



**INSTITUTE FOR
CAPACITY DEVELOPMENT**

W-3: Labor Market Rigidities and The Effect of Oil Price Shocks

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Course on Monetary and Fiscal Policy Analysis with DSGE
Models (JV25.29)

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Question 1

- We look at how real wage rigidities can affect the transmission of oil price shocks to the economy.
- In the file [Blanchard_Gali.mod](#) we programmed the model with commodities oil and real wage rigidities.

A NK Model With Commodities and Wage Rigidities

(1) Production function

$$q_t = a_t + (1 - \alpha)l_t + \alpha m_t$$

(2) Consumption basket

$$c_t = (1 - \chi)c_{q,t} + \chi c_{m,t}$$

(3) CPI Inflation

$$\pi_{c,t} = \pi_{q,t} + \chi(rm_t - rm_{t-1})$$

(4) Relative factor demand

$$rw_t = (1 - \chi)rm_t + m_t - l_t$$

(5) Relative goods demand

$$rm_t = c_{q,t} - c_{m,t}$$

(6) Labor supply

$$rw_t = (1 - \gamma)(c_t + \phi l_t) + \gamma rw_{t-1}$$

where γ measures real wage rigidities.

A NK Model With Commodities and Wage Rigidities

(7) Consumption function

$$c_t = E_t c_{t+1} - (i_t - E_t \pi_{t+1})$$

(8) Monetary policy rule

$$i_t = \phi_\pi \pi_{q,t}$$

(9) Domestic inflation

$$\pi_{q,t} = \beta E_t \pi_{q,t+1} + \kappa[(1-\alpha)wr_t + (\alpha + (1-\alpha)\chi)rm_t - a_t]$$

(10) Resource constraint

$$c_t = q_t - \chi rm_t - \eta[(1-\alpha)rw_t + (\alpha + (1-\alpha)\chi)rm_t - a_t]$$

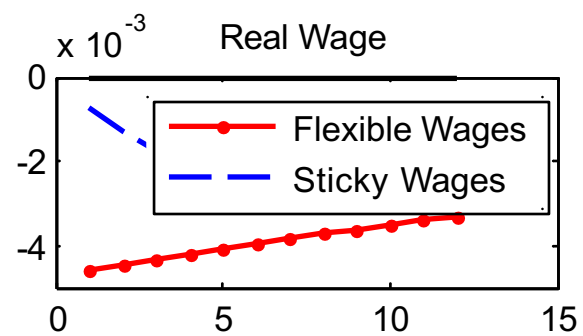
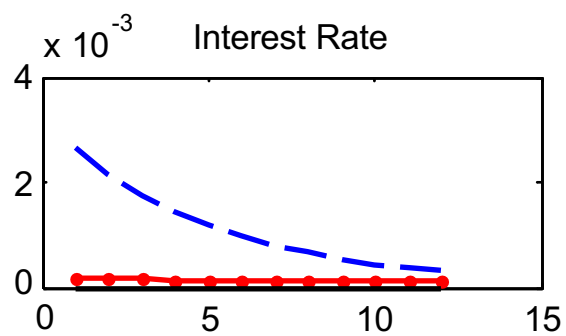
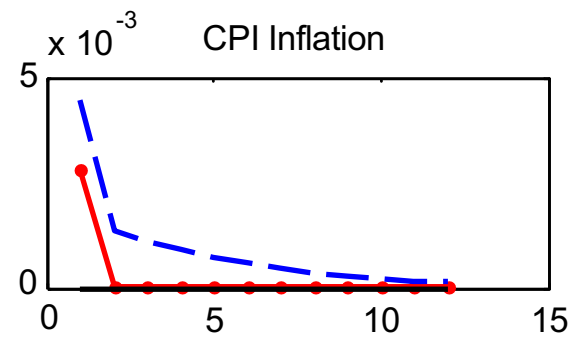
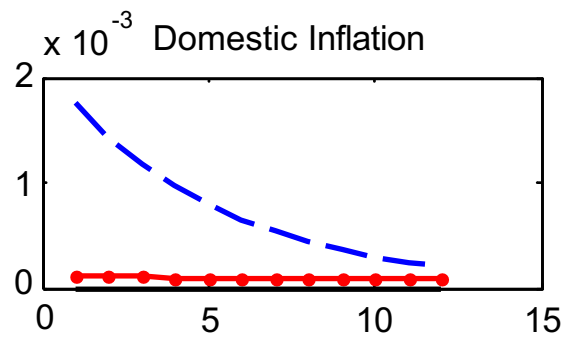
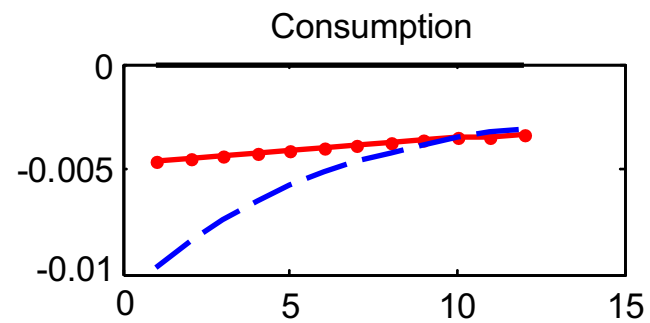
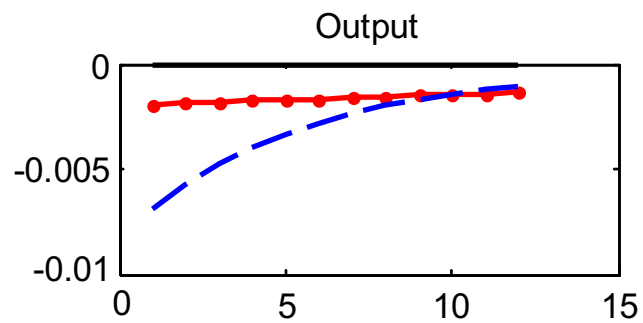
where $\eta = \alpha / (\mu^p - \alpha)$, and μ^p is the price mark-up.

Baseline Calibration

```
beta_C      = 0.99;  
alpha_bar   = 0.012;  
chi         = 0.017;  
gamma       = 0;  
sigma       = 1;  
sigma_L     = 1;  
theta_p     = 0.75;  
alpha_p     = 0;  
phi_piq     = 1.5;  
mkp         = 1.2;  
eta         = alpha / (mkp - alpha) ;  
  
rho_a       = 0.95;  
rho_rm     = 0.97;
```

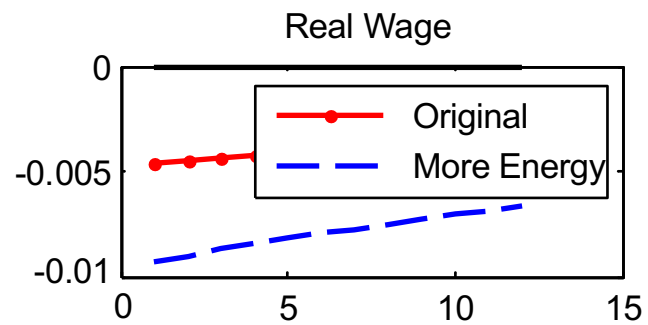
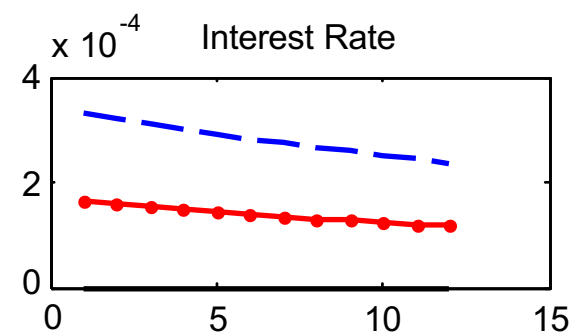
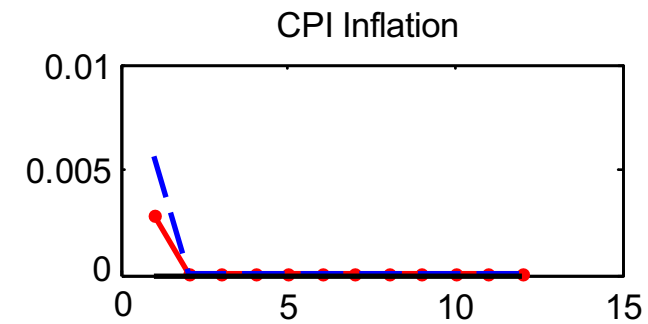
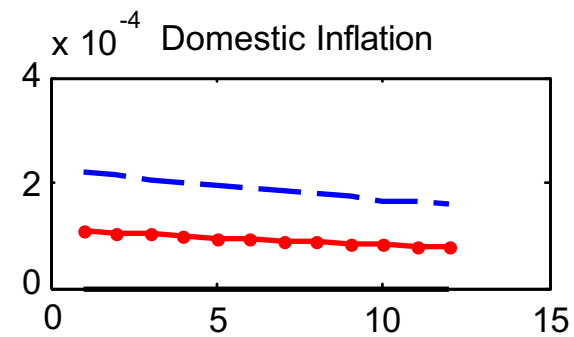
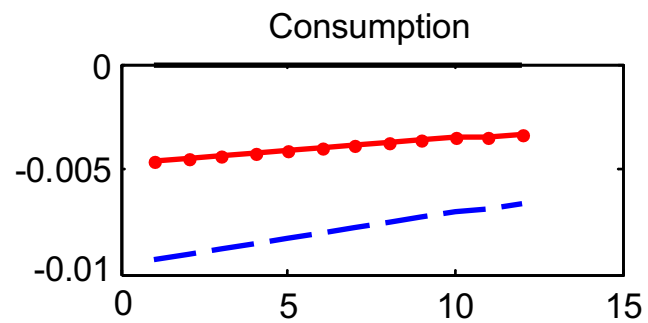
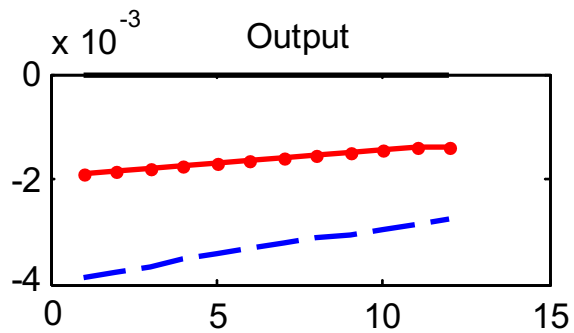
Question 1

- (A) Compute the impulse response functions to an **oil shock** in the original model and when the degree of wage rigidity is very high ($\gamma=0.95$). Discuss the differences.
- Note: In the .../W-2/Oil/**Q1a** folder you can run the file IRFS.m, which calls the model with the two calibrations and shows the impulse responses.



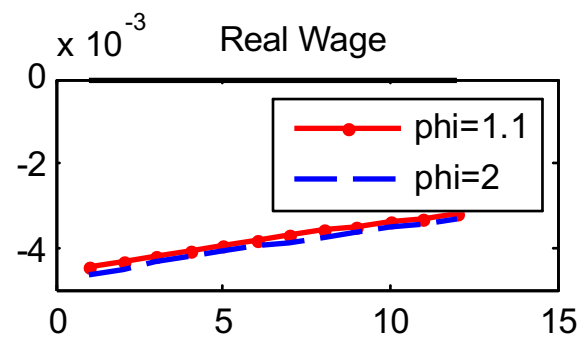
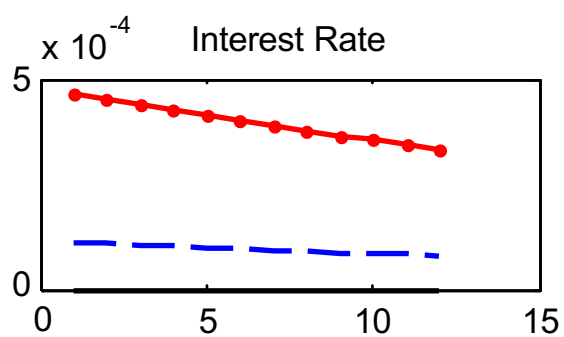
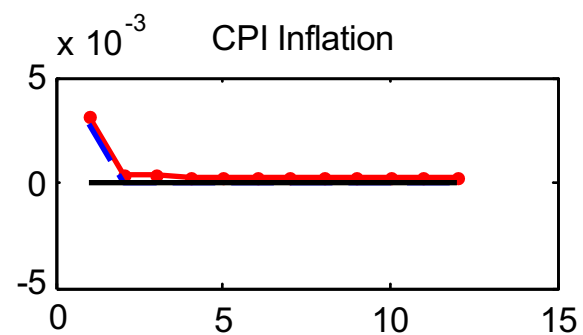
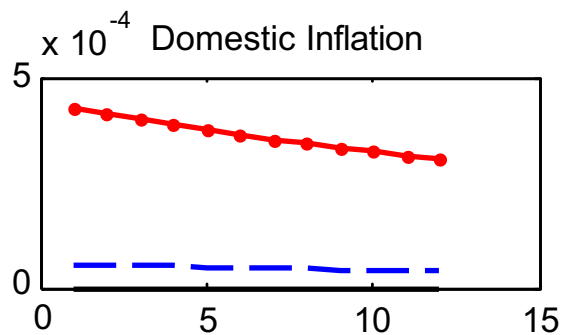
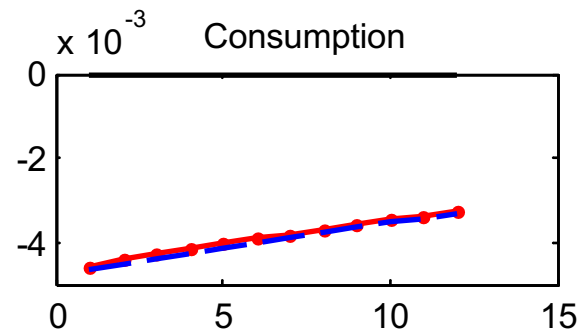
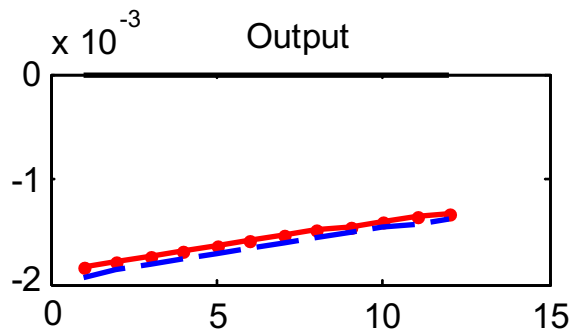
Question 1

- (B) Compute the impulse response functions in the original model and when the use of energy in the economy is doubled. Discuss the differences.
- Note: In the .../W-2/Oil/Q1b folder you can run the file IRFS.m, which calls the model with the two calibrations and shows the impulse responses.



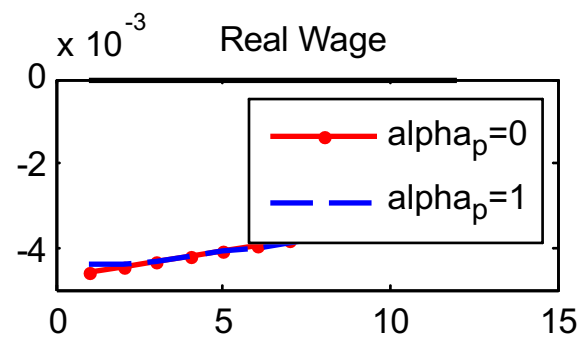
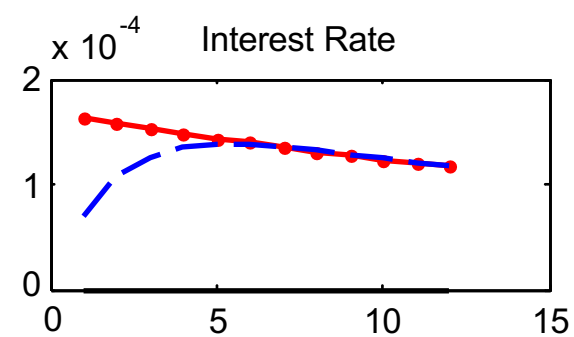
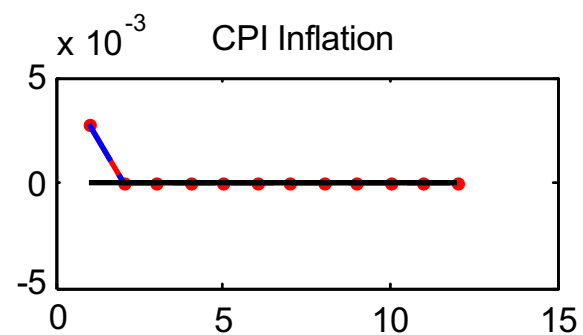
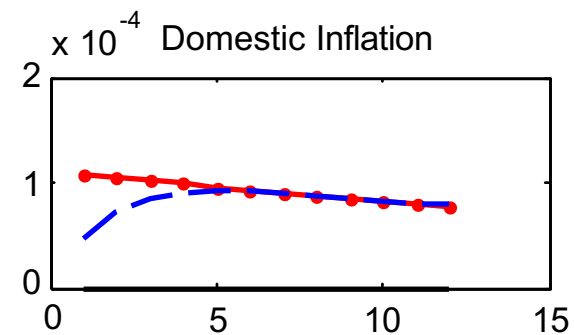
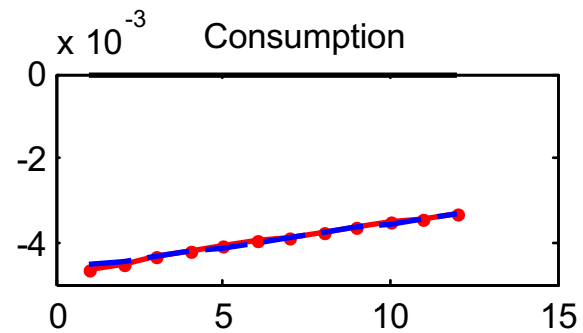
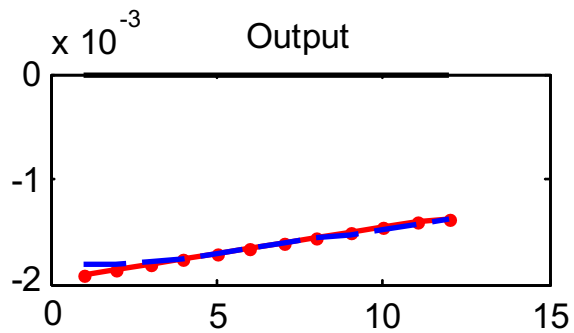
Question 1

- (C) Compute the impulse response functions in the original model and when the coefficient of the response to inflation in the Taylor rule is 1.1 and when it is 2. Discuss the differences.
- Note: In the .../W-2/Oil/Q1c folder you can run the file IRFS.m, which calls the model with the two calibrations and shows the impulse responses.



Question 1

- (D) Compute the impulse response functions in the original model and when the degree of price indexation is very high ($\alpha_p=1$). Discuss the differences.
- Note: In the .../W-2/Oil/Q1d folder you can run the file IRFS.m, which calls the model with the two calibrations and shows the impulse responses.



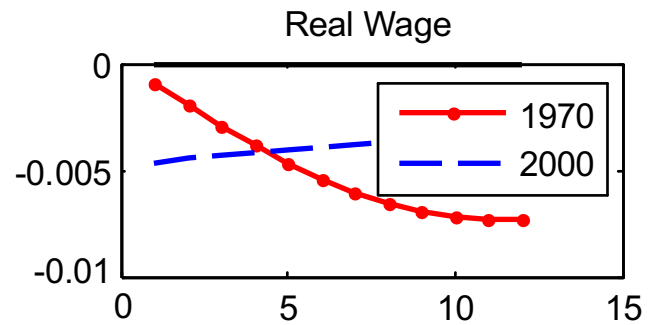
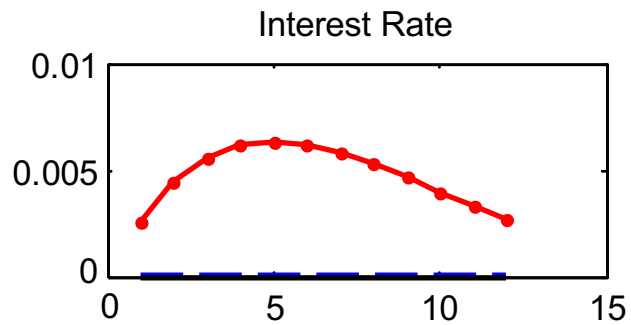
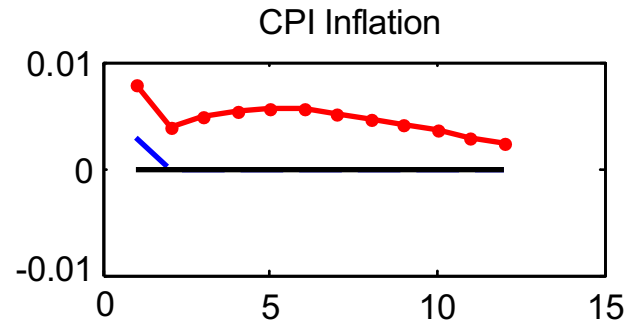
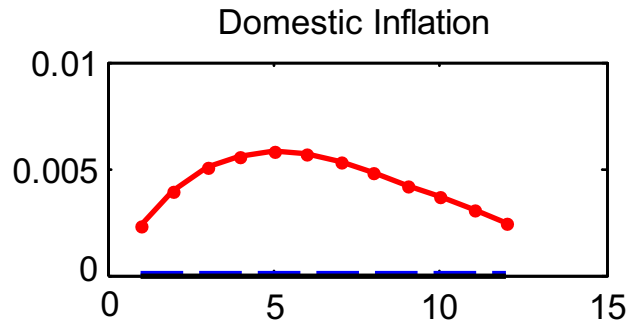
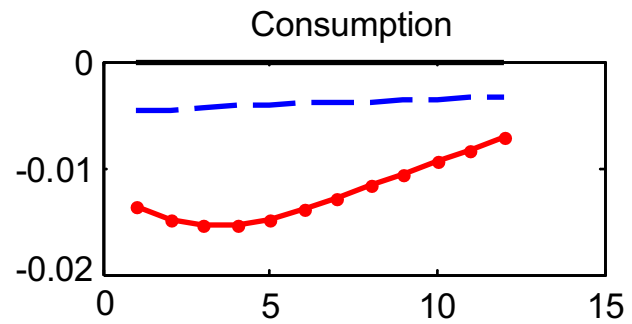
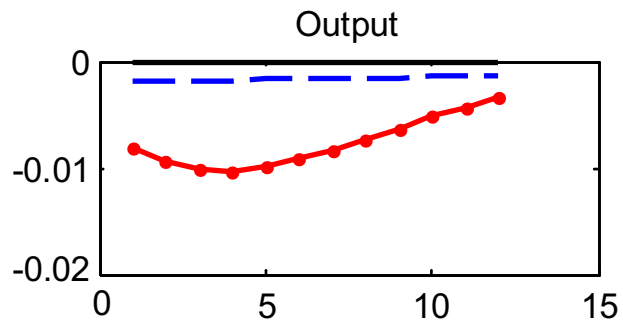
Question 1

- (E) Compute the impulse response functions with all of the ingredients. Use the 1970s calibration assuming:

- Wage rigidities of 0.95.
- Use of energy doubled.
- Response to inflation of 1.1
- Price indexation equal to 1.

Use a calibration for the 2000s as in the file `blanchard_gali2000.mod`. Compare the results.

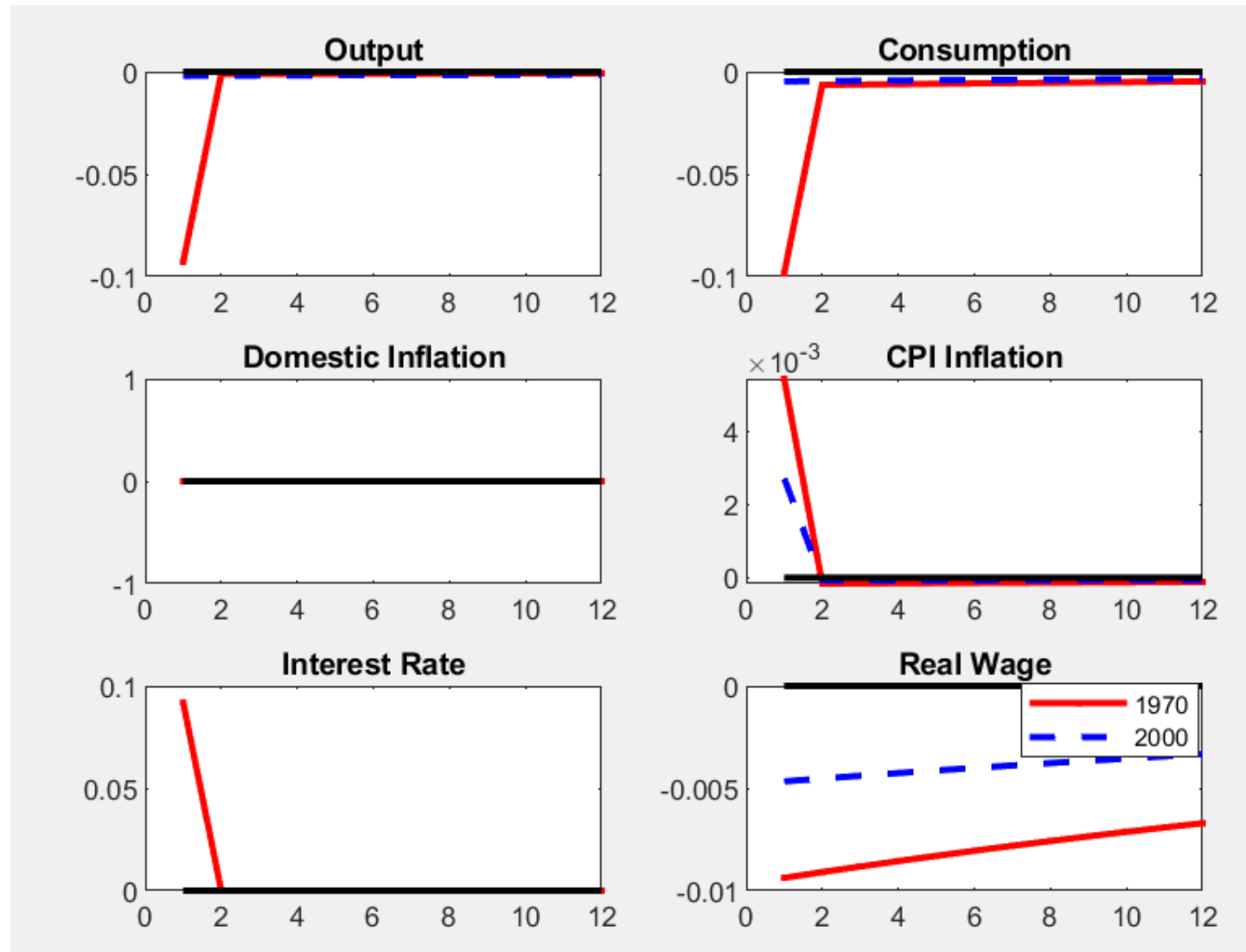
- Note: In the `.../W-2/Oil/Q1e` folder you can run the file `IRFS.m`



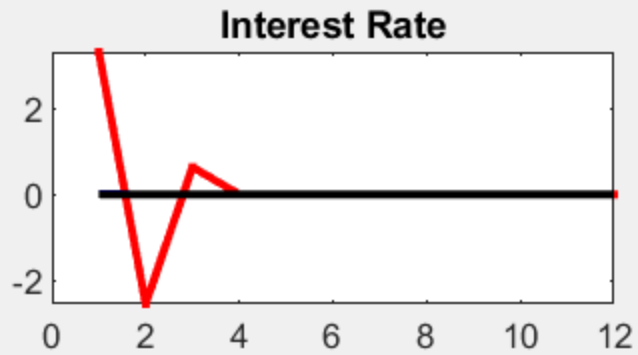
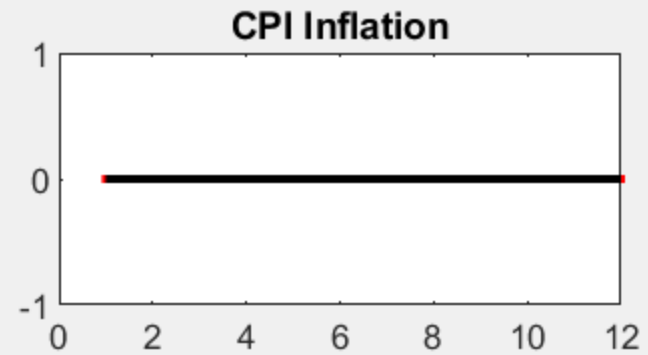
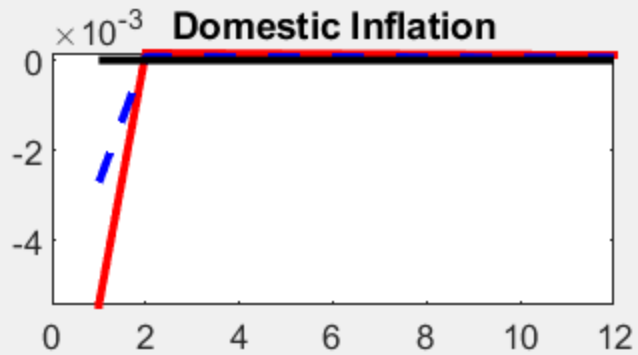
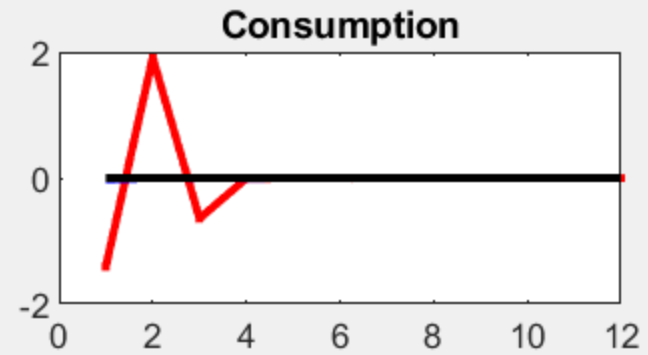
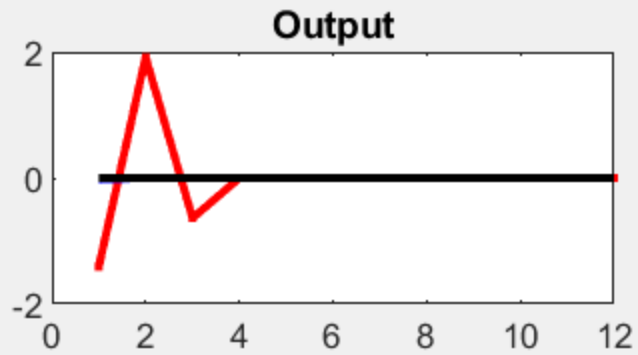
Question 1

- (F) Finally, discuss, with the two calibrations (1970s versus 2000s) what would be the effects of a policy that seeks complete stabilization of domestic inflation or of the CPI. Under which regime is it more costly to stabilize inflation?
- Note: Substitute the monetary policy rule
$$r_{nom} = \phi_{\pi} \pi_t$$
by
$$\pi_t = 0; \quad (\text{for strict domestic inflation targeting}) , \text{ or}$$
$$\pi_t^c = 0; \quad (\text{for strict CPI inflation targeting})$$
- Note: In the ../W-2/Oil/Q1f drive you can run the IRFS.m file. Be careful to change the monetary policy rule in the line 50 of both MOD files.

$\pi q = 0;$

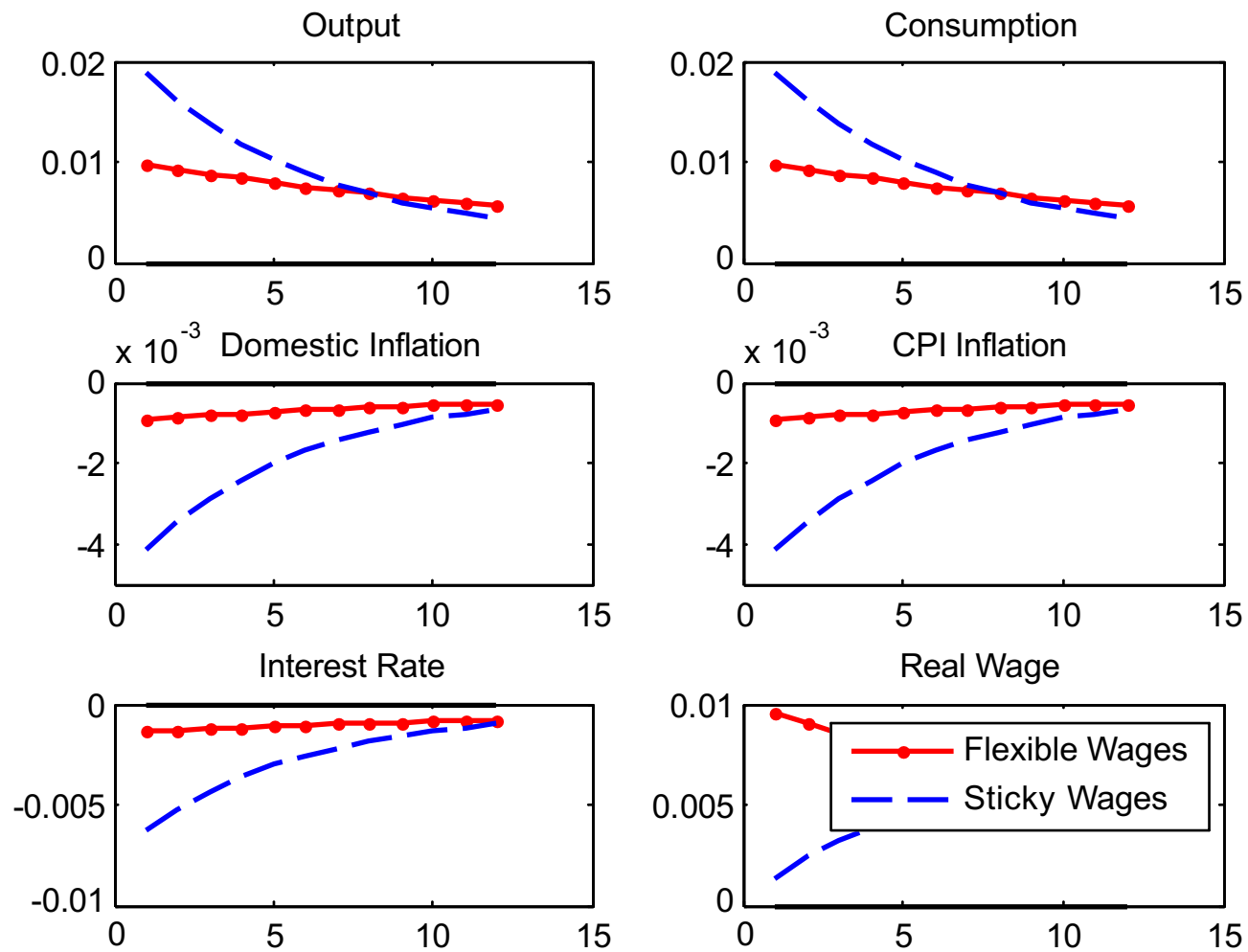


pic=0;



Question 2

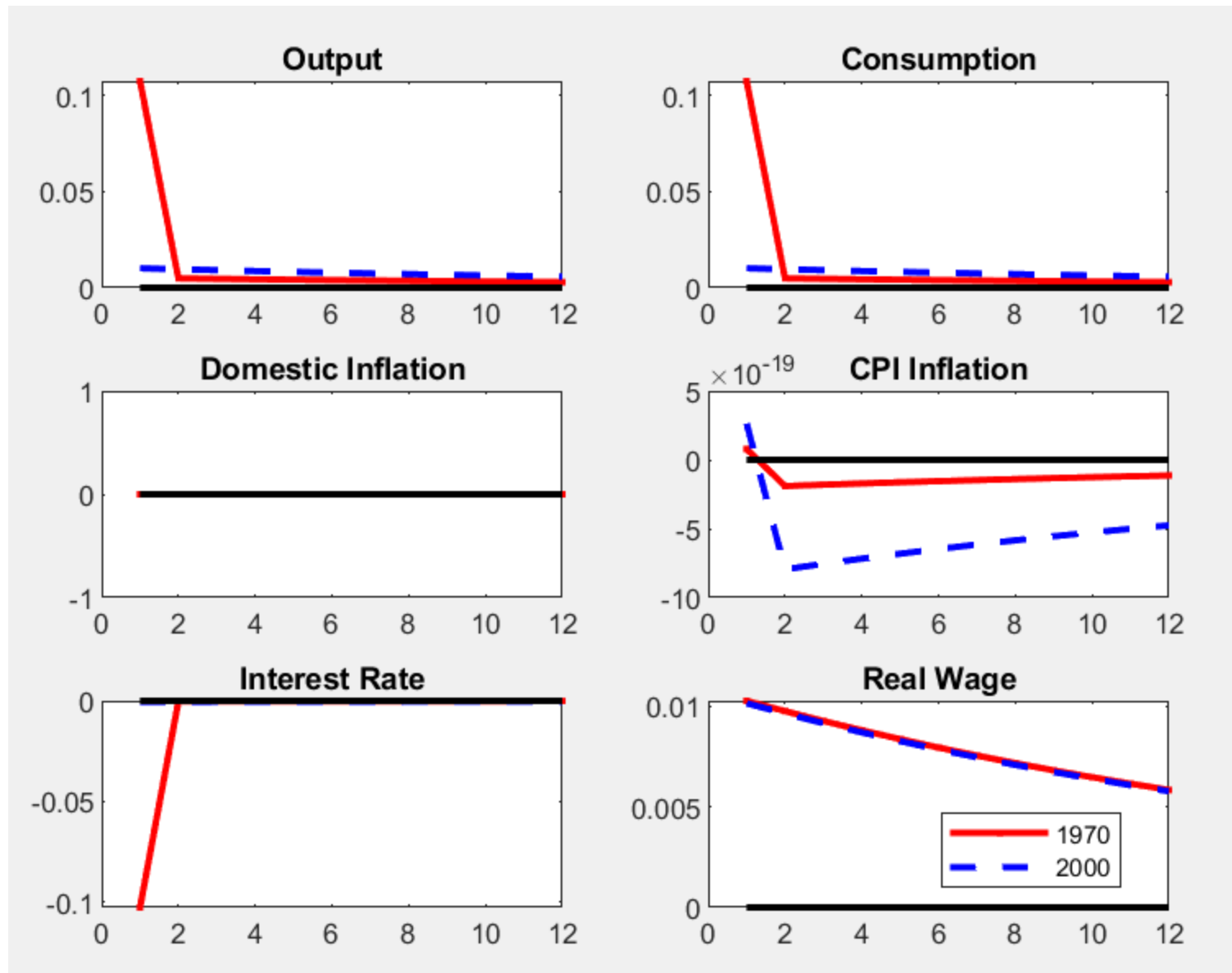
- (A) Compute the impulse response functions to a **technology shock** in the original model and when the degree of wage rigidity is very high ($\gamma=0.95$). Discuss the differences.
- Note: In the .../W-2/Tech/**Q2a** drive you can run the file IRFS.m, which calls the model with the two calibrations and shows the impulse responses.



Question 2

- (B) Discuss, with the two calibrations (1970 versus 2000) what would be the effects of a policy that seeks complete stabilization of domestic inflation or of the CPI **with technology shocks**. Under which regime is it more costly to stabilize inflation?
- Note: Substitute the monetary policy rule
$$r_{nom} = \phi_{\pi} \pi_t$$
by
$$\pi_t = 0; \quad (\text{for strict domestic inflation targeting}) , \text{ or}$$
$$\pi_t^c = 0; \quad (\text{for strict CPI inflation targeting})$$
- Note: In the .../W-2/Tech/**Q2b** drive you can run the IRFS.m file. Be careful to change the monetary policy rule in the line 50 of both MOD files.

$\pi q=0;$



pic=0;

