Credit Spreads and Credit Policies

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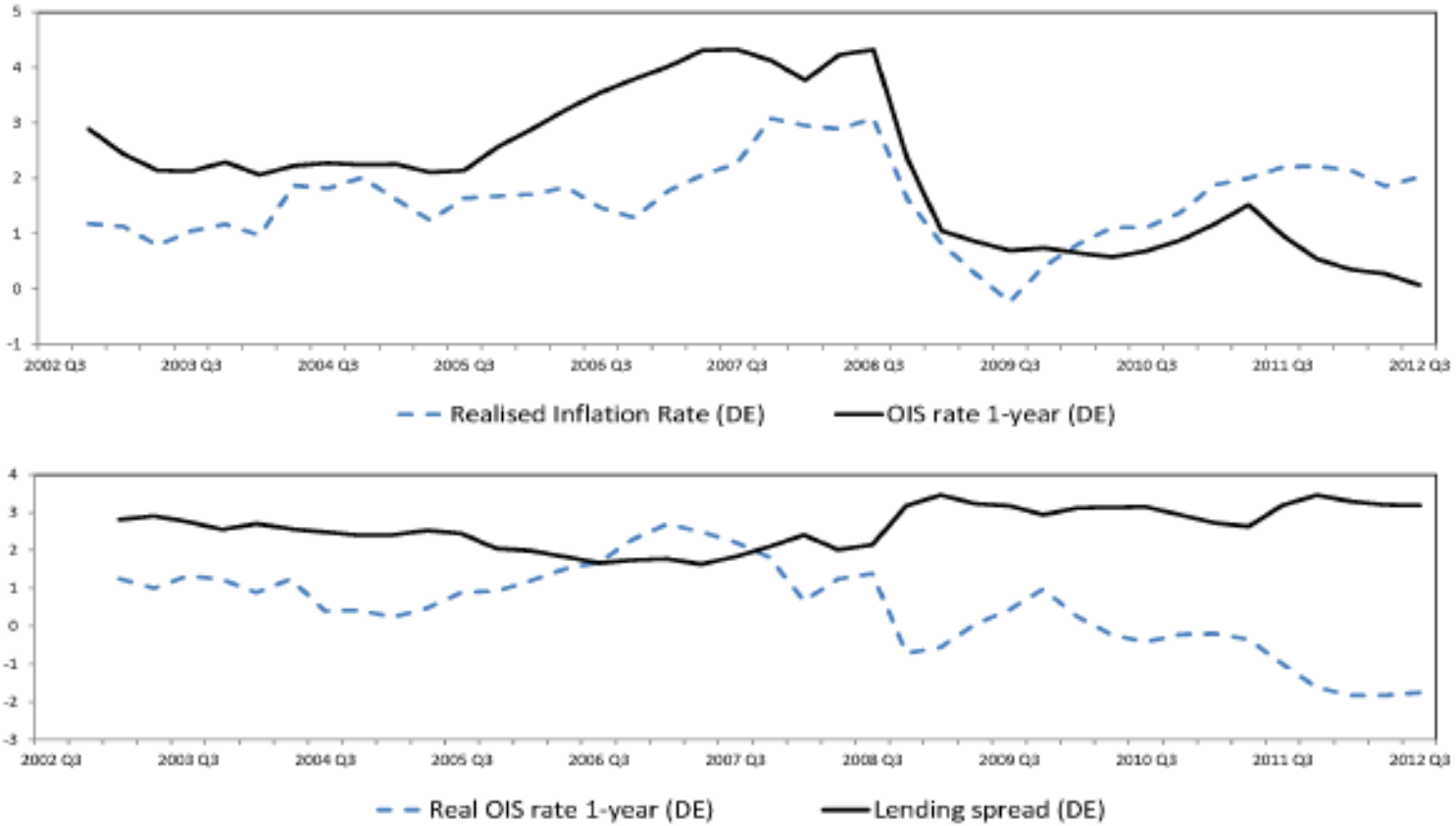
Motivation

- The recent crises have shown the limitations of standard interest rate policy.
- Policy rates have been cut to zero, but the costs of financing have been kept high by credit spreads.
- New policies, including credit policies and fiscal or macroprudential policies, were used...
- ... but policy experimentation was inevitable in the absence of model based results.

Literature

- Literature on ZLB and monetary policy (Krugman 1998, Eggertsson-Woodford 2003, Werning 2012)
  - Sticky prices and preference shock that lowers the natural rate of interest to low negative numbers
  - Because of ZLB, sticky prices and no commitment, cannot lower the nominal rate nor increase inflation
- Literature on the ZLB using fiscal policy (Correia, Farhi, Nicolini and Teles, 2013)
  - Consumption taxes (together with labor and capital taxes) can be used to overcome the zero bound.
- During the financial crisis: real interest rates were high because of credit spreads, not because of deflation.

Real interest rates vs credit spreads



Legend: Percentage points, annually. Lending spread = MFI lending rate - Real OIS rate. Source: Datastream, SDW.

This paper

- We go back to the Ramsey literature on optimal fiscal and monetary policy in a model with constrained financial intermediaries and multiple interest rates (similar to Gertler and Kiyotaki, 2010).
- We characterize the optimal policy in response to shocks that increase credit spreads.

The questions

- What is optimal monetary and fiscal policy in models where credit spreads matter?
- In particular, should credit subsidies be used when spreads are high? Can they be used to overcome the ZLB?
- Should credit easing be used to affect lending rates and credit spreads?
- Focus in the literature on direct central bank lending (Gertler and Kiyotaki 2010, Gertler and Karadi 2011, Curdia and Woodford 2011, De Fiore and Tristani 2012).

Main results (I)

- In absence of ZLB, optimal monetary policy would set negative nominal interest rates to bring lending rate to zero.
- Credit subsidies replicate the effect of negative nominal interest rates, irrespective of whether govt financing is lump-sum or distortionary.
- With lump-sum taxes: first-best.
- With distortionary taxes and state-contingent nominal government debt: second best. Credit taxes/subsidies stabilize the wedge in reaction to shocks without raising revenues on average. They replicate the responses to shocks that would be observed in the first best.
- If debt is non-contingent: price level policy and credit subsidies replicate response to shocks under first best.

Main results (II)

- If price level is restricted from moving on impact, credit subsidies are still optimal but result in permanent increase in debt and permanent reduction in output.

- Credit subsidies vs credit easing:
  - credit subsidies are in general preferable, i.e. whenever they stabilize the wedge and replicate the response to shocks under the first best;
  - otherwise, ranking depends on the distortion created by the financing of credit subsidies relative to the resource cost of credit easing.

The environment

Households Infinitely lived. Composed of workers and bankers who share consumption and jointly decide on labor supply and the allocation of nominal wealth.

Workers Share $1 - f$. Work and earn income.

Bankers Share f. Become workers with probability $1 - \theta$. Intermediate funds from depositors to firms. Can appropriate a fraction λ of bank assets. Need internal funds to get deposits.

Firms Representative, wealthless. Linear technology in labor. Raise external finance to pay for wage bill.

Government Finances expenditure and credit policies with lump sum taxes and/or issuing money and debt.

Households

- Preferences:

$$E_o \sum_0^\infty \beta^t U\left(C_t, N_t\right),$$

- Budget constraints:

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

where

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

Firms

- Representative. Linear technology in labor:

$$Y_t = A_t N_t$$

- Borrows to pay for wage bill at lending rate R_t^l,

$$W_t N_t \leq S_t$$

- 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 $j \in [0, 1]$.
- Each bank borrows $D_{j,t}$ at rate R_t and lends $S^b_{j,t}$ at rate R^l_t

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

with $Z_{j,t}$ internal funds.

- 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:

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

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

- Incentive compatibility constraint:

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

- The lending rate R^l_t must be high relative to the deposit/policy rate R_t.Because of high returns, internal funds are accumulated until exit.

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

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

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

Bankers

- We impose $\upsilon_t < \lambda$. Then, ICC holds as equality

$$\frac{s^b_{j,t}}{z_{j,t}} = \frac{\eta_t}{(\lambda - \upsilon_t)} \equiv \phi_t$$

where ϕ_t is a measure of leverage.

Entry and exit of bankers

- Exiting banks transfer net worth, $(1-\theta)\,Z_t$, to household.
- Entry of bankers to keep population constant. Transfer of $\frac{\omega}{1-\theta}$ funds from households.
- Aggregate net worth of bankers:

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

where ξ_t is a shock to the value of banks' net worth.

The government

- Finances own consumption $P_t G_t$ and credit policies with lump sum taxes and/or issuing money and debt.
- Two types of credit policies:
  - Credit subsidies, $\tau_t^l R_t^l S_t$.
  - Direct intermediation, i.e. lending of a fraction ψ_t of S_t at the market rate R_t^l. No incentive problem, but resource cost c per unit of lending. Direct enforcement cost.

Equilibria

- For $\psi_t = 0$:

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

$$C_t + G_t = A_t N_t$$

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

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

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

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

Equilibria (cont'd)

- Description of the equilibria includes the expression for the weights η_t and υ_t, the budget constraint of the households (or the government) if taxes are not lump sum, and the restriction that

$$\left(1-\tau_t^l\right) R_t^l \geq R_t \geq 1.$$

- The price level matters because Z_t is predetermined.

Optimal policy with lump sum taxes

- Only implementability restrictions are the resource constraints.
- First-best (FB):

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

- Equilibrium:

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

- Optimal policy: $\left(1-\tau_t^l\right) R_t^l = 1$ and $R_t = 1$ so that neither ZLB on interest rates nor upper bound on subsidies binds.

Optimal Policy: Second Best

- Consider the case without lump sum taxes and with state-contingent nominal govt debt.
- With only interest rate policy, ZLB may be binding.
- Use credit tax/subsidy in a state-contingent way to stabilize the wedge without raising revenues on average. Set the policy rate to zero so that the upper bound on the subsidy is never binding.
- This policy replicates the response of the economy to socks that would arise in the FB.

Irrelevance of ZLB for implementation of equilibria

- For any $\left\{R_t, R_t^l, \tau_t^l\right\}$, there is an alternative $\left\{\widetilde{R}_t, \widetilde{R^l}_t, \widetilde{\tau}_t^l\right\}$, with $\widetilde{R}_t \geq 1$, such that the real variables remain constant. Only nominal variables grow at a different rate.

- The paths satisfy

$$R_t^l\left(1-\tau_t^l\right) = \widetilde{R}_t^l\left(1-\widetilde{\tau}_t^l\right)$$

$$\frac{R_t^l}{R_t} = \frac{\widetilde{R}_t^l}{\widetilde{R}_t}$$

$$\widetilde{Q}_{t,t+1}\widetilde{R}_t = Q_{t,t+1}R_t$$

$$\widetilde{R}_t\frac{\widetilde{P}_t}{\widetilde{P}_{t+1}} = R_t\frac{P_t}{P_{t+1}}$$

Credit subsidies vs credit easing

- Because of the resource loss c, a policy of credit easing can never achieve the FB.
- When lump-sum taxes are available, or when they are not but nominal debt is state contingent, credit subsidies replicate responses under FB. Preferable to credit easing.
- Can credit subsidies replicate responses under FB, when lump-sum taxes are not available and nominal debt is non-state contingent?
- Numerical analysis. We consider the responses of the economy under committment to an i.i.d. shock ξ_t that reduces banks' net worth, when the nominal interest rate is kept at the ZLB.

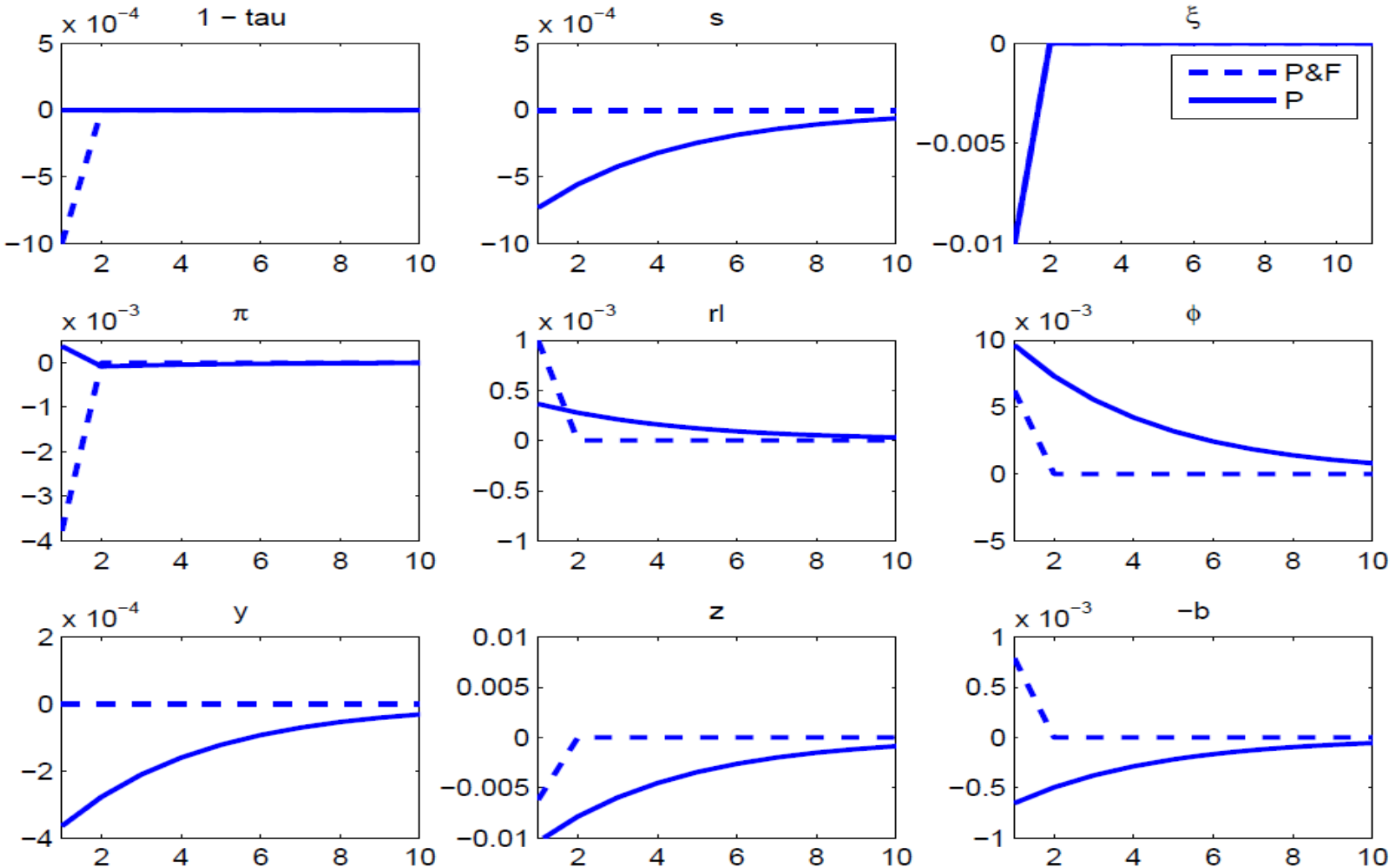
Calibration

- Same financial parameters as in Gertler and Karadi (2011).
- λ, θ and ω: SS spreads are 1.1%, bank leverage is 6.
- Steady state level of assets is enough to finance the FB subsidy.
- $G = 0$.

Optimal policy with non-state contingent debt

- Price level and fiscal policy can replicate FB responses:
  - Fiscal policy takes care of the distortions.
  - Price level policy takes care of state contingency of the debt.
- True also when noncontingent debt is real as price level policy can still affect real value of money.

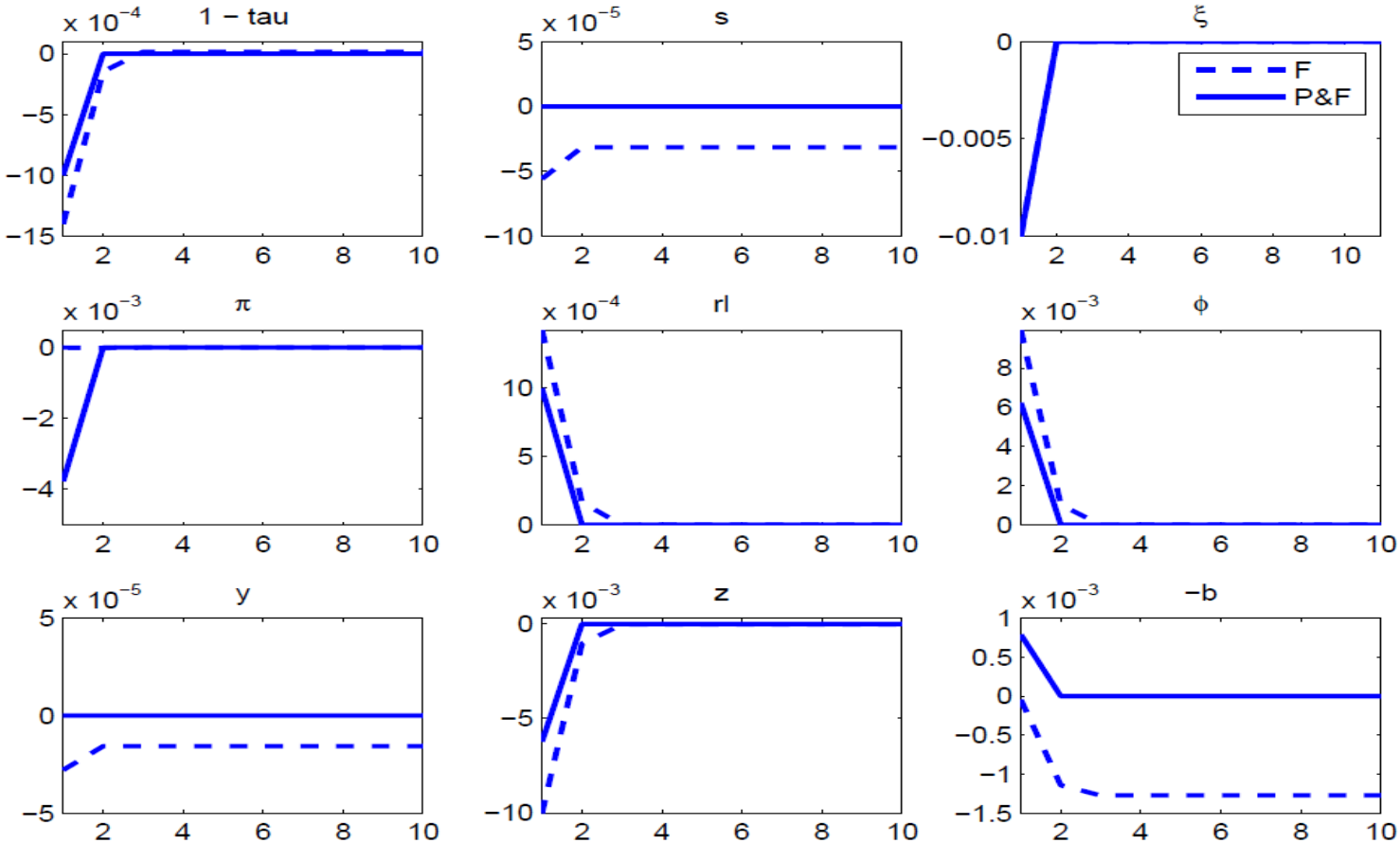
"Price level" vs "price level and fiscal" policies



Restrictions on the price level

- We restrict the price level from moving on impact.
- Credit subsidies are still effective but cannot replicate FB responses.
- They generate permanent increase in debt and reduction in output.
- A destruction of 12% of banks' net worth which increases spreads by 1.5% (as in 2008Q4) results in a permanent increase in real debt of 1.4%.

"Price level and fiscal" vs "fiscal only" policies



Conclusions

- In a financial crisis shouldn't optimal policy provide liquidity?
- To some extent that is what policy is doing here: make sure that liquidity is provided by banks at low cost.
  - That is the role of the policy rate.
  - Because of the ZLB, this can be done with credit subsidies.
- But there is more to liquidity provision than just credit subsidies (or interest rate policy). In this model price level policy is liquidity policy.
- Credit easing is generally not a good alternative. To be desirable, the distortion associated to the financing of the subsidies must be large relative to the resource cost associated to asset purchases.