infty} g(\epsilon^i)(\epsilon^i - (R^i - K^i + B^i +$$

$$-r_X\Big(\int_{R^i-K^i+B^i}^{R^i-K^i+B^i+C^i} g(\epsilon^i)(\epsilon^i - (R^i - K^i + B^i) + \int_{R^i-K^i+B^i+C^i}^{\infty} g(\epsilon^i) C^i d\epsilon^i \Big) \tag{5}$$

- Where $g(.)$ is the density function of the random variable ϵ^i.(this function is identical for all banks.)
- Profit maximization with respect to the amount of interbank loans (B^i) (5)