Managing Monetary Policy Normalization

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Motivation

- The 2007-2008 financial crisis and the 2019-COVID pandemic revealed unprecedented interventions by central banks, involving large-scale asset purchase programs and an expansion of their balance sheets.

- This brings important questions:
  1. On the effectiveness of such policies.
  2. On whether they represent additional tools compared to conventional policies.
  3. On where the "new normal" will be.

- The benchmark New Keynesian model offers a straightforward answer to these questions. Central bank balance-sheet policies are irrelevant for the equilibrium. What matters for controlling inflation and output is solely the interest rate on reserves.

Contribution

Provide a framework that can address these questions focusing on few new elements in the transmission mechanism of policy:

1. Government liquidity (including central bank's reserves) can influence aggregate demand through its effects on liquidity premia, with an expansion of reserves being expansionary on demand;
2. Government liquidity and interest-rate on reserves are two independent tools of monetary policy even under normal conditions;
3. Interest rate on reserves acts first through the banking sector and has imperfect pass-through on the money market rates that influence consumption/saving choices

Questions

- What is optimal supply of liquidity and therefore the optimal size of central bank's balance sheet under normal conditions?
- How should government liquidity be managed in and out of a liquidity trap?
- Is government liquidity a substitute of forward guidance at the zero lower bound?

Mechanism

Model with two financial frictions:

1. In the banking sector, government liquidity is an explicit or implicit collateral for issuing deposits

$$B_t^g \geq \rho D_t$$

with $0 < \rho < 1 \Rightarrow$ It implies a spread between the deposit rate and interest-rate on reserves: $i_t^D > i_t^R$.

2. At the level of households, deposits provide liquidity (non-pecuniary) services modeled as direct utility from holding real deposits

$$V\left(\frac{D_t}{P_t}\right)$$

with $V_d(\cdot) = 0$ for $d \geq \bar{d} \Rightarrow$ It implies a spread between the money-market rate (affecting consumption/saving choices) and the deposit rate $i_t > i_t^D$.
$\Rightarrow$ 1) and 2) implies the following hierarchy between rates:$i_t > i_t^D > i_t^R$.

Mechanism

- Banking equilibrium implies that

$$1 + i_t^D = \rho(1 + i_t^R) + (1 - \rho)(1 + i_t)$$

- Demand of deposits imply that

$$\frac{1 + i_t^D}{1 + i_t} = 1 - V_d\left(d_t\right)$$

- Consumption/saving choices requires that

$$C_t^{-\frac{1}{\sigma}} = \beta(1 + i_t)\frac{P_t}{P_{t+1}}C_{t+1}^{-\frac{1}{\sigma}}$$

Combining we get

$$Y_t = \left(\frac{1}{\beta}\frac{P_{t+1}}{P_t}\right)^{\sigma}\left[\frac{1 - \rho^{-1}V_d(\rho^{-1}b_t^g)}{1 + i_t^R}\right]^{\sigma} Y_{t+1}$$

having used $B_t^g = \rho D_t$ and $C_t = Y_t$.

A New Aggregate Demand

$$\hat{Y}_t = (1-\rho^{-1}\nu)E_t\hat{Y}_{t+1} - \sigma(1-\rho^{-1}\nu)(\hat{\imath}_t^R - E_t(\pi_{t+1}-\pi) - \tilde{r}_t^n) + q_y^{-1}\rho^{-1}\nu\hat{q}_t$$

- When $\nu = 0$, liquidity is fully satiated, standard NK demand schedule is recovered.
- Government liquidity ($\hat{q}_t$) affects directly AD on top of interest rate on reserves $\hat{\imath}_t^R$;
- Discount factor in AD demand is less than unitary value: $(1-\rho^{-1}\nu) < 1$. Forward guidance has lower impact on output.

What is the optimal supply of liquidity?

- Consider a benevolent policymaker maximizing household's utility

$$U_{t_0} = \left\{ \sum_{t=t_0}^{\infty} \beta^{t-t_0} \left[\frac{Y_t^{1-\sigma^{-1}}}{1-\sigma^{-1}} - \frac{Y_t^{1+\eta}}{1+\eta} + V(q_t) \right] \right\}$$

- Subject to the intertemporal resource constraint:

$$Y_{t_0}^{-\sigma^{-1}} \frac{(1+i_{t_0-1}^R) b_{t_0-1}^g}{\Pi} = \sum_{T=t_0}^{\infty} \beta^{T-t_0} \left[Y_T^{-\sigma^{-1}} \left(\tau_T Y_T - \frac{T_T}{P_T} \right) + \frac{V_q(q_t) b}{\rho} \right.$$

with

$$Y_t = Y(\tau) \equiv \left[\frac{(1-\tau)}{\mu_\theta} \right]^{\frac{1}{\eta+\sigma^{-1}}}.$$

and

$$\rho^{-1} b_t^g = q_t$$

Optimal liquidity policy

- When lump-sum taxes are available without any bound:
- then it is optimal to satiate liquidity $V_q(\cdot) = 0$ and taxes should be appropriately set to achieve the maximum liquidity.
- $\Longrightarrow$ the NK benchmark model is achieved with no spreads in money markets.
- $\Longrightarrow$ Liquidity becomes irrelevant.

When only distortionary taxes are available:

- as in a standard second-best argument, it is optimal to maintain liquidity rents in a way to reduce the distortionary effects of taxes (backing liquidity with assets can further reduce the use of distortionary taxes);
- $\Longrightarrow$ Liquidity is supplied below full satiation;
- $\Longrightarrow$ There are money market spreads and liquidity becomes relevant to influence aggregate demand.

Managing liquidity during a liquidity trap

- Consider shock that brings the natural real rate of interest, r^n, from the steady-state level of 2% to -4% at annual rates for twelve quarters.
- Given that the steady-state policy rate is set at 4% accounting for a 2% inflation target, the shock to the natural rate of interest could be fully accommodated only if the policy rate could fall at -2%.
- The zero-lower bound prevents this fall and creates an interesting trade-off among stabilizing the relevant macroeconomic variables.

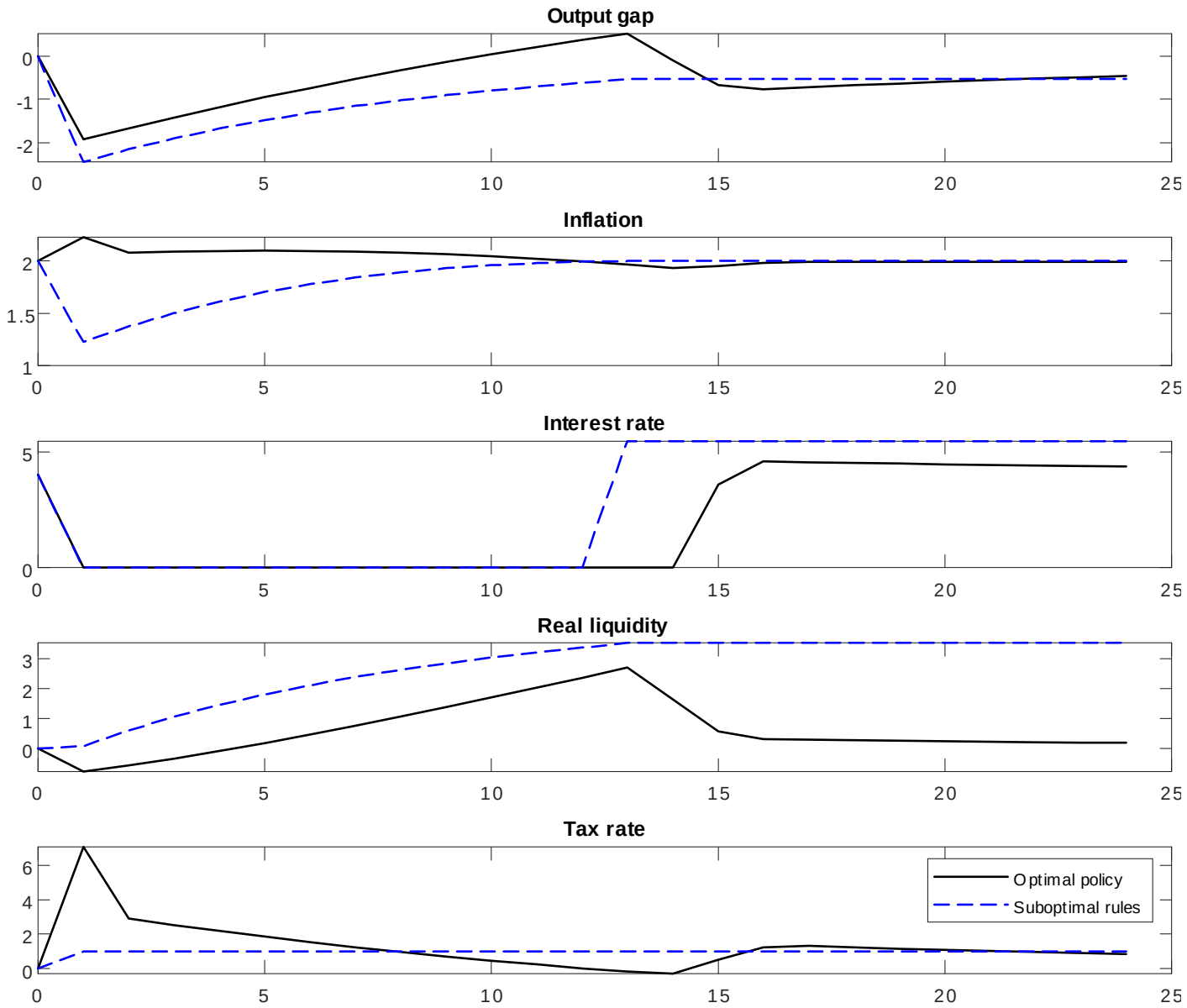
What to investigate?

- Is the use of liquidity a substitute for forward guidance?
- What is the optimal path of liquidity?
- What about QT with respect to the liftoff of the policy rate?
- Compare optimal policy with a "constant liquidity policy" and "suboptimal policy" (limited variation in taxes and no forward guidance)

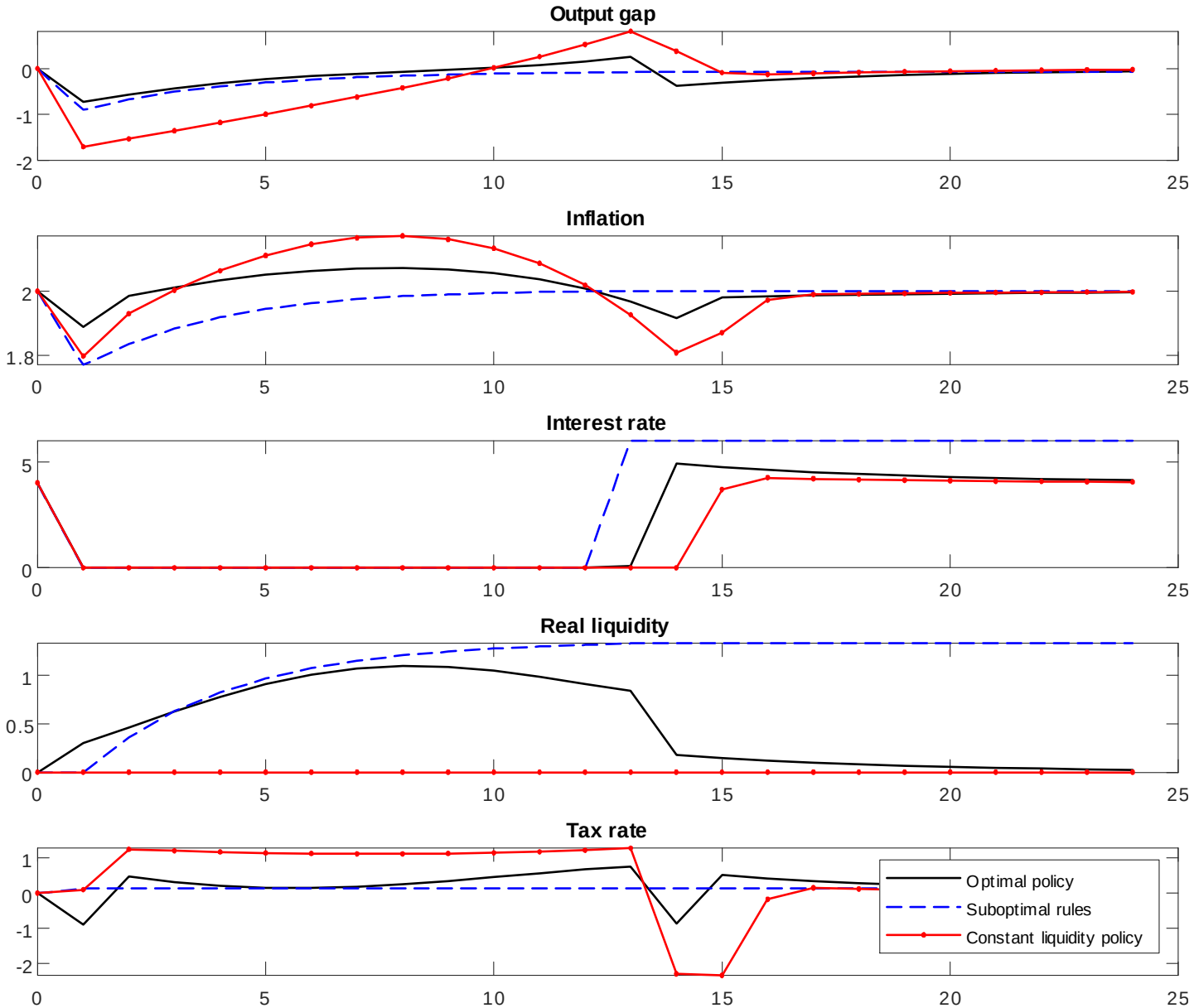
Results

- The use of liquidity is a substitute of forward-guidance when the demand channel is stronger (higher money market spread, or higher weight to output stabilization versus inflation stabilization)
- Liquidity should peak in the middle of the trap but its withdrawal should occur at the same time the policy rate leaves the zero lower bound.
- No new normal, liquidity should go back to the initial optimal value.

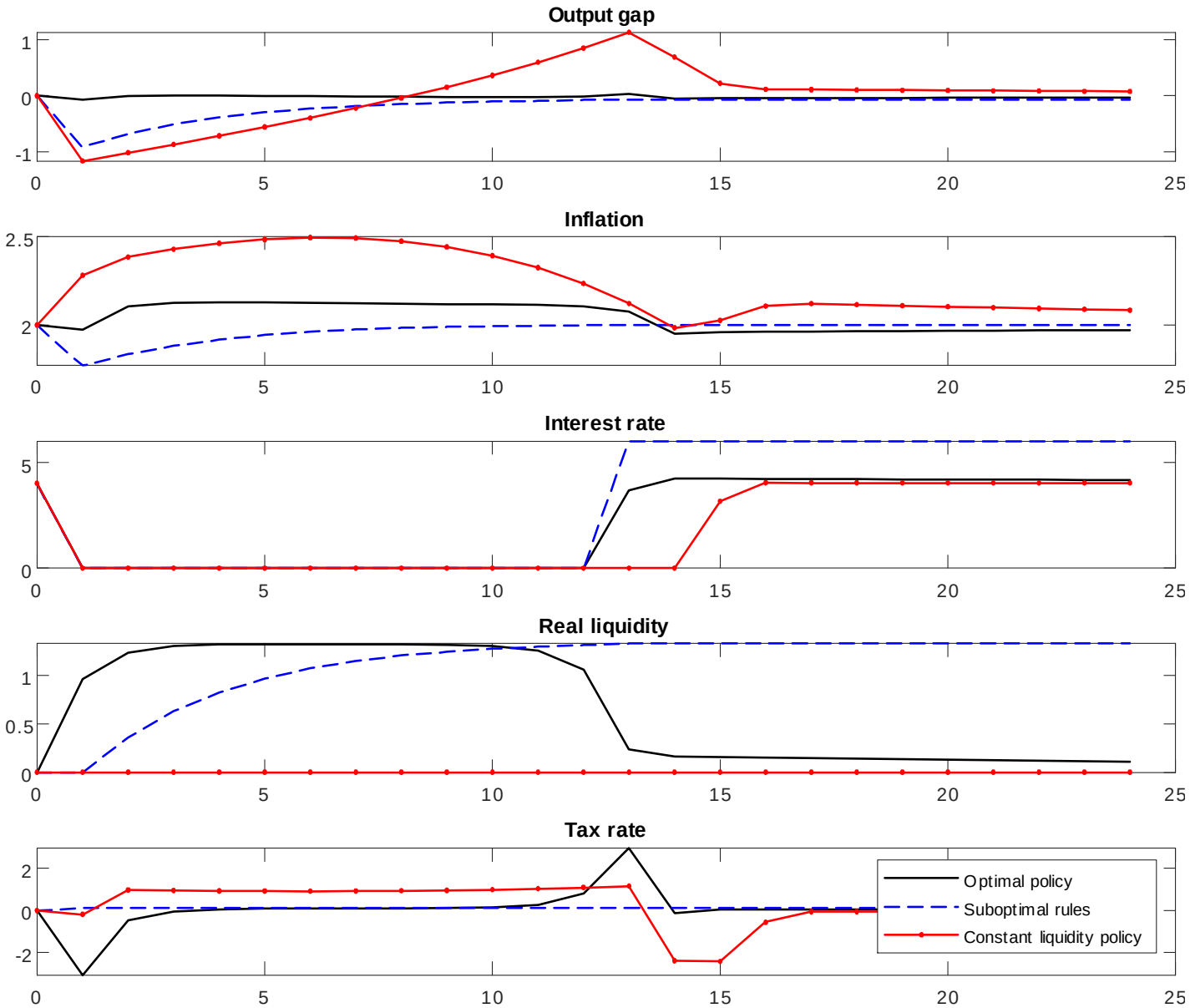
Low money-market spread



High money-market spread



High weight on output stabilization



Conclusions

- Provide a model in which government liquidity is an additional tool of monetary policy because of financial frictions in the banking sector and at the household level. These frictions create spreads in money markets.
- Optimal liquidity is below satiation and in a new normal liquidity should go back to the optimal level.
- Liquidity should be used in a liquidity trap to reduce the stay at the zero lower bound but withdrawal should occur at the liftoff of the policy rate.