Monetary Aggregates and Liquidity in a Neo-Wicksellian Framework

by

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- in these models, interest rates transmit directly to aggregate demand
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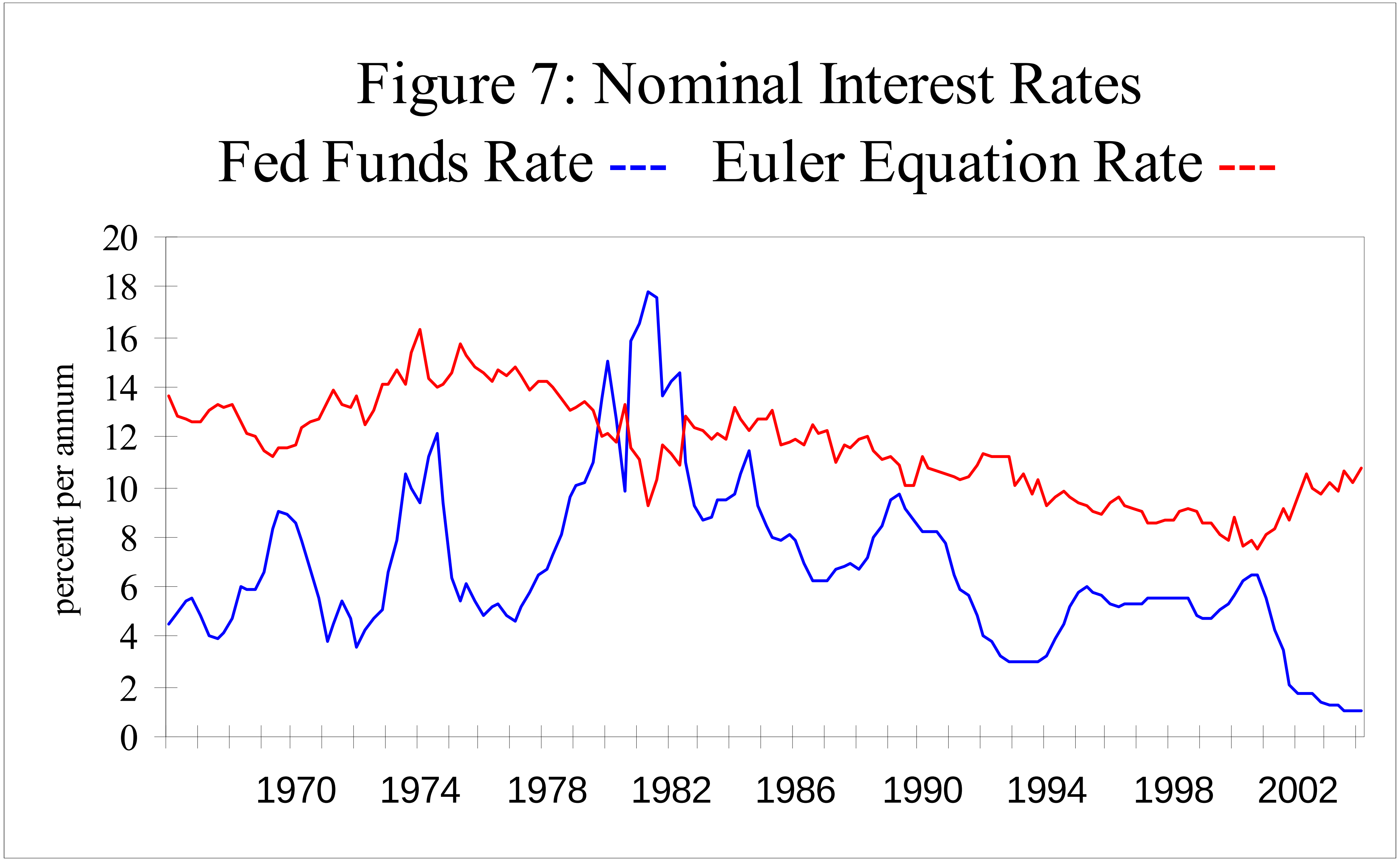
modeling monetary aggregates and financial institutions viewed as a needless complication

Question: Does the Neo-Wicksellian model give an adequate account of macro behavior for the business cycle analyst & policy analyst? What is lost if we take this modeling shortcut?

Several Reasons for Concern with NW Model –

1. Seems to be a disconnect between $i_{ffr,t}$ and $i_{c,t}$

Figure from Canzoneri, Cumby and Diba (*JME*, October, 2007)



2. Concern by some that neo-Wicksellian models “are coherent as far as they go, but that they are incomplete” – Goodfriend and McCallum (2006) and many others: missing markets that are part of transmission mechanism

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3. The recent financial "meltdown".
   Interest rate spreads quite important; recent macro models have them.
   But, no model has a sizing up of credit.
      Risk is priced, interest rate spreads move to clear the markets.
      No: lemons problem; serious information and/or agency problems.
   Should we be developing models of the current meltdown;
      or putting financial markets into models of "normal" times.

In this paper, we

Start with a simple neo-Wicksellian model (our NW model).

Complete the modeling by adding banks and a role for government bonds in transactions technology (our BB model).

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Complete the modeling by adding banks and a role for government bonds in transactions technology (our BB model).

BB model provides a more complete modeling of economy, but NW model has the virtue of simplicity.

Question: Assume BB model represents "truth". Does the NW model give an adequate account of macro behavior for the business cycle analyst & policy analyst?

NW model:

$$U_t = E_t \sum_{j=t}^{\infty} \beta^{j-t} \{\log(c_t - \eta c_{t-1}) + \varphi_{m,t} \log(m_t) - \varphi_n (1+\chi)^{-1} n_t^{1+\chi}\}$$

Cons Euler Eqn: $1/(1 + i_{c,t}) = \beta E_t[(\lambda_{t+1}/\lambda_t)/\Pi_{t+1}]$

where λ_t = MU of wealth

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Monetary and Fiscal Policy Rules:

$$i_{c,t} = 0.8 i_{c,t-1} + 0.2[\bar{i}_c + \theta_\pi(\pi_t - \bar{\pi}) + 0.2(\log(y_t - \log(\bar{y}))] + \varepsilon_{i,t}$$

$$liab_t = liab_{t-1}/\Pi_t + def_t \quad \text{where} \quad liab = m + b$$

$$\ln(g_t) = 0.1 \ln(\bar{g}) + 0.9 \ln(g_{t-1}) + \varepsilon_{g,t}$$

$$\tau_t = 0.1\bar{\tau} + 0.9\tau_{t-1} + 0.1\varphi_f (b_{t-1} - \bar{b}) \quad \text{where} \quad \varphi_f = 0.018 > \bar{r}_c$$

A Standard NNS framework:

- monopolistic firms; c_t is the usual CES bundle of goods.
- fixed firm specific k, no investment.
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BUT:

CASH demand equation: $\varphi_{m,t}/m_t = \lambda_t(I_{c,t} - 1)/I_c$

Two monetary aggregates in NW model: CASH, LIAB

- m_t plays no independent role in transmission mechanism
- $liab_t$ and govt debt management policy do not "matter"

BB model: adds banks and liquid government bonds

Households –

$$U_t = E_t \sum_{j=t}^{\infty} \beta^{j-t} \{\log(c_t - \eta c_{t-1}) + \varphi_{m,t} \log(m_{h,t}) + \varphi_{d,t} \log(d_{h,t})$$
$$+ \varphi_b \log(b_{h,t}) - \varphi_n (1+\chi)^{-1} [\mu n_t^{1+\chi} + (1-\mu) n_{b,t}^{1+\chi}]\}$$

Cash ($m_{h,t}$) and bank deposits ($d_{h,t}$) are used in transactions.

Govt bonds used by banks, money market funds, mutual funds, pension funds & insurance companies to manage liquidity; we only model banks directly, so we put $b_{h,t}$ in utility.

Four monetary aggregates in BB model:

CASH, LIAB, M3 (= M + D), L (= M3 + LIAB)

Competitive Banks –

issue deposits and loans at a cost (the financial frictions)

$$l_{b,t} = Z_l n_{b,t}$$

$$d_{b,t} = Z_d m_{b,t}^{\delta} b_{b,t}^{1-\delta}$$

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Who borrows from banks? Two variants: Households, Firms

We do not model federal funds market directly:

substitutability of fed funds and T-bills $\Rightarrow$ $i_{ffr,t} = i_{g,t}$

$i_{g,t} = 0.8 i_{g,t-1} + 0.2[\bar{i}_g + \theta_\pi(\pi_t - \bar{\pi}) + 0.2(\log(y_t - \log(\bar{y}))] + \varepsilon_{i,t}$

Spread $\equiv I_{c,t} - I_{g,t} > 0$ since bonds have non-pecuniary return

Bank balance sheet:

$$l_{b,t} + m_{b,t} + b_{b,t} = d_{b,t} + a_{b,t}$$

Bank maximizes:

$$E_t\sum_{s=t}^{\infty}\beta^{s-t}\lambda_s[(I_{l,s}/\Pi_{s+1})l_{b,s} + (1/\Pi_{s+1})m_{b,s} + (I_{g,s}/\Pi_{s+1})b_{b,s}$$
$$- (I_{c,s}/\Pi_{s+1})a_{b,s} - (I_{d,s}/\Pi_{s+1})d_{b,s} - w_s n_{b,s}]$$

Bank's FOCs include:

$$I_{d,t} + \kappa_t = I_{c,t}$$

where $\kappa_t = (I_{c,t} - 1)^{\delta}(I_{c,t} - I_{g,t})^{1-\delta}/Z_b\delta^s(1-\delta)^{1-\delta}$

= marg cost of "producing" a loan

(recall Cobb-Douglas form: $d_{b,t} = Z_d m_{b,t}^{\delta} b_{b,t}^{1-\delta}$)

Provision of Liquidity in the BB model:

m_t & b_t provide liquidity services to households and banks

fiscal policy determines total supply of these assets

$liab_t = liab_{t-1}/\Pi_t + def_t$ where $liab = m + b$

OMOs (swaps of m for b) determine composition of liab,

or "effective transactions balances" –

$d_{b,t} = Z_d m_{b,t}^{\delta} b_{b,t}^{1-\delta}$

$U_t = E_t \sum_{j=t}^{\infty} \beta^{j-t} \{ \ldots + \varphi_{m,t} \log(m_{h,t}) + \varphi_b \log(b_{h,t}) + \ldots \}$

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Both monetary and fiscal policy affect liquidity, and this changes the usual conditions for P-level determinacy:

Canzoneri and Diba (*JME*, 2005)

Canzoneri, Cumby, Diba & Lopez-Salido (mimeo, 2006)

Theoretical Implications of Completing the Model:

1. **The "Liquidity Buffering"** effect of liquid govt bonds

Consider a contractionary OMO: b ↑ & m ↓

The transactions services of bonds buffer the credit crunch

In the model, the buffering effect manifests itself in $I_{ct} - I_{g,t}$ ↓

b ↑ ⇒ marg value of b in transactions ↓

(recall: $d_{b,t} = Z_d m_{b,t}^{\delta} b_{b,t}^{1-\delta}$ and U function)

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This model gives one possible explanation of Figure 7, shown earlier.

Implications for Monetary Policy –

1. "Liquidity Buffering" effect of liquid bonds:

   a. Consider an $I_g \uparrow$ policy shock: (a contractionary OMO)

      $I_{ct} - I_{g,t} \downarrow$ to make households and banks hold higher b/m

      a given $I_{g,t} \uparrow$ has less effect on I_c & aggregate demand

   b. Consider systematic component of interest rate rule:

      $i_{g,t} = 0.8 i_{g,t-1} + 0.2[\bar{i}_g + \theta_\pi(\pi_t - \bar{\pi}) + 0.2(\log(y_t - \log(\bar{y}))]$

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3. Bank loans, financial frictions, new ways of transacting, etc.

Figure 1: Interest Rate (Ig) Shock

liquidity buffering effect is apparent

5 to 20% differences in IRFs

NW model

BB model

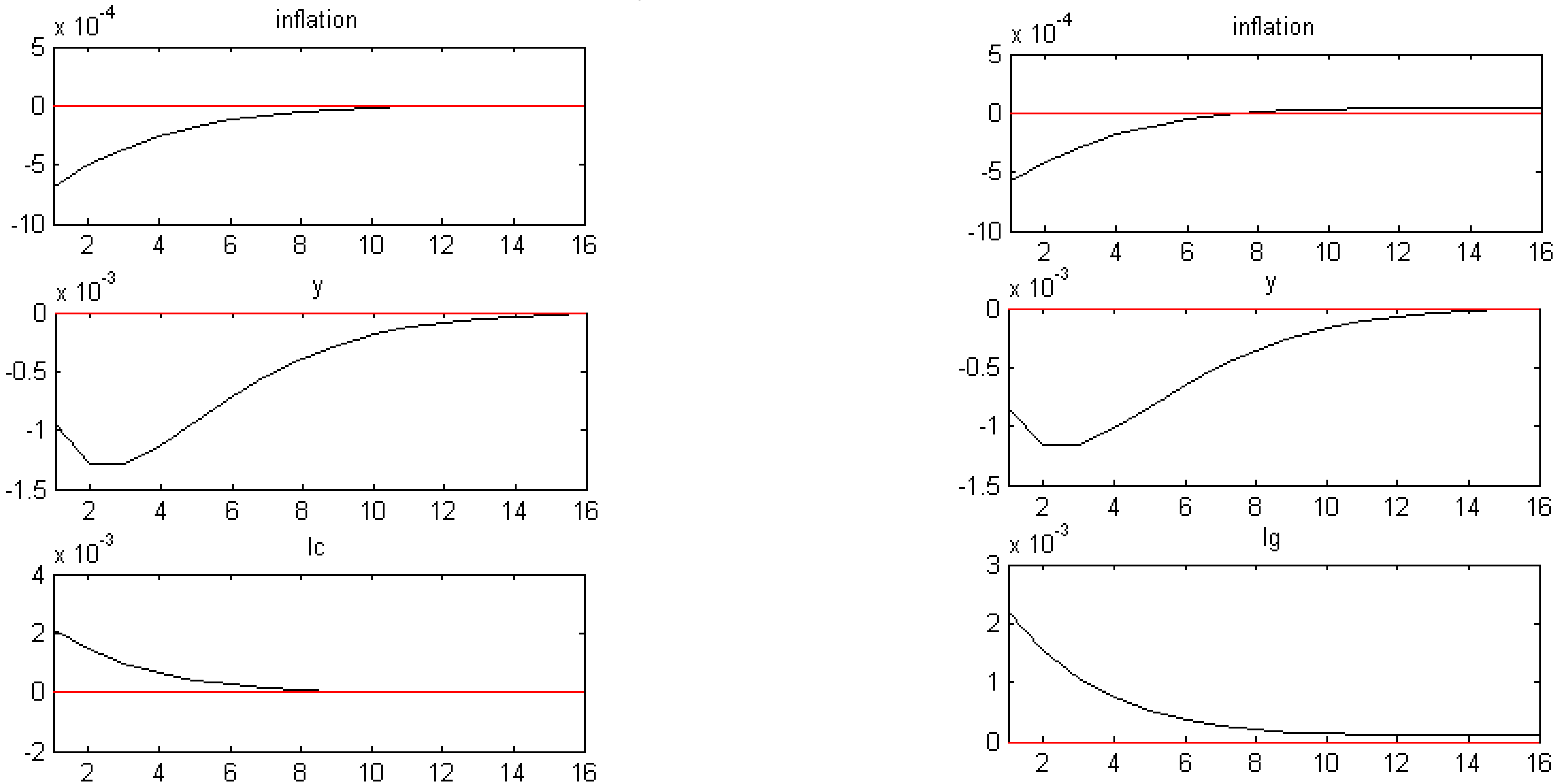
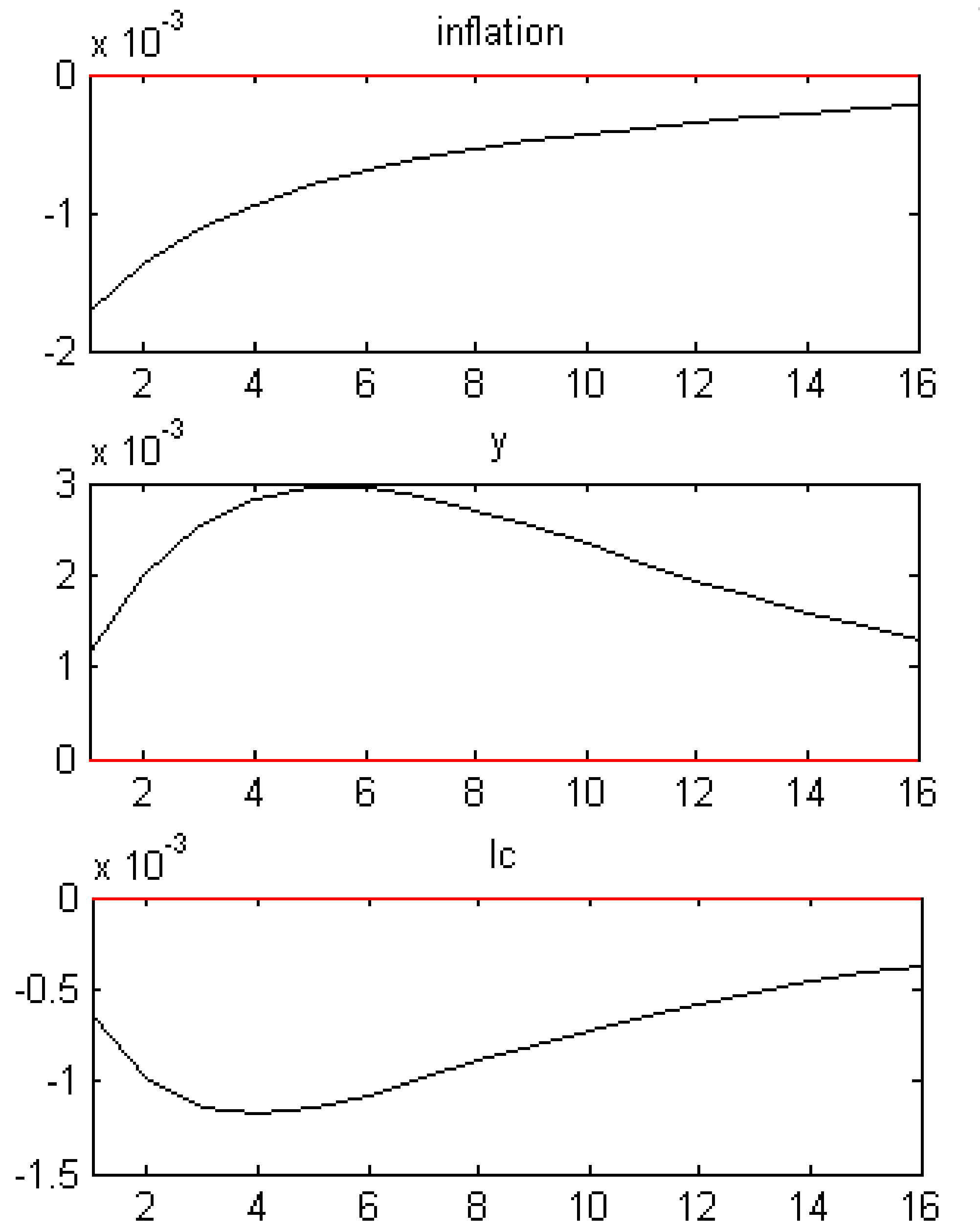


Figure 2: Productivity Shock

liquidity buffering effect apparent

5 to 20% differences in IRFs

NW model



BB model

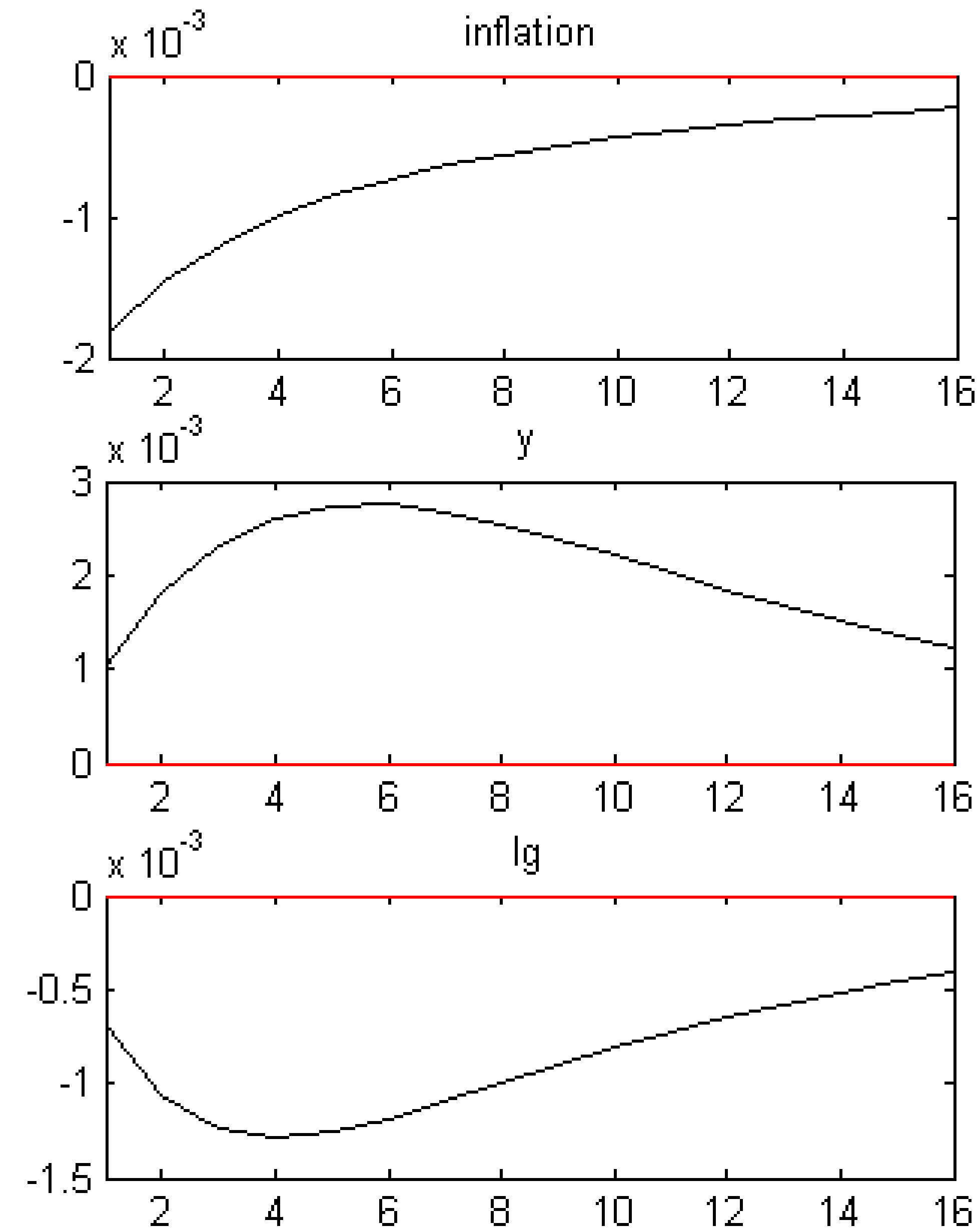
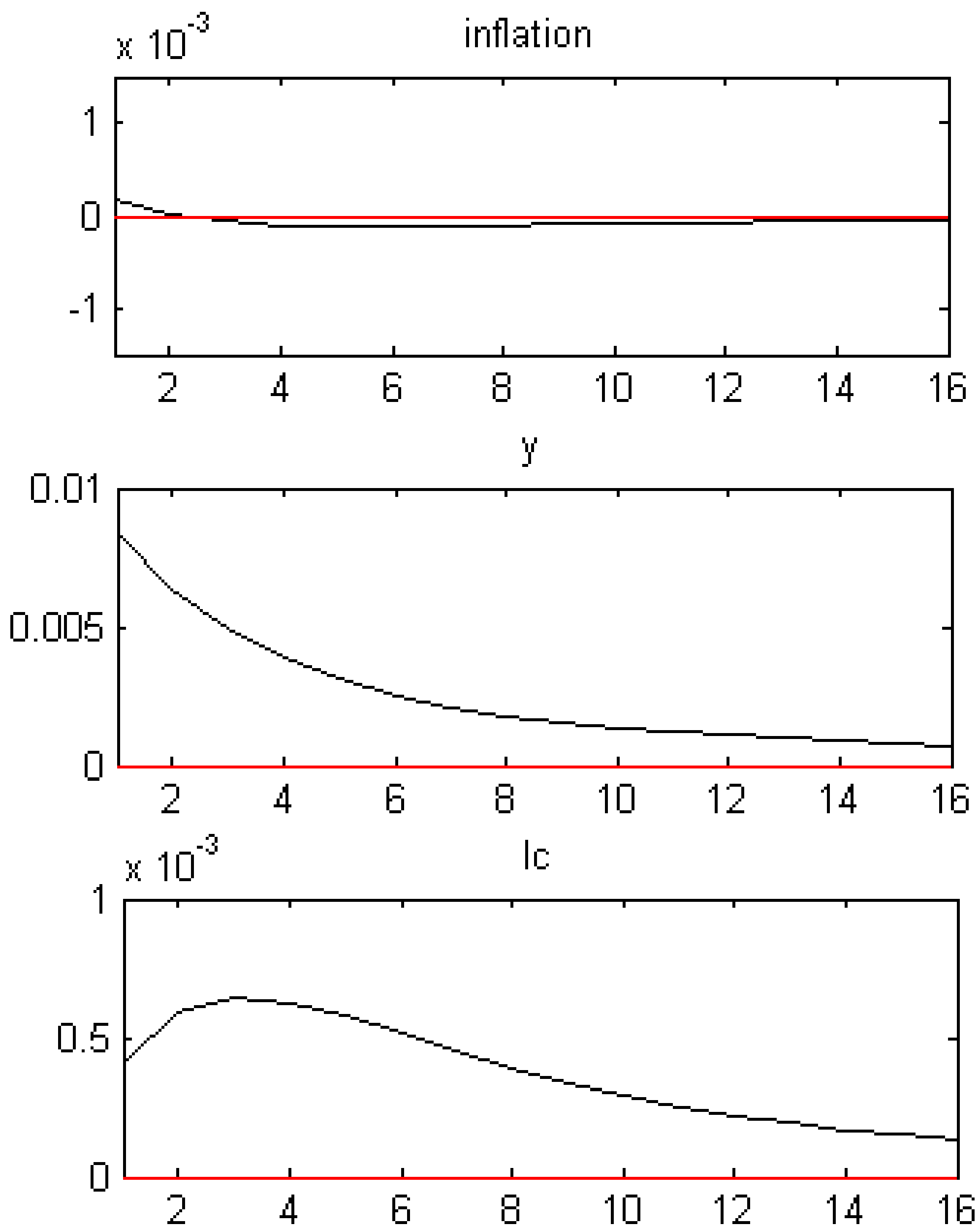


Figure 3: Government Spending Shock (1% of GDP)

liquidity provision effect is apparent; persistence??

NW model



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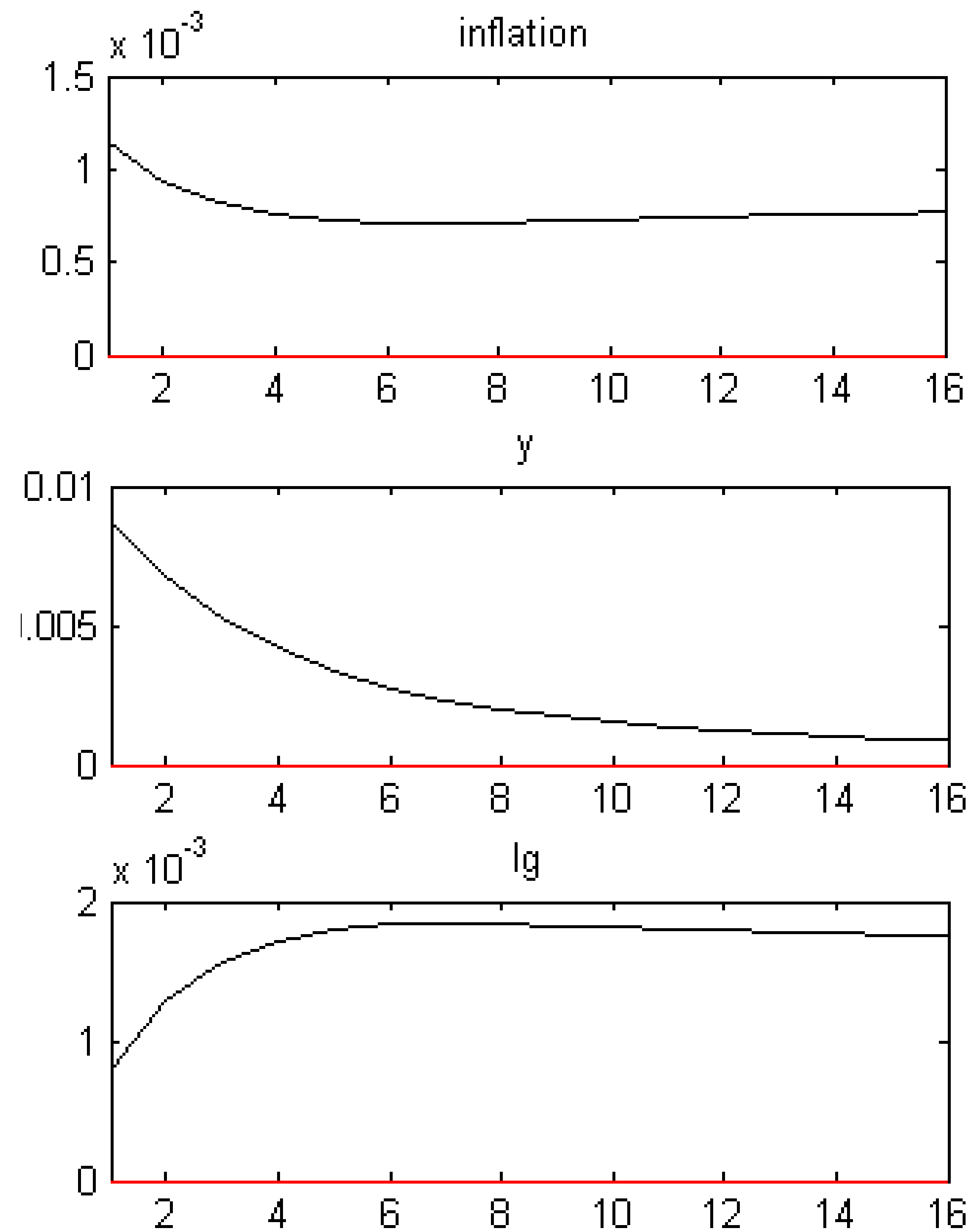


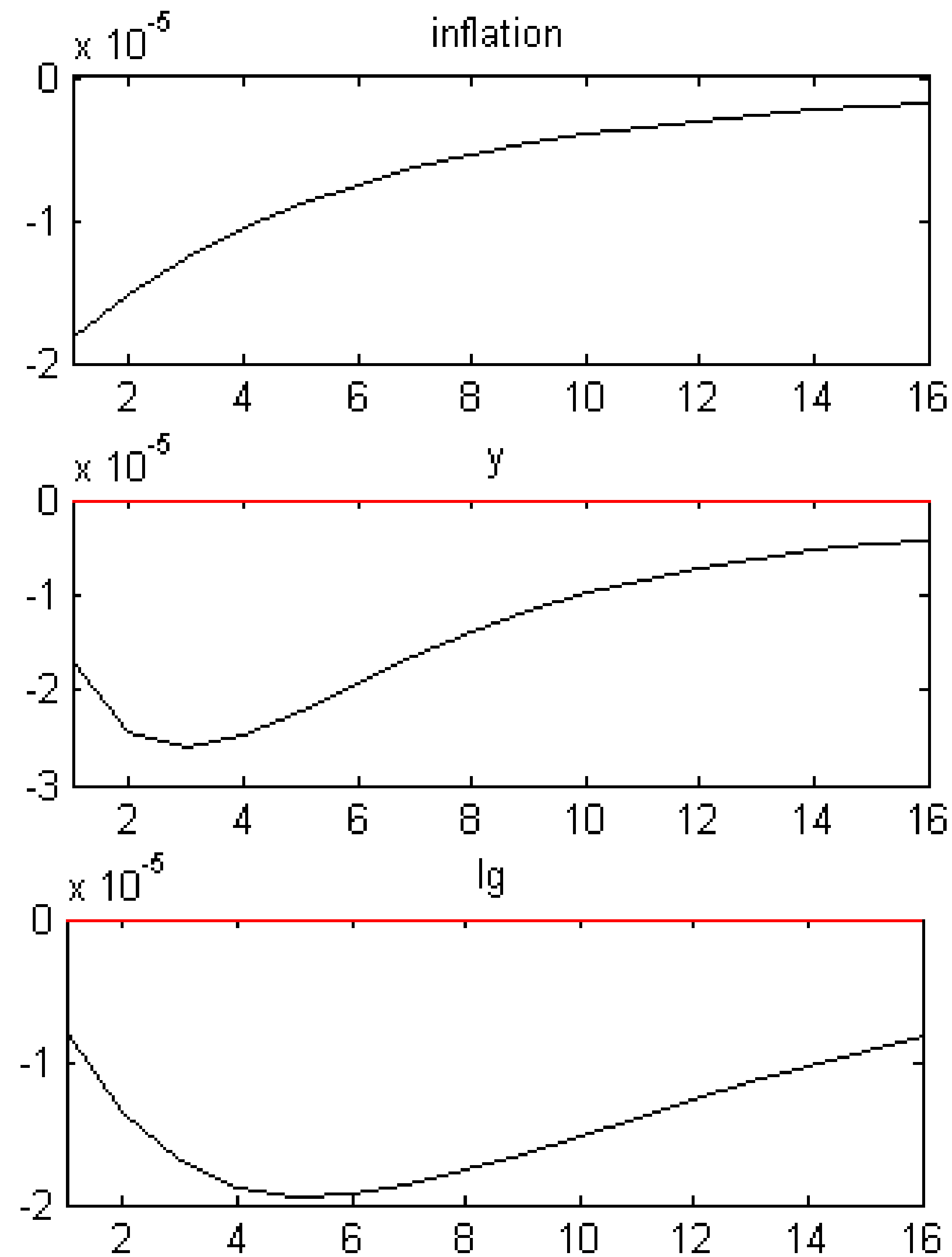
Figure 4: Money Demand Shock

NW model

Pool result:

interest rate rule keeps monetary shocks from passing to real side of the economy

BB model



In Conclusion:

Model in its current state suggests –

1. NW model gives a reasonably accurate account of way Y, Rc, c, w and π respond to Ig shocks and productivity shocks in the more complete BB model.
   A. Differences in IRFs: 5 to 20%
   B. Money demand shocks have real effects, but they are very small.

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   A. Differences in IRFs: 5 to 20%
   B. Money demand shocks have real effects, but they are very small.

2. NW model does not give an accurate account of the way Rc and (especially) π respond to government spending shocks in the more complete BB model. Here BB model seems more reasonable.

Future work –

A. Implications for monetary policy:

1. Many interest rates and spreads: I_c, I_g, I_d, I_l,
2. Which to take as the policy rate?
3. How to use spreads as indicator variables?

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A. Implications for monetary policy:

1. Many interest rates and spreads: I_c, I_g, I_d, I_l,
2. Which to take as the policy rate?
3. How to use spreads as indicator variables?

B. Current modeling may understate importance of adding monetary financial markets and financial frictions.

1. Add financial accelerator(s).
2. Add long term nominal debt: another channel for monetary policy.
3. Add ff market, elements relevant for the current festivities???