Credit Spreads and the Zero Bound on Interest Rates

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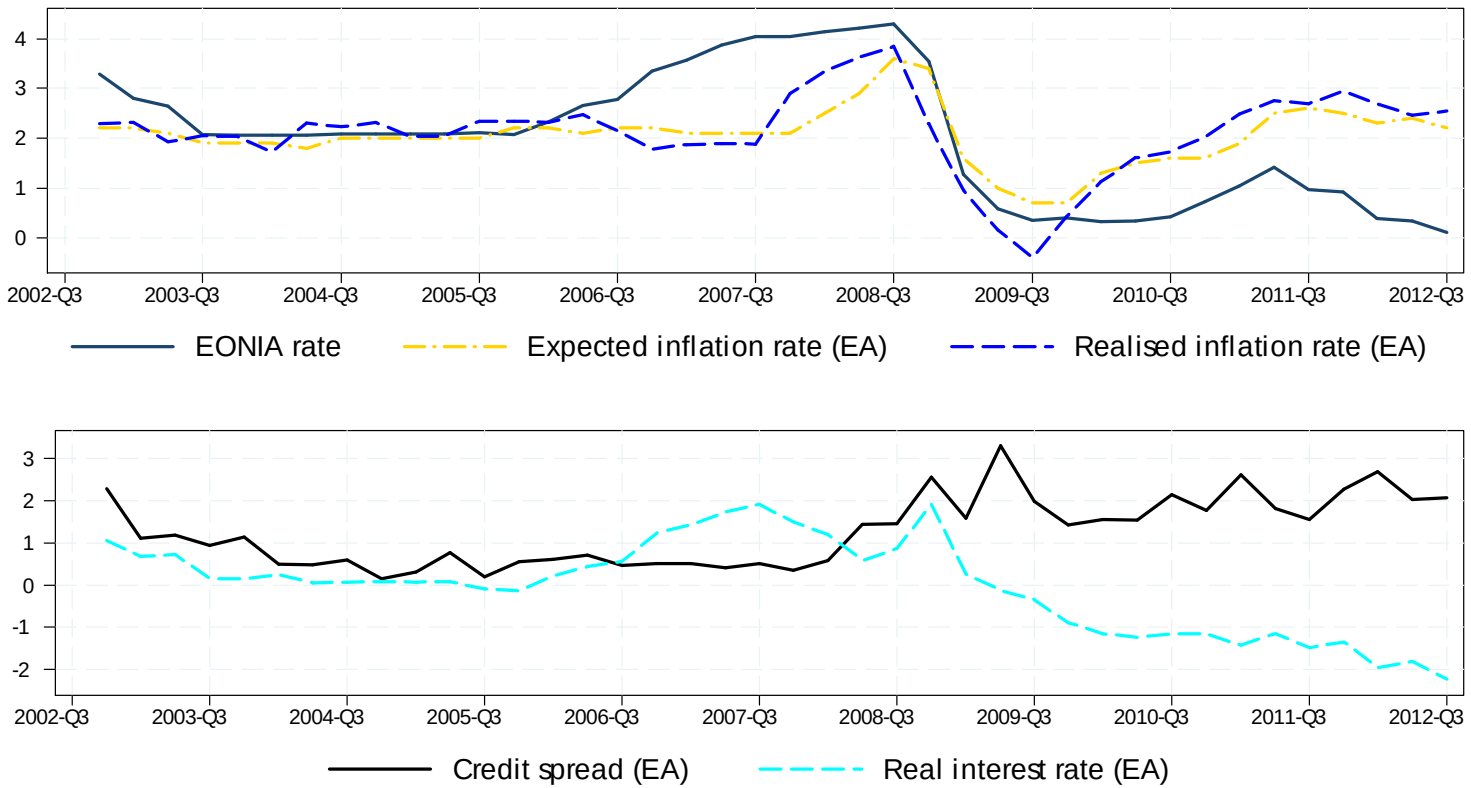
Motivation

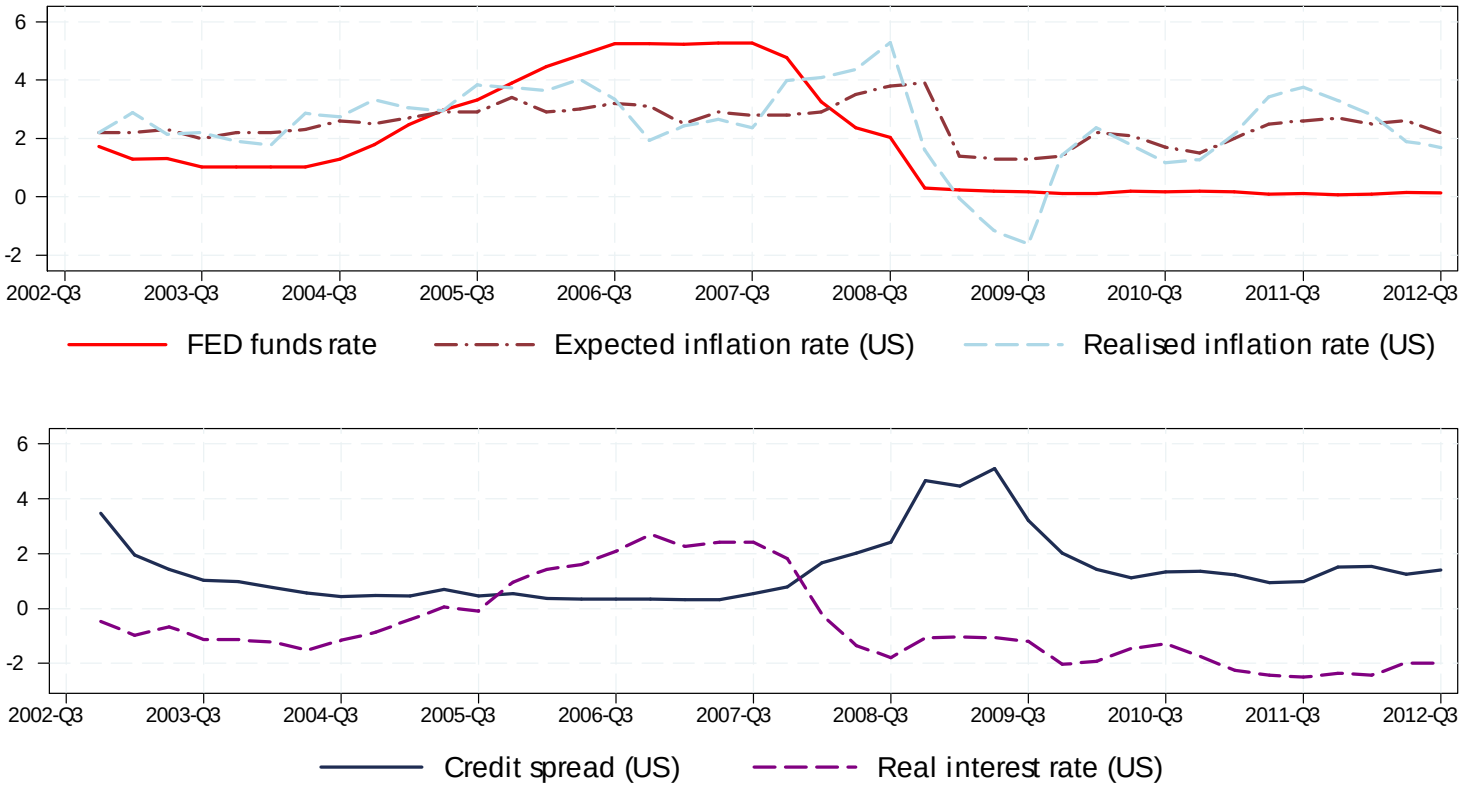
- Literature on the ZLB as a constraint to monetary policy.
  - Sticky prices and preference shocks
  - Preference shock that lowers the natural rate of interest to low negative numbers
  - Cannot lower the nominal rate or increase the inflation rate to match the natural rate.
  - Deflation and high real interest rates.
- During the financial crisis: real interest rates were high because of credit spreads, not because of deflation.

Real interest rates vs credit spreads in EA



Legend: percentage points, annually.
Source: Datastream, SDW, Eurostat, World Economic Survey.

Real interest rates vs credit spreads in US



Legend: percentage points, annually.
Source: Datastream, SDW, Eurostat, World Economic Survey.

Questions

- Is the ZLB a constraint in models where credit spreads matter?
- In the sticky price model, taxes can be used to overcome the ZLB. Can taxes be used to overcome the ZLB when interest rates are high because of credit spreads?
- What other policies can be used to affect lending rates and credit spreads?

ZLB in sticky price models

Eggertsson and Woodford (BPEA, 2003):

- Preference shock that lowers the natural rate of interest to low negative numbers. Lower the nominal rate to zero. With inflation could match the natural rate. Without commitment, there's deflation instead. The downturn could be arbitrarily large. The use of forward guidance.

Correia, Fahri, Nicolini and Teles (AER, 2013):

- Unconventional fiscal policy: zero producer price inflation and a path for consumption taxes that generates expected inflation; neutralize the distortion with appropriate choice of other taxes.
- With lump-sum taxes, first-best allocation. Time-consistent.
- Without lump-sum taxes, second-best. But ZLB is not a constraint.

Credit policy and the ZLB

Gertler and Karadi (JME, 2011):

- A model with financial frictions and capital quality shocks: a rule for direct credit provision by the central bank. Particularly useful at the ZLB.

De Fiore and Tristani (2013):

- Optimal mix of interest rate and credit provision at the ZLB.

This paper (so far)

- Model where financial intermediaries face balance sheet constraints.
- Financial shocks increase credit spreads and reduce output.
  - Without the ZLB, and with lump sum taxes: Negative policy rates. First-best.
  - With ZLB, with lump-sum taxes: Credit subsidies and first-best.
  - Without lump sum taxes: redit taxes/subsidies, second best.State contingent real debt with ex-post volatility of prices.
  - ZLB is not a restriction whether taxes are lump sum or not.

This paper (so far)

- Credit tax/subsidy vs credit easing.
  - Direct credit provision is inefficient.
  - Subsidies are not inefficient but need to be financed. In the steady state and in response to shocks. Role of state contingent debt.
- Raising more questions than providing answers
  - Model of liquidity. Exogeneity of financial shocks
  - Treating the symptoms and not the disease.

The environment

Households Single household with workers and bankers. Infinitely lived.

Share $1 - f$ of workers

Share f of bankers Become workers with probability θ. Intermediate funds to firms. Can appropriate a fraction λ of bank assets. Need internal funds to be able to borrow.

Firms Representative. Linear technology in labor. Borrows to pay for wage bill.

Government Finances own consumption and credit subsidies with lump-sum (or distortionary) taxes and seigniorage.

Households

- Problem:

$$\text{Max } E_0 \sum_0^{\infty} \beta^t \left[\ln C_t - \frac{\chi}{1+\phi} N_t^{1+\varphi} \right],$$

s.t.

$$D_t + E_t Q_{t,t+1} B_{t,t+1} \leq W_t,$$

where

$$W_{t+1} = B_{t,t+1} + R_t D_t + \Pi_t^b + W_t N_t - P_t C_t - T_t.$$

Firms

- Linear technology:

$$Y_t = A_t N_t$$

- Need to borrow nominal funds S_t to pay the wage bill,

$$W_t N_t \leq S_t$$

- Receive subsidy on debt repayment, $\tau_t^l R_t^l S_t$. Profits:

$$\Pi_t^f = P_t Y_t - \left(1 - \tau_t^l\right) R_t^l W_t N_t,$$

Bankers

- Continuum $j \in [0, 1]$.
- Because of a costly enforcement problem, each bank must have internal funds, $Z_{j,t}$.
- Each bank borrows $D_{j,t}$ and lends $S^b_{j,t}$,

$$S^b_{j,t} = D_{j,t} + Z_{j,t}$$

- Because of exit, internal funds are scarce and remuneration is high. Internal funds are accumulated until exit.
- Net worth evolves according to

$$Z_{j,t+1} = R^l_t S^b_{j,t} - R_t D_{j,t}$$

Bankers

- Bankers maximize terminal wealth:

$$V_{j,t} = \max E_t \sum_{s=0}^{\infty} (1-\theta)\,\theta^s Q_{t,t+1+s} Z_{j,t+1+s}$$

where

$$Z_{j,t+1} = \left[\left(R_t^l - R_t \right) S_{j,t}^b + R_t Z_{j,t} \right]$$

Bankers

- Costly enforcement problem: bankers can divert a fraction λ of assets $S^b_{j,t}$.
- Incentive compatibility constraint:

$$V_{j,t} \geq \lambda S^b_{j,t}$$

Bankers

- The value $V_{j,t}$ can be written as

$$V_{j,t} = \upsilon_t S^b_{j,t} + \eta_t Z_{j,t}$$

where

$$\upsilon_t = E_t \left\{ (1-\theta) Q_{t,t+1} \left(R^l_t - R_t \right) + Q_{t,t+1} \theta \frac{S^b_{j,t+1}}{S^b_{j,t}} \upsilon_{t+1} \right\}$$

$$\eta_t = E_t \left\{ (1-\theta) + Q_{t,t+1} \theta \frac{Z_{j,t+1}}{Z_{j,t}} \eta_{t+1} \right\}.$$

Bankers

- Assuming ICC holds with equality

$$\frac{s_{j,t}^{b}}{z_{j,t}} = \frac{\eta_t}{\lambda - \upsilon_t} \equiv \phi_t$$

where ϕ_t is a measure of leverage.

Entry and exit of bankers

- Exiting banks transfer net worth, $(1-\theta)\,Z_t$, to household. A fraction $\frac{\omega}{(1-\theta)}$ is given to newly entering bankers as start-up funds.
- Internal funds of surviving bankers are θZ_t.
- ξ_t is a capital quality shock.
- Aggregate net worth of bankers:

$$Z_t = \xi_t\,(\theta+\omega)\left[\left(R^I_{t-1}-R_{t-1}\right)\phi_{t-1}+R_{t-1}\right]Z_{t-1}.$$

The government

- Credit policies:
  - Credit subsidies, $\tau_t^l R_t^l S_t$.
  - Direct intermediation, i.e. lending of a fraction ψ of S_t at the market rate R_t^l. No incentive problem, but resource cost τ per unit of lending.
  - Direct enforcement cost?
- Budget constraint:

$$\begin{aligned} & B_t^g + M_t - \psi_t S_t \\ \leq\ & R_{t-1} B_{t-1}^g + M_{t-1} + \tau_{t-1}^l R_{t-1}^l S_{t-1}^b + \tau \psi_{t-1} S_{t-1} \\ & -\psi_{t-1} S_{t-1} R_{t-1}^l + P_{t-1} G_{t-1} - T_{t-1} \end{aligned}$$

Equilibria

- Equilibria: conditions above for υ_t and η_t, and

$$-\frac{u_C(t)}{u_N(t)} = \frac{\left(1-\tau_t^l\right) R_t^l}{A_t}$$

$$\frac{u_C(t)}{P_t} = R_t E_t \frac{\beta u_C(t+1)}{P_{t+1}}$$

$$A_t N_t = R_t^l \left(1-\tau_t^l\right) \frac{\phi_t}{1-\psi_t} \frac{Z_t}{P_t}$$

$$\phi_t = \frac{\eta_t}{\lambda - \upsilon_t}$$

$$Z_t = \xi_t (\theta+\omega) R_{t-1} \left[\left(\frac{R_{t-1}^l}{R_{t-1}} - 1\right)\phi_{t-1} + 1\right] Z_{t-1}$$

$$C_t + G_t + \tau\psi_t \frac{S_t}{P_t} = A_t N_t$$

- The price level matters because Z_t is predetermined.

Equivalence between credit subsidies and interest rates

- Take an allocation, $\{C_t, N_t\}$ and $\left\{\phi_t, \frac{R_t^l}{R_t}, \eta_t, \upsilon_t\right\}$, where $R_t^l \geq 1$ but R_t can be less than one. Take a path for $\left\{\tau_t^l\right\}$. There is an alternative path $\left\{\widetilde{\tau}_t^l\right\}$ and $\left\{\widetilde{R}_t \geq 1\right\}$ such that

$$\begin{aligned} R_t^l\left(1-\tau_t^l\right) &= \widetilde{R}_t^l\left(1-\widetilde{\tau}_t^l\right) \\ \frac{R_t^l}{R_t} &= \frac{\widetilde{R}_t^l}{\widetilde{R}_t} \end{aligned}$$

Equivalence between credit subsidies and interest rate

- Under the alternative path, spreads, leverage and weights are all invariant.
- Only the nominal variables grow at a different rate, keeping the real variables constant.
- There is an equivalence between interest rates and credit taxes/subsidies, R_t and τ_t^l. This is true irrespective of whether taxes are lump-sum or distortionary.

First-best

- First-best allocation: Maximizing welfare subject to resource constraint:

$$-\frac{u_C(t)}{u_N(t)} = \frac{1}{A_t}$$

$$C_t + G_t = A_t N_t$$

- In equilibrium

$$-\frac{u_C(t)}{u_N(t)} = \frac{\left(1-\tau_t^l\right) R_t^l}{A_t}$$

Credit subsidies and the first best

- When the ZLB binds and lump-sum taxes are available, it is possible to overcome the ZLB and achieve the first-best by setting $R_t = 1$ and $R_t^l \left(1 - \tau_t^l\right) = 1$.

- There are multiple policies on the price level, spreads and subsidies, that achieve the first best.

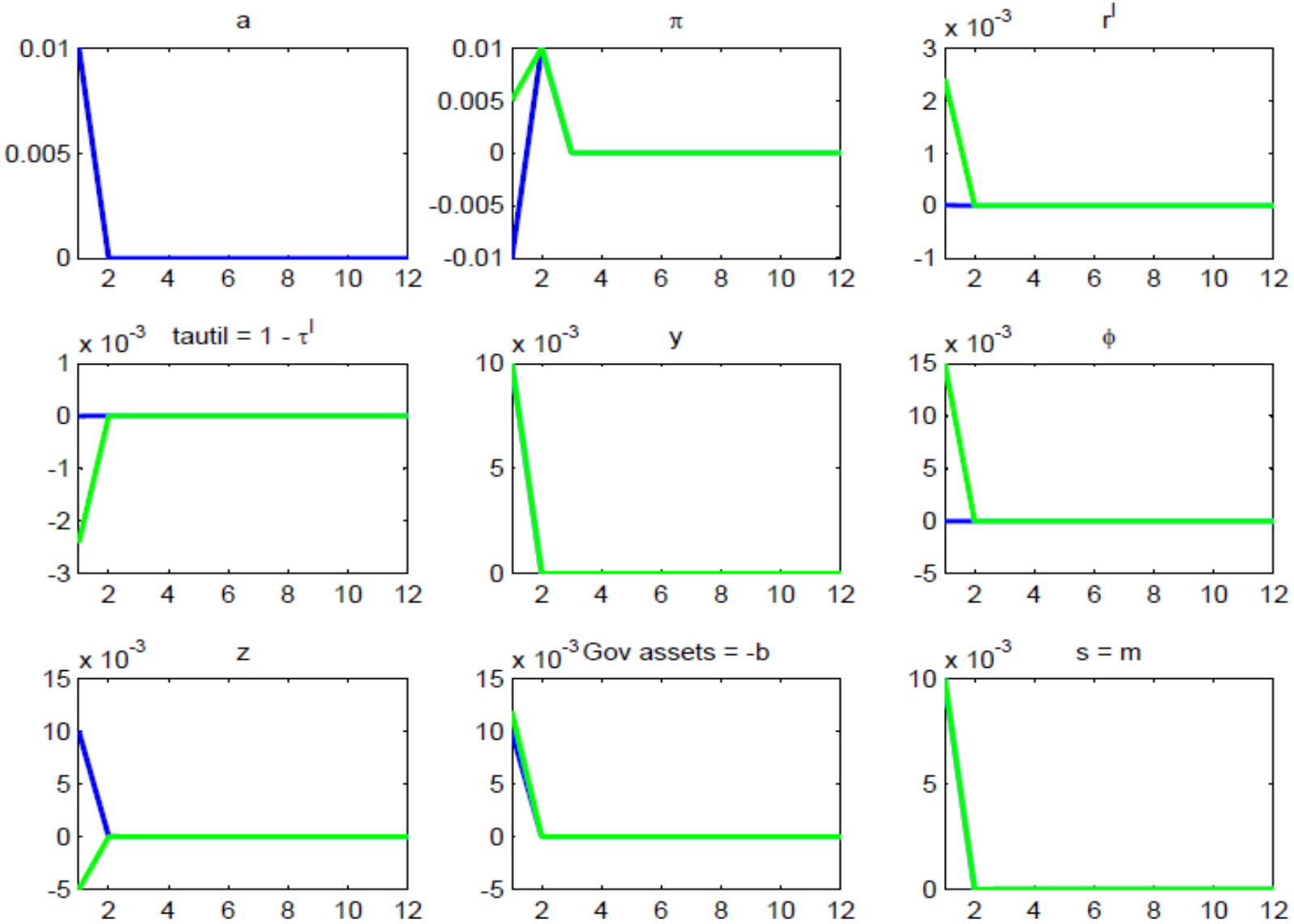
Distortionary taxes and the ZLB

- Without lump-sum taxes, the credit subsidy needs to be financed. The first-best cannot be achieved.
- Second best policy: use credit tax/subsidy in a state-contingent way to stabilize the wedge (if optimal) without raising revenues on average.
- Noncontingent debt is an additional restriction. Nominal debt or money with volatile price levels replicate state contingent assets.
- The ZLB is not a restriction to policy. The restrictions are no lump sum taxes, and possibly noncontingent debt.

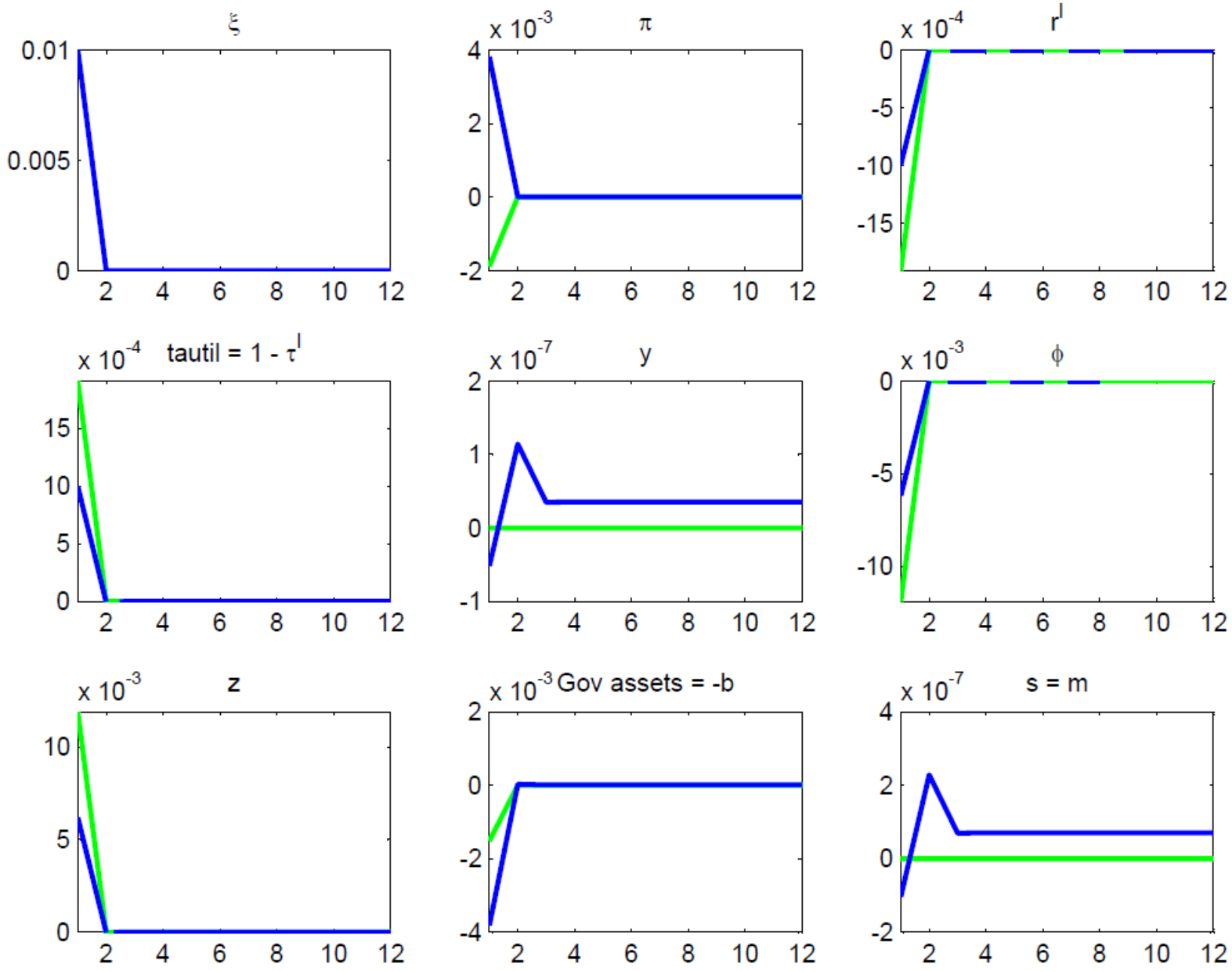
Calibration

- Same financial parameters as in Gertler and Karadi (2011):
  - $\lambda = 0.381$
  - $\omega = 0.002$
  - $\theta = 0.972$.
- λ, θ and ω: SS spreads are 1%, bank leverage is 6.2, for an average horizon of bankers of 10 years.

Nominal vs real non-contingent debt: tech shock



Nominal vs real non-contingent debt: fin shock



Conclusion

- Just as in Correia et al. (2013), taxes can replicate interest rate policy. The zero lower bound is not a restriction to policy.
- But no lump sum taxes and noncontingent debt (or sticky prices) are restrictions to policy, on both interest rates and taxes.
- With distortionary taxes, still possible to do cyclical policy with credit taxes and subsidies, overcoming the ZLB.
- (With sticky prices, debt would be noncontingent, and credit subsidies would be restricted. As would interest rate policy.)

Conclusion

- Credit easing may be an alternative policy. Trade-off between efficiency and deadweight costs.
- Conclusions are somewhat disturbing.
  - Are credit subsidies a substitute policy for liquidity provision?
  - They are to interest rate policy, but is liquidity provision a substitute to interest rate policy?