Incorporating Real and Financial Sector Data

within an

Inflation Targeting Framework

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November 2006

Elements of Inflation Targeting (IT)

1. Inflation Target: explicit numerical obective for inflation.

2. Targeting Rule: desired path of inflation to target.

3. Interest Rate Policy: Instrument policy that engineers inflation to target along the desired path.

Three Main Points

1. Under IT, Interest Rate Policy should incorporate a broad array of economic information, not just inflation.

2. Absent financial frictions, financial variables may be useful as information variables.

3. With financial frictions, a "substantive" role for financial conditions.

Two Models

1. Conventional New Keynesian model with investment

2. (1) with financial frictions in the spirit of Bernanke, Gertler, Gilchrist and Christiano, Motto and Rostagno.

$$y_t - y_t^n \equiv \widetilde{y}_t = \frac{C}{Y}\widetilde{c}_t + \frac{I}{Y}\widetilde{i}_t \quad \rightarrow$$

Aggregate Demand (IS Curve):

$$\widetilde{y}_t = -\gamma_c \, \widetilde{rr}_t^l + \gamma_i \widetilde{q}_t$$

with

$$\widetilde{rr}_t^l = E_t \sum_{i=0}^{\infty} (r_{t+i} - \pi_{t+1+i} - rr_{t+i}^n)$$

$$\widetilde{q}_t = E_t \sum_{i=0}^{\infty} \beta^i [(1-\beta) \; E_t \widetilde{y}_{t+1} - (r_{t+i} - E_t \pi_{t+1+i} - rr_{t+i}^n)]$$

Aggregate Supply (Phillips Curve):

$$\pi_t = \lambda \widetilde{y}_t + \beta \; E_t \pi_{t+1} + u_t$$

with

$$u_t = -\kappa \widetilde{q}_t + \nu \mu_t$$

Interest Rate Rules

1. Simple Taylor Rule:

$$r_t^* = \phi \pi_t$$

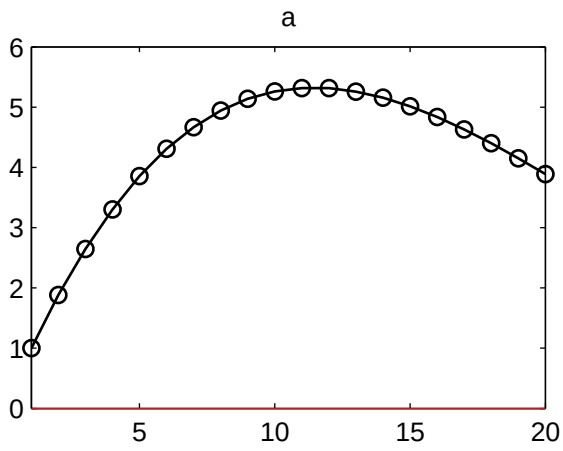
2. (1) adjusted for rr_t^n:

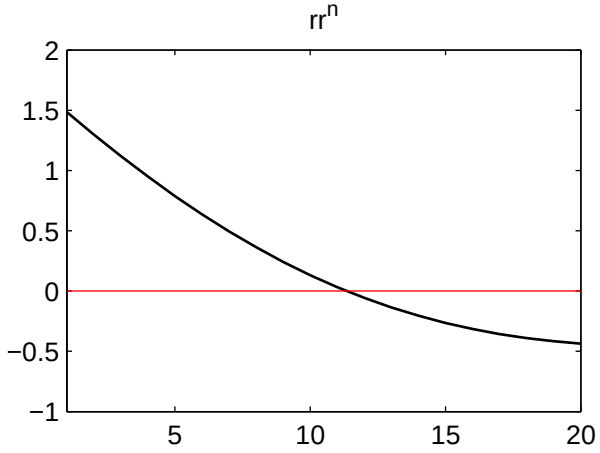
$$r_t^* = rr_t^n + \phi \pi_t$$

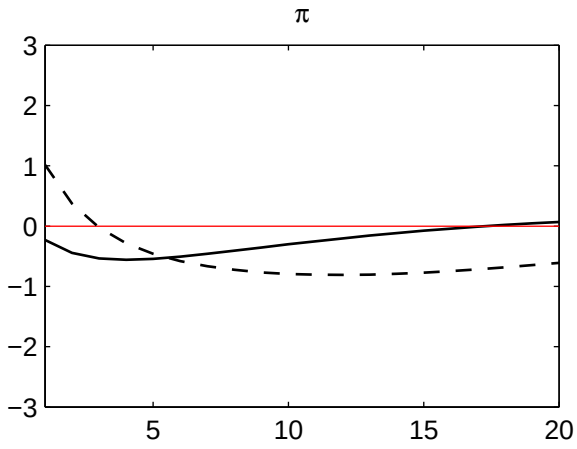
3. (1) or (2) with smoothing:

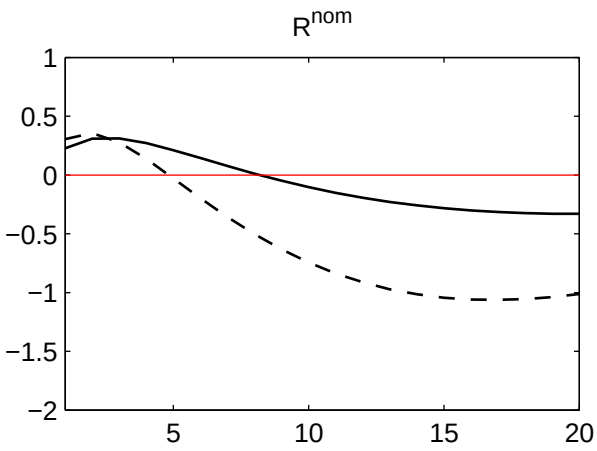
$$r_t = (1 - \rho) r_t^* + \rho r_{t-1}$$

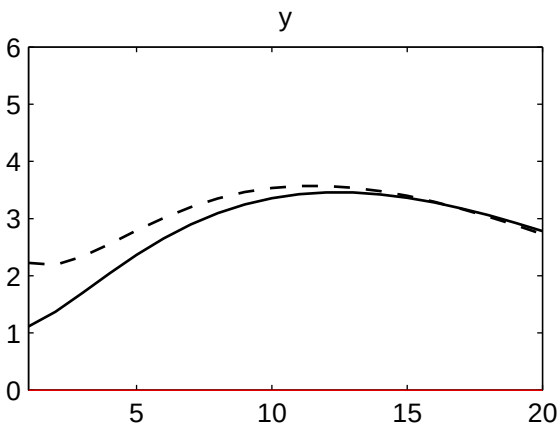
Baseline Model: Positive Shock to Technology Growth

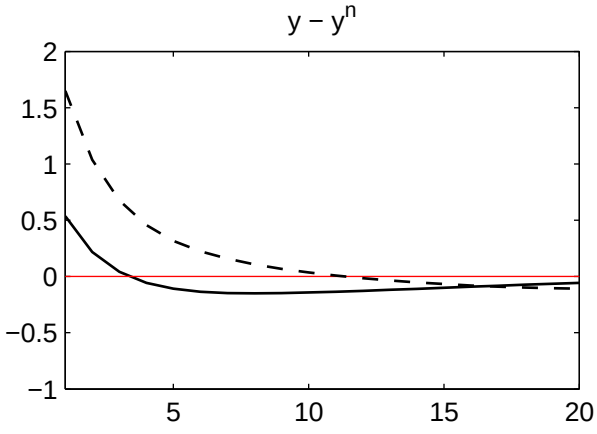












——— $R_t = (1 - \rho_R)\,(rr_t^n + \phi_\pi\,\pi_t) + \rho_R\,R_{t-1}$

– – – $R_t = (1 - \rho_R)\,\phi_\pi\,\pi_t + \rho_R\,R_{t-1}$

Financial Market Frictions

Let: $rr^k \equiv$ required real return on capital

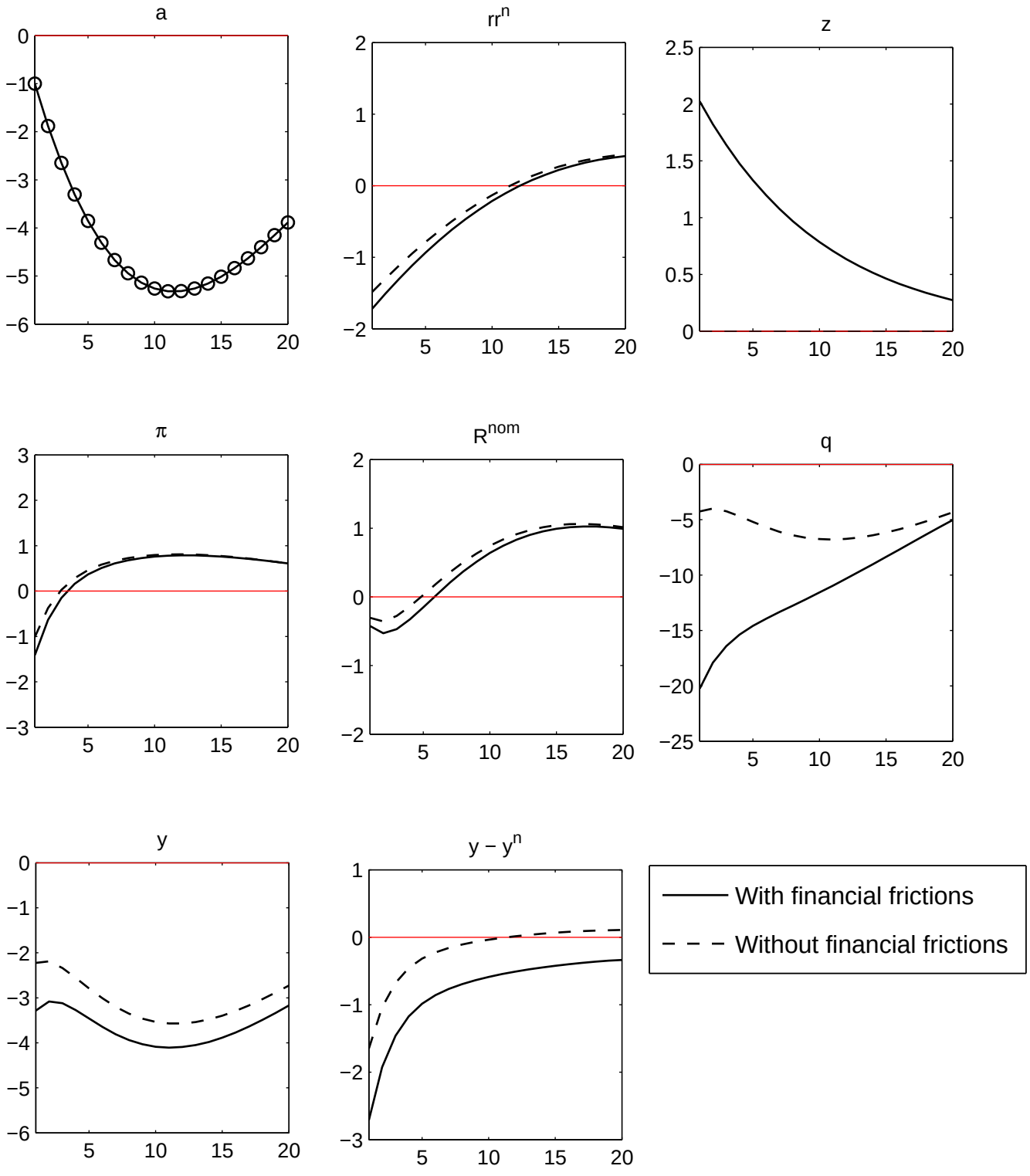
$z_t \equiv$ external finance premium:

$$rr^k = z_t + (r_t - E_t\pi_{t+1} - rr_t^n)$$

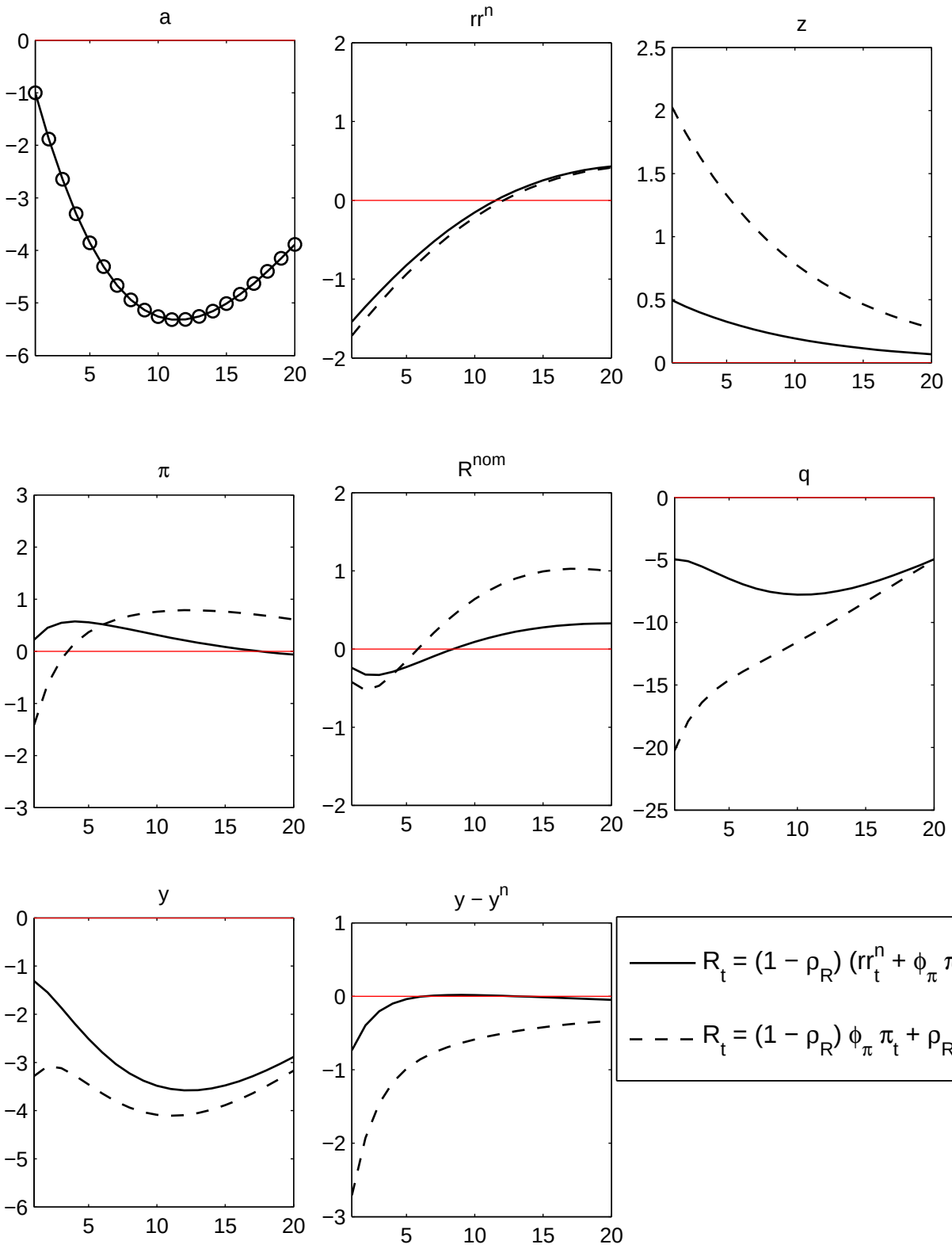
with

$$z_t = -\eta(q_t - E_{t-1}q_t) + \rho_z z_{t-1}$$

Negative Shock with and without Financial Frictions



Financial Frictions with and without Adjusting to rr^n



Key Issue: rr_t^n not directly obserable:

- In principle can use a mixture of theory and data. But estimates are very noisy.
- Unexpected demand and inflation may reveal information about about rr_t^n.
- Financial market indicators may be helpful, but caution in order!

Formally

$$r_t = (1-\rho)[E_t\{rr_t^n \mid I_t\} + \phi\pi_t] + \rho r_{t-1}$$

- May want to include financial variables in I_t.
- In this example, z_t and q_t may be helpful
- Not the same as targeting z_t and q_t!

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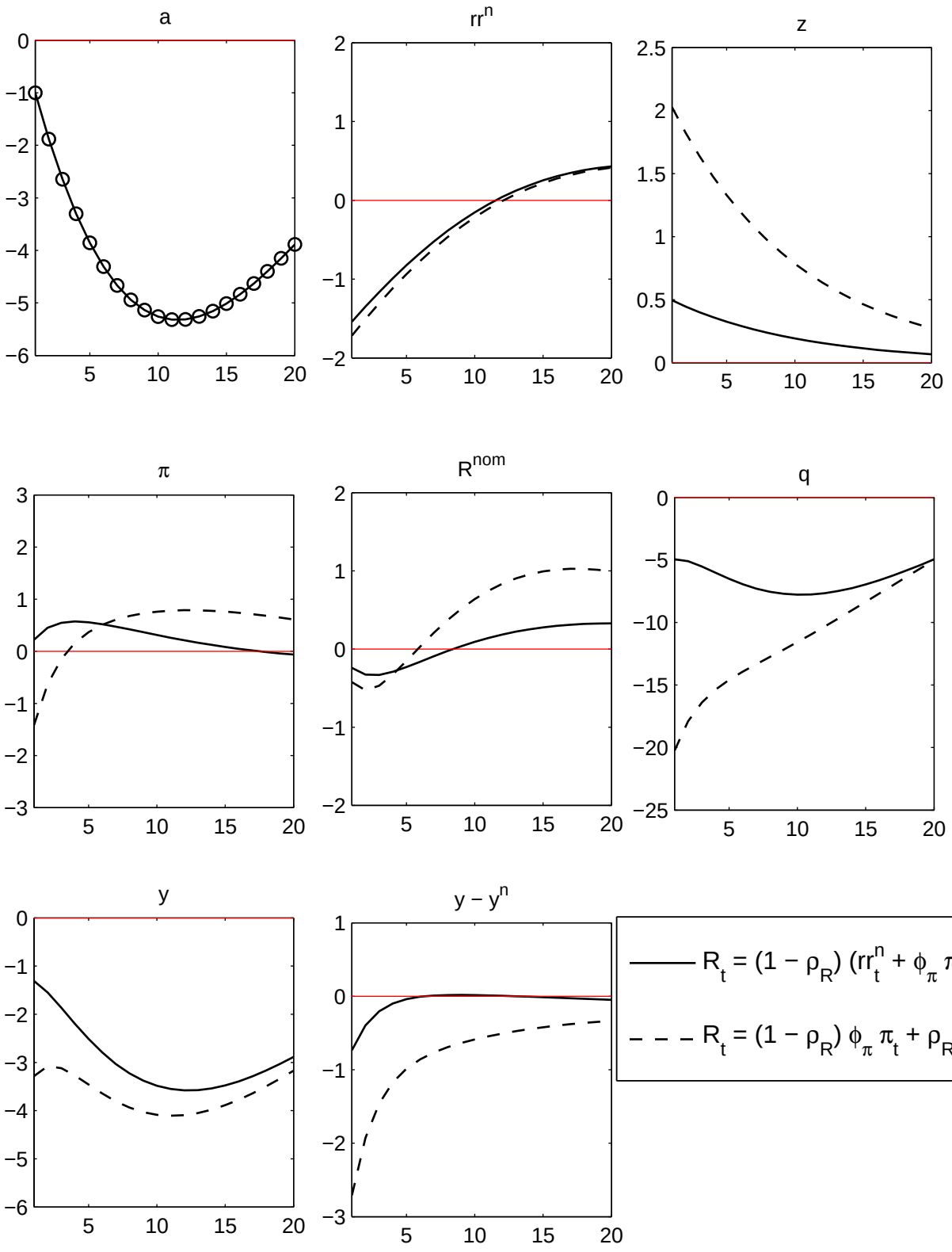


Caveats

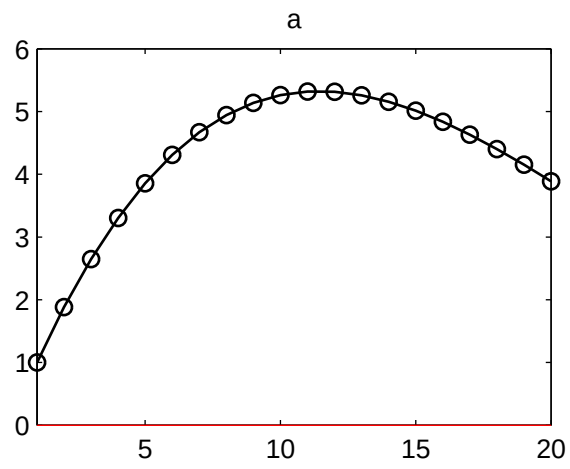
1. Correlation of financial variables with rr_t^n may depend on shock and policy rule

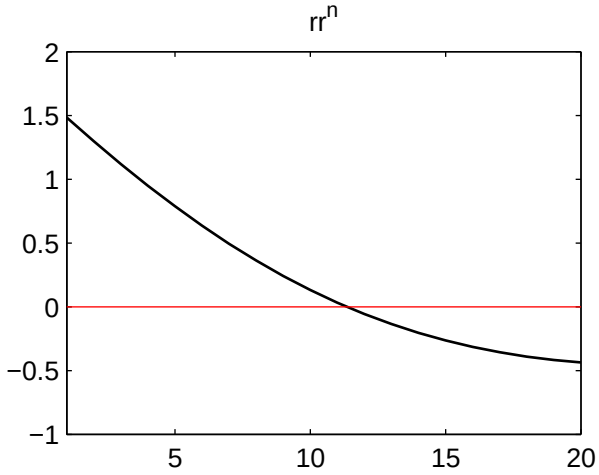
2. Financial variables can be noisy (bubbles, liquidity prob.)

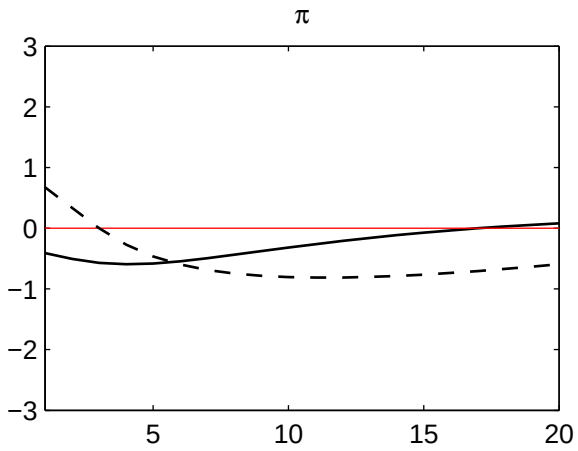
3. Credit? Financial innovation, countercyclical credit demand to finance inventories, etc.

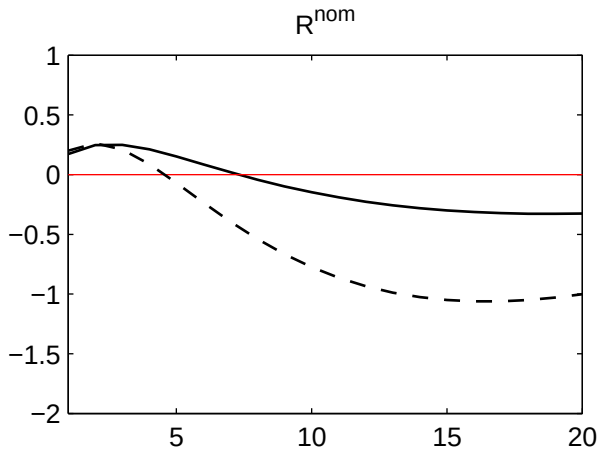
4. Money? not linked to credit in U.S.

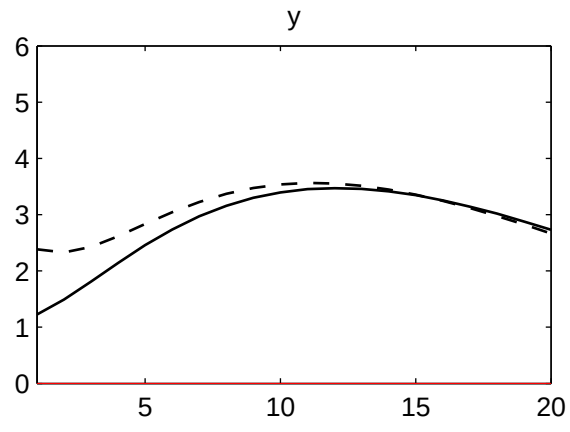
Baseline Model: Positive Shock to Technology Growth
Wage rigidity

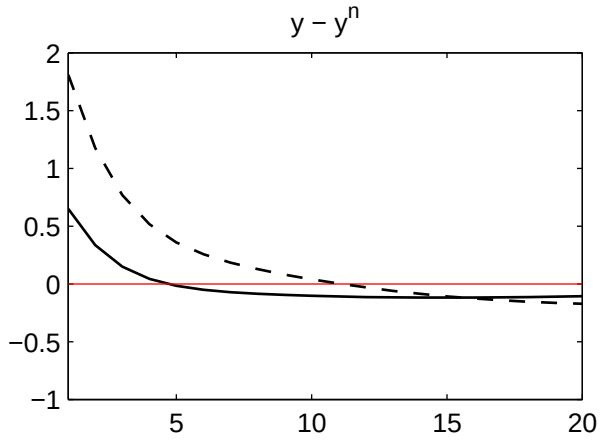












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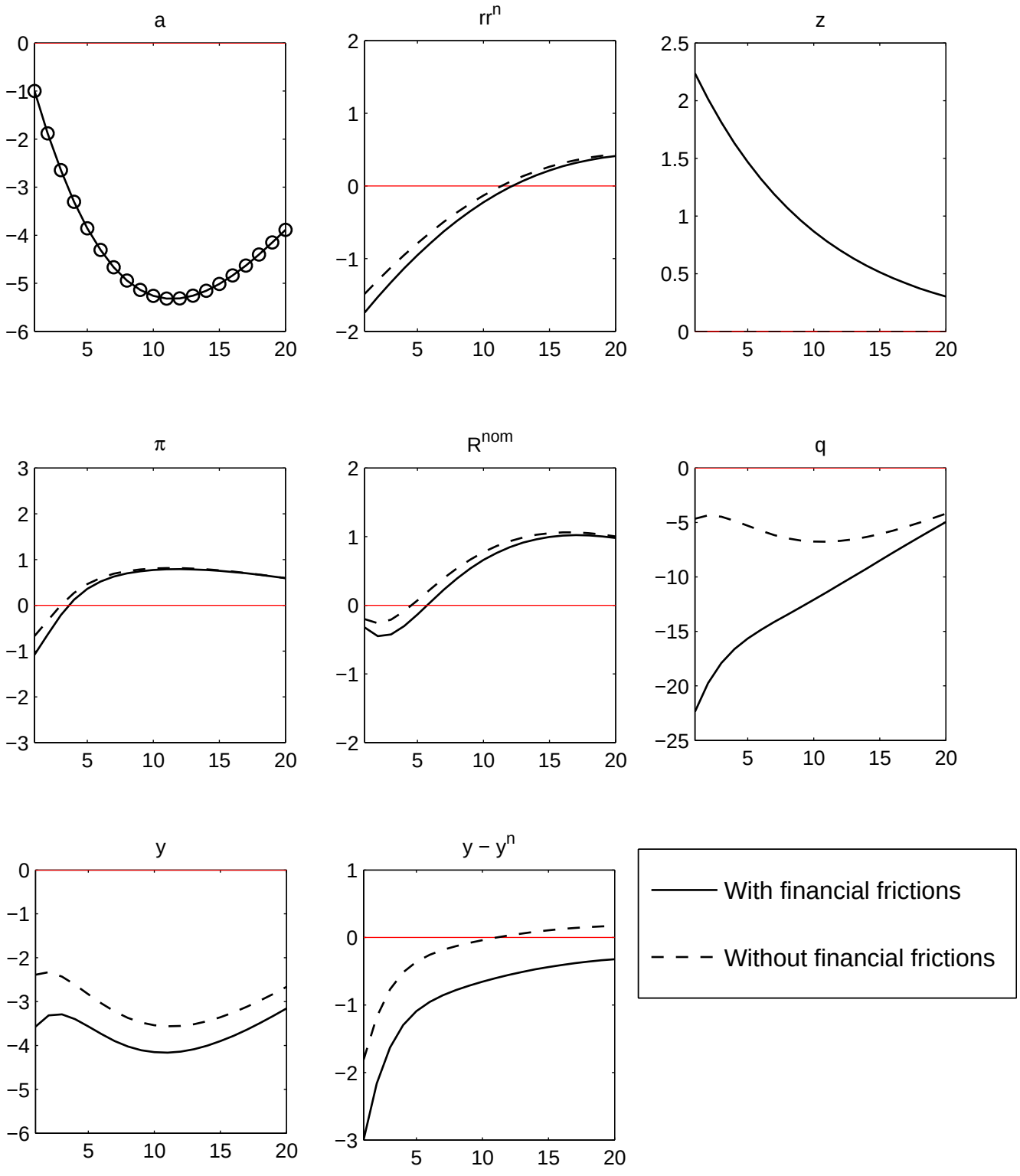

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