Discussion of "A Model of Intermediation, Money, Interest and Prices" by Saki Bigio & Yuliy Sannikov

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Overview

- model of money as a store of value in incomplete markets
- nice feature: risk choice about endowment
- Discussion:
  - study effects in an environment where financial structure is real
  - connect to literature on fiscal policy

Environment

- utility function over consumption

$$E \int_0^{\infty} e^{-\rho t} \frac{\left(c_{i,t}^{1-\gamma} - 1\right)}{1-\gamma} dt$$

- nontradable exogenous income

$$dw_{i,t} = y\left(u_{i,t}\right) dt + \sigma\left(u_{i,t}\right) dZ_{i,t}$$

  - $dZ_{i,t}$ idiosyncratic shock
  - risk choice $u_{i,t}$: high mean y_H and volatility σ_H or low mean y_L and volatility $\sigma_L = 0$

- in every instant, choose consumption $c_{i,t}$ and $u_{i,t}$
- resource constraint: aggregate consumption = aggregate output, output endogenous!

First best allocation

- all households choose high risk: $u_{i,t} = H$
  mean y_H is high for everyone!
- perfect risk sharing: σ_H does not matter
- high output $Y_t = y_H$
- high consumption $C_t = y_H$

Incomplete markets

- financial structure as in Aiyagari: real noncontingent bonds save and borrow at real interest rate r up to a debt limit $\bar{s}$

$$E \int_0^\infty e^{-\rho t} \frac{\left(c_{i,t}^{1-\gamma} - 1\right)}{1-\gamma} dt$$

$$\begin{aligned} dw_{i,t} &= y\left(u_{i,t}\right) dt + \sigma\left(u_{i,t}\right) dZ_{i,t} \\ ds_{i,t} &= \left(r\ s_{i,t} - c_{i,t}\right) dt + dw_{i,t} \\ s_{i,t} &\geq \bar{s} \end{aligned}$$

- close to debt limit $\bar{s}$, precautionary motive is strong:
  - households choose low risk $u_{i,t} = L$ with low mean y_L
- output and consumption are inefficiently low: $Y_t < y_H$
- equilibrium interest rate r is low

Comparison with other incomplete markets models

- Models with imperfect risk sharing without aggregate shocks
  - strong precautionary motive $\rightarrow$ welfare loss
  - output may be distorted relative to first best
- Aiyagari 1994 endowment model
  - idiosyncratic shocks to endowment, real bonds have low rate
  - no aggregate output loss
- Aiyagari model with production
  - idiosyncratic skill shocks, capital and bonds are perfect substitutes
  - overaccumulation of capital, aggregate output inefficiently high
- Angeletos 2007 with sufficiently high EIS
  - capital and bonds are not perfect substitutes, low real interest rate
  - underaccumulation of capital, aggregate output inefficiently low
- Bigio & Sannikov model
  - risk choice makes aggregate output inefficiently low

Fiscal policy in incomplete markets

- Aiyagari & McGrattan 1998: debt in model with production
  - capital and government debt are perfect substitutes for savers
  - government debt B_t crowds out private capital K_t, reduces output
  - equilibrium real rate depends on debt and taxes
- Bigio & Sannikov with government debt
  - household and government debt are perfect substitutes for savers
  - government debt allows precautionary savings
  - equilibrium real rate depends on debt and taxes
- Fiscal policy can improve risk sharing and output distortion

Intermediation and spreads

- So far, banks are a veil
- Without government debt: competitive banks take household savings A_t and pay interest r^A, lend to households L_t and collect interest r^L, maximize

$$L_t\left(1+r^L\right)-A_t\left(1+r^A\right)$$

  banks' FOCs equalize rates of return: $r^L = r^A$
- What if government forces banks to hold some government debt?

$$L_t\left(1+r^L\right)+B_t\left(1+r^B\right)-A_t\left(1+r^A\right)$$

$$B_t \geq \rho A_t$$

  If constraint binds, $r^L > r^A > r^B$
- If $\rho = 1$, narrow banking, no loans to households $L_t = 0$

$\rightarrow$ Fiscal policy not only changes real rate but also spreads

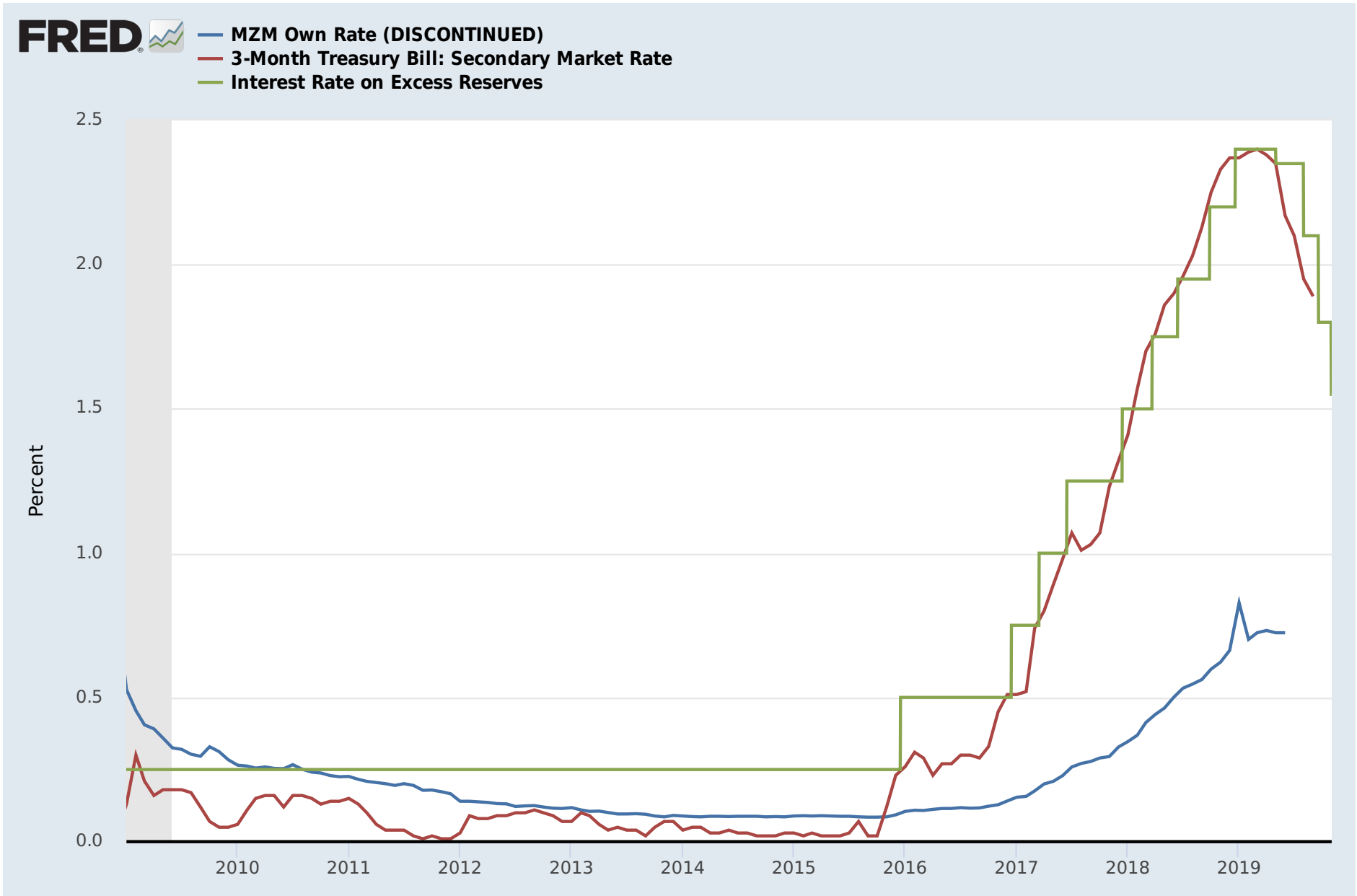
Fiscal policy vs monetary policy

- So far, theory of fiscal policy, how do we think about monetary policy?
- recast model with nominal assets and nominal interest rates
- definition of equilibrium
  - given initial price level P_0, nominal interest rate path i_t^B, nominal supply of government debt M_t
  - find path of prices P_t so that real interest rate $r_t^B = i_t^B - \dot{P}_t / P_t$ clears market for path of real debt M_t / P_t
- changing nominal rate has real effects holding fixed M_t
- interpretation of government debt as reserves
  - bank constraint from before = reserve requirement
  - government forces banks to also hold some reserves $\rho P_t A_t$
  - if constraint does not bind: $i^L = i^A = i^M$ floor system
  - if constraint binds: $i^L > i^A > i^M$ corridor system

Money as store of value

- reinterpretation of the model works if there are no other assets that dominate money in rate of return
- tradition of Bewley 1980, Samuelson 1968
  money is the only asset, useful as store of value
- in data, rate of return dominance is important
  - floor system: spread between deposit rates, T-bill rates

T-bill rate and deposit rate in Floor System



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- in data, rate of return dominance is important
  - floor system: spread between deposit rates, T-bill rates
- can explain spread with money as medium of exchange
- Bewley/Samuelson not typically used for monetary policy
  but Aiyagari/OLG workhorse models for fiscal policy
- Bigio-Sannikov: very interesting insights about fiscal policy, risk choice, output and welfare