# A First order conditions

FOC of optimizing households wrt. consumption:

$$\epsilon_t^c \left(C_t^o - hC_{t-1}^o\right)^{-\sigma} = \left(1+\tau_t^c\right)\lambda_t^o \tag{A.1}$$

FOC of optimizing households wrt. investment:

$$\begin{aligned} Q_t^o \epsilon_t^i S'\left(\tfrac{I_t^o}{I_{t-1}^o}\right)\tfrac{I_t^o}{I_{t-1}^o} - \quad & \beta E_t \left[Q_{t+1}^o \epsilon_{t+1}^i \tfrac{\lambda_{t+1}^o}{\lambda_t^o} S'\left(\tfrac{I_{t+1}^o}{I_t^o}\right)\left(\tfrac{I_{t+1}^o}{I_t^o}\right)\tfrac{I_{t+1}^o}{I_t^o}\right] + 1 = \\ & Q_t^o \epsilon_t^i \left(1 - S\left(\tfrac{I_t^o}{I_{t-1}^o}\right)\right) \end{aligned} \tag{A.2}$$

FOC of optimizing households wrt. labor

$$(1-\tau_t^w)\frac{W_t}{P_t} = \psi_l \frac{\epsilon_t^l (L_t^o)^\varphi}{\lambda_t^o} \tag{A.3}$$

FOC of optimizing households wrt. bond holdings:

$$\lambda_t^o P_t = \beta E_t \left(\lambda_{t+1}^o P_{t+1}\right)\epsilon_t^{rp} R_t \tag{A.4}$$

FOC of optimizing households wrt. foreign bond holdings:

$$\lambda_t^o P_t = \beta E_t \left(\lambda_{t+1}^o P_{t+1}\right) e_t R_t \phi\left(\cdot\right) \tag{A.5}$$

FOC of optimizing households wrt. next period's capital stock:

$$Q_t^o = \beta E_t \left[\frac{\lambda_{t+1}^o}{\lambda_t^o}\left(\left(1-\tau_t^k\right)\left[r_t^k u_t - a\left(u_{t+1}\right)\right] + \tau_t^k \delta + \left(1-\delta\right) Q_{t+1}^o\right)\right] \tag{A.6}$$

FOC of optimizing households wrt. the capital utilization rate:

$$a'\left(u_t\right) = r_t^k \tag{A.7}$$

# B Log linearized equations

## B.1 Households

Consumption Euler equation of optimizing households:

$$c_t^o = \frac{1}{1+h}\left(E_t c_{t+1}^o + h c_{t-1}^o\right) - \frac{1}{\sigma}\frac{1-h}{1+h}E_t\left(r_t - \pi_{t+1} + \epsilon_t^{rp} + \epsilon_{t+1}^c - \epsilon_t^c + \frac{1}{1+\tau^c}\left(\tau_t^c - \tau_{t+1}^c\right)\right) \tag{A.8}$$

Consumption of rule-of-thumb households:

$$(1+\tau^c)\frac{C^{nr}}{Y}c_t^{nr} = \frac{WL}{Y}\left(\tau_t^w + (1-\tau^w)(w_t + l_t)\right) + \frac{TR^{nr}}{Y}tr_t^{nr} - \frac{C^{nr}}{Y}\tau_t^c \tag{A.9}$$

Aggregate consumption:

$$c_t = (1-\mu)\frac{C^o}{C}c_t^o + \mu\frac{C^{nr}}{C}c_t^{nr} \tag{A.10}$$

Aggregate transfers:

$$tr_t = (\xi(1-\mu)+\mu)\frac{TR^{nr}}{TR}tr_t^{nr} \tag{A.11}$$

Wage dynamics:

$$\begin{aligned} w_t = \; & \tfrac{1}{1+\beta}\left(\beta E_t w_{t+1} + w_{t-1}\right) + \tfrac{\beta}{1+\beta}E_t\pi_{t+1} - \tfrac{1+\beta\chi^w}{1+\beta}\pi_t + \tfrac{\chi^w}{1+\beta}\pi_{t-1} \\ & - \tfrac{1}{1+\beta}\,\tfrac{(1-\beta\,\theta^w)\,(1-\theta^w)}{\theta^w\left(1+\frac{\varphi\,(1+\lambda^w)}{\lambda^w}\right)}\left(w_t - mrs_t^o - \tfrac{1}{1+\tau^w}\tau_t^w\right) \end{aligned} \tag{A.12}$$

Marginal rate of substitution (between consumption and labor):

$$mrs_t^o = \epsilon_t^l + \varphi l_t + \frac{\sigma}{1-h}\left(c_t^o - h\,c_{t-1}^o\right) + \frac{1}{1+\tau^c}\tau_t^c - \epsilon_t^b \tag{A.13}$$

Private investment Euler equation:

$$i_t = \frac{1}{1+\beta}\left(\beta E_t i_{t+1} + i_{t-1}\right) + \frac{\beta}{\varkappa(1+\beta)}\left(q_t + \epsilon_t^i\right) \tag{A.14}$$

where $\varkappa = S$"

Shadow cost of private capital:

$$q_t = \quad \beta E_t \left( (1-\delta)\, q_{t+1} + \left(1-\tau^k\right) r^k_{t+1} - r^k \tau^k_{t+1} + \delta \tau^k_{t+1} \right) - r_t - E_t \pi_{t+1} - \epsilon^{rp}_t \qquad \text{(A.15)}$$

Capital utilization:

$$u_t = \sigma_u r^k_t \qquad \text{(A.16)}$$

where: $\sigma_u = a''$.

Privat capital law of motion:

$$k_t = (1-\delta)\ k_{t-1} + \delta \left( i_t + \epsilon^i_t \right) \qquad \text{(A.17)}$$

## B.2 Firms

Labor demand:

$$l_t = k_{t-1} + u_t + r^k_t - w_t \qquad \text{(A.18)}$$

Marginal cost (domestic):

$$mc_t = (1-\alpha)\ w_t + \alpha\, r^k_t - z_t - \zeta\, k^g_{t-1} \qquad \text{(A.19)}$$

Marginal cost (exporters):

$$mc^x_t = mc_t - s_t - t^x_t \qquad \text{(A.20)}$$

Marginal cost (import retailers):

$$mc^m_t = s_t - t^m_t \qquad \text{(A.21)}$$

Phillips curve (domestic):

$$\pi^h_t = \frac{\beta}{1+\beta\,\chi^h} E_t \pi^h_{t+1} + \frac{\chi^h}{1+\beta\,\chi^h}\, \pi^h_{t-1} + \frac{\left(1-\beta\,\theta^h\right)\,\left(1-\theta^h\right)}{\left(1+\beta\,\chi^h\right)\,\theta^h} \left( mc_t + \epsilon^{cp,h}_t \right) \qquad \text{(A.22)}$$

Phillips curve (exporters):

$$\pi_t^x = \frac{\beta}{1+\beta\,\chi^x} E_t \pi_{t+1}^x + \frac{\chi^x}{1+\beta\,\chi^x}\,\pi_{t-1}^x + \frac{(1-\beta\,\theta^x)\,(1-\theta^x)}{(1+\beta\,\chi^x)\,\theta^x}\,(mc_t^x + \epsilon_t^{cp,x}) \tag{A.23}$$

Phillips curve (importers):

$$\pi_t^m = \frac{\beta}{1+\beta\,\chi^m} E_t \pi_{t+1}^m + \frac{\chi^m}{1+\beta\,\chi^m}\,\pi_{t-1}^m + \frac{(1-\beta\,\theta^m)\,(1-\theta^m)}{(1+\beta\,\chi^m)\,\theta^m}\,(mc_t^m + \epsilon_t^{cp,m}) \tag{A.24}$$

## B.3 Fiscal authority

Government consumption:

$$g_t^c = \rho_{gc} g_{t-1}^c + (1-\rho_{gc})\,(\varphi_{gc,y} y_t + \varphi_{gc,b} b_{t-1}) + (1-\psi_{gc})\,\eta_t^{gc} + \psi_{gc}\eta_{t-1}^{gc} \tag{A.25}$$

Government investment:

$$g_t^i = \rho_{gi} g_{t-1}^i + (1-\rho_{gi})\,(\varphi_{gi,y} y_t + \varphi_{gi,b} b_{t-1}) + (1-\psi_{gi})\,\eta_t^{gi} + \psi_{gi}\eta_{t-1}^{gi} \tag{A.26}$$

Government transfers:

$$tr_t = \rho_{tr} tr_{t-1} + (1-\rho_{tr})\,(\varphi_{tr,l} l_t + \varphi_{tr,b} b_{t-1}) + (1-\psi_{tr})\,\eta_t^{tr} + \psi_{tr}\eta_{t-1}^{tr} \tag{A.27}$$

Consumption tax rate:

$$\tau_t^c = \rho_{\tau c} \tau_{t-1}^c + (1-\rho_{\tau c})\,(\varphi_{\tau c,y} y_t + \varphi_{\tau c,b} b_{t-1}) + (1-\psi_{\tau c})\,\eta_t^{\tau c} + \psi_{\tau c}\eta_{t-1}^{\tau c} \tag{A.28}$$

Labor tax rate:

$$\tau_t^w = \rho_{\tau w} \tau_{t-1}^w + (1-\rho_{\tau w})\,(\varphi_{\tau w,y} l_t + \varphi_{\tau w,b} b_{t-1}) + (1-\psi_{\tau w})\,\eta_t^{\tau w} + \psi_{\tau w}\eta_{t-1}^{\tau w} \tag{A.29}$$

Capital tax rate:

$$\tau_t^k = \rho_{\tau k}\tau_{t-1}^k + (1-\rho_{\tau k})\left(\varphi_{\tau k,y} i_t + \varphi_{\tau k,b} b_{t-1}\right) + (1-\psi_{\tau k})\,\eta_t^{\tau k} + \psi_{\tau k}\eta_{t-1}^{\tau k}, \tag{A.30}$$

Lump-sum taxes:

$$ls_t = \varphi_{ls,b} b_{t-1} \tag{A.31}$$

Public capital law of motion:

$$k_t^g = (1-\delta^g)\,k_{t-1}^g + \delta^g g_t^i \tag{A.32}$$

Government budget constraint:

$$\begin{aligned} \tfrac{B}{Y} b_t = \; & \tfrac{TR}{Y} tr_t + \tfrac{B}{Y}\tfrac{1}{\beta}\left(r_{t-1} - \pi_t + b_{t-1}\right) + \tfrac{G^c}{Y} g_t^c + \tfrac{G^i}{Y} g_t^i - \tfrac{C}{Y}\left(\tau_t^c + \tau^c c_t\right) \\ & - \tfrac{WL}{Y}\left(\tau_t^w + \tau^w\left(l_t + w_t\right)\right) - r^k \tfrac{K}{Y}\left(\tau_t^k + \tau^k\left(u_t + r_t^k + k_{t-1}\right)\right) \\ & + \tfrac{K}{Y}\left(\delta\tau_t^k + \tau^k r^k u_t + \tau^k \delta k_{t-1}\right) - \tfrac{LS}{Y} ls_t \end{aligned} \tag{A.33}$$

where $\frac{LS}{Y} = \frac{1}{\beta}\frac{B}{Y} - \frac{B}{Y} + \frac{G^c}{Y} + \frac{G^i}{Y} + \frac{TR}{Y} - \tau^c\frac{C}{Y} - \tau^w\frac{WL}{Y} - \tau^k r^k \frac{K}{Y} + \tau^k \delta \frac{K}{Y}$.

## B.4 Monetary authority and euro area aggregates

Taylor Rule:

$$r_t = \rho_r r_{t-1} + (1-\rho_r)\left(\rho_\pi \pi_{EA,t} + \rho_y y_{EA,t}\right) + \eta_t^r \tag{A.34}$$

Euro area inflation:

$$\pi_{EA,t} = n\pi_t + (1-n)\,\pi_t^{REA} \tag{A.35}$$

Euro area output gap:

$$y_{EA,t} = n y_t + (1-n)\,y_t^{REA} \tag{A.36}$$

## B.5 Aggregation, market clearing and relative prices

Production function:

$$y_t = \phi \left( \zeta \, k_{t-1}^g + z_t + \alpha \, u_t k_{t-1} + (1-\alpha) \; l_t \right) \tag{A.37}$$

where $\phi = (1+\Phi)/Y$.

Goods market clearing:

$$y_t = \tfrac{C}{Y} c_t + \tfrac{I}{Y} i_t + \tfrac{G^c}{Y} \left( t_t^h + g_t^c \right) + \tfrac{G^i}{Y} \left( t_t^h + g_t^i \right) + r^k \tfrac{K}{Y} u_t + \tfrac{X}{Y} x_t - \tfrac{M}{Y} m_t \tag{A.38}$$

with exports

$$x_t = -\eta^x t_t^x + y_t^{REA} \tag{A.39}$$

and imports

$$m_t = -\eta t_t^m + \frac{C}{C+I} c_t + \frac{I}{C+I} i_t \tag{A.40}$$

Net foreign assets:

$$nfa_t = \frac{1}{\beta} nfa_{t-1} + \frac{X}{Y} \left( t_t^x + s_t + x_t \right) - \frac{M}{Y} \left( t_t^m + m_t \right) \tag{A.41}$$

Domestic prices (relative to consumer prices)

$$t_t^h = -\frac{1-\omega}{\omega} t_t^m \tag{A.42}$$

Export prices (relative to foreign prices)

$$t_t^x = t_{t-1}^x + \pi_t^x - \pi_t^{REA} \tag{A.43}$$

Import prices (relative to consumer prices)

$$t_t^m = t_{t-1}^m + \pi_t^m - \pi_t \tag{A.44}$$

Real exchange rate (UIP condition, from optimal choice of domestic and foreign bonds)

$$E_t s_{t+1} = s_t + E_t \left(\pi_{t+1}^{REA} - \pi_{t+1}\right) + \kappa nfa_t + \epsilon_t^{uip} + \epsilon_t^{rp} \tag{A.45}$$

## B.6 Shocks and AR(1) processes

Technology shock:

$$z_t = \rho_z \, z_{t-1} + \eta_t^z \tag{A.46}$$

Risk-premium shock:

$$\epsilon_t^{rp} = \rho_{\epsilon,rp} \, \epsilon_{t-1}^{rp} + \eta_t^{rp} \tag{A.47}$$

Investment shock:

$$\epsilon_t^{i} = \rho_{\epsilon,i} \, \epsilon_{t-1}^{i} + \eta_t^{i} \tag{A.48}$$

Preference shock:

$$\epsilon_t^{c} = \rho_{\epsilon,c} \, \epsilon_{t-1}^{c} + \eta_t^{c} \tag{A.49}$$

Labor supply shock:

$$\epsilon_t^{l} = \rho_{\epsilon,l} \, \epsilon_{t-1}^{l} + \eta_t^{l} \tag{A.50}$$

Domestic cost-push shock:

$$\epsilon_t^{cph} = \rho_{\epsilon,cph} \, \epsilon_{t-1}^{cph} + \eta_t^{cph} \tag{A.51}$$

Exporters cost-push shock:

$$\epsilon_t^{cpx} = \rho_{\epsilon,cpx} \, \epsilon_{t-1}^{cpx} + \eta_t^{cpx} \tag{A.52}$$

Importers cost-push shock:

$$\epsilon_t^{cpm} = \rho_{\epsilon,cpm} \, \epsilon_{t-1}^{cpm} + \eta_t^{cpm} \tag{A.53}$$

UIP shock :

$$\epsilon_t^{uip} = \rho_{\epsilon,uip}\, \epsilon_{t-1}^{uip} + \eta_t^{uip} \tag{A.54}$$

# C Steady state

We fix the steady-state shares of public consumption, public investment, transfers and the three tax rates at their relative sample means. The steady-state ratio of public debt to (quarterly) GDP is set to 2.4 in line with the respective Maastricht criterium. Hours worked are calibrated to 1/3 of total time according to a standard eight-hour working day.

Assuming that elasticities of substition are identical for intermediate goods, it holds for relative prices:

$$T^h = T^x = T^m = 1 \tag{A.55}$$

(Gross) inflation rates are given by:

$$\Pi = \Pi^h = \Pi^x = \Pi^m = 1 \tag{A.56}$$

From the FOC wrt to investment it follows:

$$Q = 1 \tag{A.57}$$

Given the assumption that:

$$u = 1 \tag{A.58}$$

and:

$$a\left(u\right) = 1 \tag{A.59}$$

it follows from the FOC wrt to the capital stock:

$$r^k = \frac{\beta^{-1} + \delta - 1 - \tau^k \delta}{1 - \tau^k} \tag{A.60}$$

From the FOC wrt to bond holdings it follows that:

$$\frac{1}{\beta} = R \tag{A.61}$$

From the price-setting of firms it follows:

$$MC = \frac{1}{\lambda^p} \tag{A.62}$$

From (11) and recalling that $WL/Y = (1-\alpha)$ and $K^g = (G^i/\delta^g Y)\,Y$it follows that:

$$W = \left(\lambda^p \left(\frac{1}{\alpha}\right)^{\alpha} \left(\frac{1}{1-\alpha}\right)^{1-\alpha} \left(r^k\right)^{\alpha}\right)^{\frac{1}{\zeta-(1-\alpha)}} \left(\frac{\delta^g\,(1-\alpha)}{(G^i/Y)\,L}\right)^{\frac{\zeta}{\zeta-(1-\alpha)}} \tag{A.63}$$

Optimal input factor ratio of firms:

$$K = \frac{\alpha}{1-\alpha}\frac{W}{r^k}L \tag{A.64}$$

From the law of motion for private capital:

$$I = \delta K \tag{A.65}$$

From (11):

$$K^g = \left(\lambda^p \left(\frac{1}{\alpha}\right)^{\alpha} \left(\frac{1}{1-\alpha}\right)^{1-\alpha} \left(r^k\right)^{\alpha} W^{(1-\alpha)}\right)^{\frac{1}{\zeta}} \tag{A.66}$$

The zero profit condition for firms leads to:

$$Y = MCK^{\alpha}L^{1-\alpha}\,(K^g)^{\zeta} \tag{A.67}$$

From the production function of firms:

$$\Phi = Y - K^{\alpha}L^{1-\alpha}\,(K^g)^{\zeta} \tag{A.68}$$

Making use of the fixed ratios of public expenditures and debt to output:

$$G^c = \frac{G^c}{Y}Y \tag{A.69}$$

$$G^i = \frac{G^i}{Y}Y \tag{A.70}$$

$$TR = \frac{TR}{Y}Y \tag{A.71}$$

$$B = \frac{B}{Y}Y \tag{A.72}$$

Total consumption expenditures equal total income net of taxes, savings and investment expenditures:

$$(1+\tau^c)\,C = (1-\tau^w)\,WL + TR + \left(1-\tau^k\right) r^k K + \tau^k \delta K - \left(1-\beta^{-1}\right) B - I - LS \tag{A.73}$$

with:

$$LS = \left(\beta^{-1}-1\right) B + G^c + G^i + TR - \tau^c C - \tau^w WL - \tau^k r^k K + \tau^k \delta K \tag{A.74}$$

From the budget constraint of non-Ricardian households and recalling that $TR^{nr} = \frac{TR^o}{\xi} = \frac{TR}{(1-\mu)\xi+\mu}$:

$$(1+\tau^c)\,C^{nr} = (1-\tau^w)\,WL + \frac{TR}{(1-\mu)\,\xi+\mu} \tag{A.75}$$

Consumption of optimizing households is then given by:

$$C^o = \frac{C-\mu C^{nr}}{1-\mu} \tag{A.76}$$

For the scaling parameter it follows from the labor-market equilibrium:

$$\psi_l = (1-\tau^w)\,Kr^k \frac{1-\alpha}{\alpha}\frac{L^{\varphi+1}}{\lambda^w}\frac{((1-h)\,C^o)^{-\sigma}}{1+\tau^c} \tag{A.77}$$

Finally, exports and imports are given by:

$$EX = \frac{1-n}{n} \left(1-\omega^*\right) \left(\frac{C^{REA}+I^{REA}}{Y^{REA}}\right) Y^{REA}, \tag{A.78}$$

assuming symmetry between home and abroad: $Y^{REA} = Y$ and $\left(C^{REA}+I^{REA}\right)/Y^{REA} = \left(C+I\right)/Y$, and

$$IM = \left(1-\omega\right)\left(C+I\right) \tag{A.79}$$

# D Data and sources

We use a total of 17 time series for estimation. These include domestic series for GDP, private consumption, government consumption, private investment, government investment, transfer payments, wages, hours worked, consumer price inflation, export and import price as well as effective rates on consumption, labor and capital taxes.

Data on GDP and its components are taken from the Federal Statistical Office (Destatis). We use chain-linked, quarterly, seasonally and working day adjusted series published in the series "National Accounts - Chain-linked volume data and contributions to growth". All series are divided by the working age population (15-64 years) obtained from Eurostat.

The data series for transfer payments is constructed from Eurostat quarterly sectoral accounts data on subsidies (D.31 and D.39), social benefits other than social transfers in kind (D. 62), other current transfers (D.75) and capital transfers (D.9) paid to households and NPISH (S.14 and S.15). The series is seasonally adjusted by means of the X-12-ARIMA method, deflated by the PCE deflator obtained from Destatis and divided by the working age population. We use the PCE deflator to deflate nominal transfers since most of this income source is used for consumption purposes.

The time series for wages is constructed using seasonally adjusted hourly compensation of employees data from Destatis "Fachserie 18 Reihe 1.3" and deflated by the PCE deflator obtained from Destatis. Analogously to transfers, the PCE deflator is used to deflate nominal wages since most of this income source is used for consumption purposes.

We use seasonally adjusted data from Destatis "Fachserie 18 Reihe 1.3" on total hours worked, divided by the working age population to obtain a series for hours worked.

The time series for consumer, export and import price inflation are obtained by first differencing the logarithm of the respective seasonally and calendar adjusted price index time series by Destatis.

Effective tax rates are constructed following Mendoza et al. (1994), i.e. we assign all proprietors' income to capital income. For the consumption tax rate we use data from Eurostat quarterly sectoral accounts for income from taxes on products (D.21) and divide the series by total consumption expenditures.

For the remaining tax rate we first calculate an effective income tax rate $\tau_t^i$ according to the following formula:

$$\tau_t^i = \frac{CTI}{CE - ESSC + PI + NOSMI} \tag{A.80}$$

where we use data from Eurostat quarterly sectoral accounts of households and NPISH on current taxes on income paid ($CTI$, D.5), compensation of employees received ($CE$, D.1), employers social security contributions ($ESSC$, D.12), property income received ($PI$, D.4) and net operating surplus and mixed income received ($NOSMI$, B.2/3n).

We then calculate the effective labor tax rate according to the following formula:

$$\tau_t^w = \frac{\tau_t^i(CE - ESSC) + SC}{CE} \tag{A.81}$$

where we use data Eurostat from quarterly sectoral accounts of the general government on total social contribution received ($SC$, D.61).

The effective capital tax rate is calculated according to the following formula:

$$\tau_t^k = \frac{(PI + NOSMI - CFC)\tau_t^i + (CTI^g - CTI) + OT^g}{NOSMI^{tot}} \tag{A.82}$$

where we use data from Eurostat quarterly sectoral accounts of households and NPISH consumption of fixed capital ($CFC$, P.51), current taxes on income recieved by the government ($CTI^g$, D.54) and other taxes on production ($OT^g$, D.29) received by the general government and the net operating surplus and mixed income received ($NOSMI^{tot}$, B.2/3n) of the total economy.

All three effective tax rate series are seasonally adjusted by means of the X-12-ARIMA method.

For the REA variables we use quartely, seasonally and working day adjusted series for nominal GDP, GDP deflators and consumer price indices of Germany and the Euro area provided by Eurostat. We construct a REA GDP deflator and consumer price index on the basis the German and area-wide indices and the German GDP share. We then substract German GDP from the EMU aggregate and deflate nominal REA GDP by the constructed GDP deflator. The series is divided by working age population in the REA.

For the interest rate we take the 3-month money market rate (EURIBOR), divided by 400.

All inflation rates and the interest rate are demeaned, the remaining observables are linearly detrended prior to estimation.

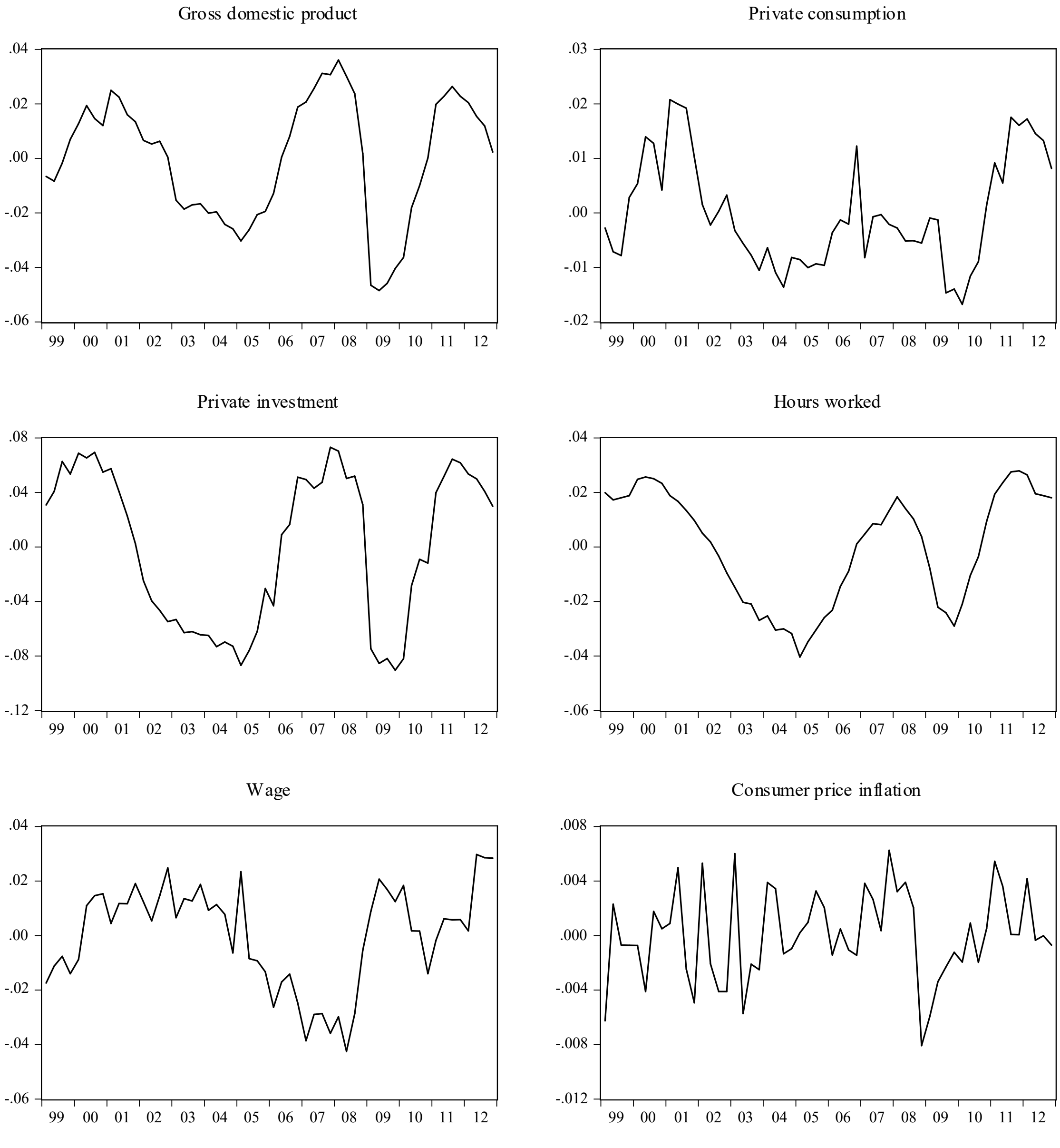


**Figure A.1: Domestic non-fiscal variables**

The figure shows the domestic non-fiscal time series used for estimation. Details on the original variables and its transformations are provided in Section D.

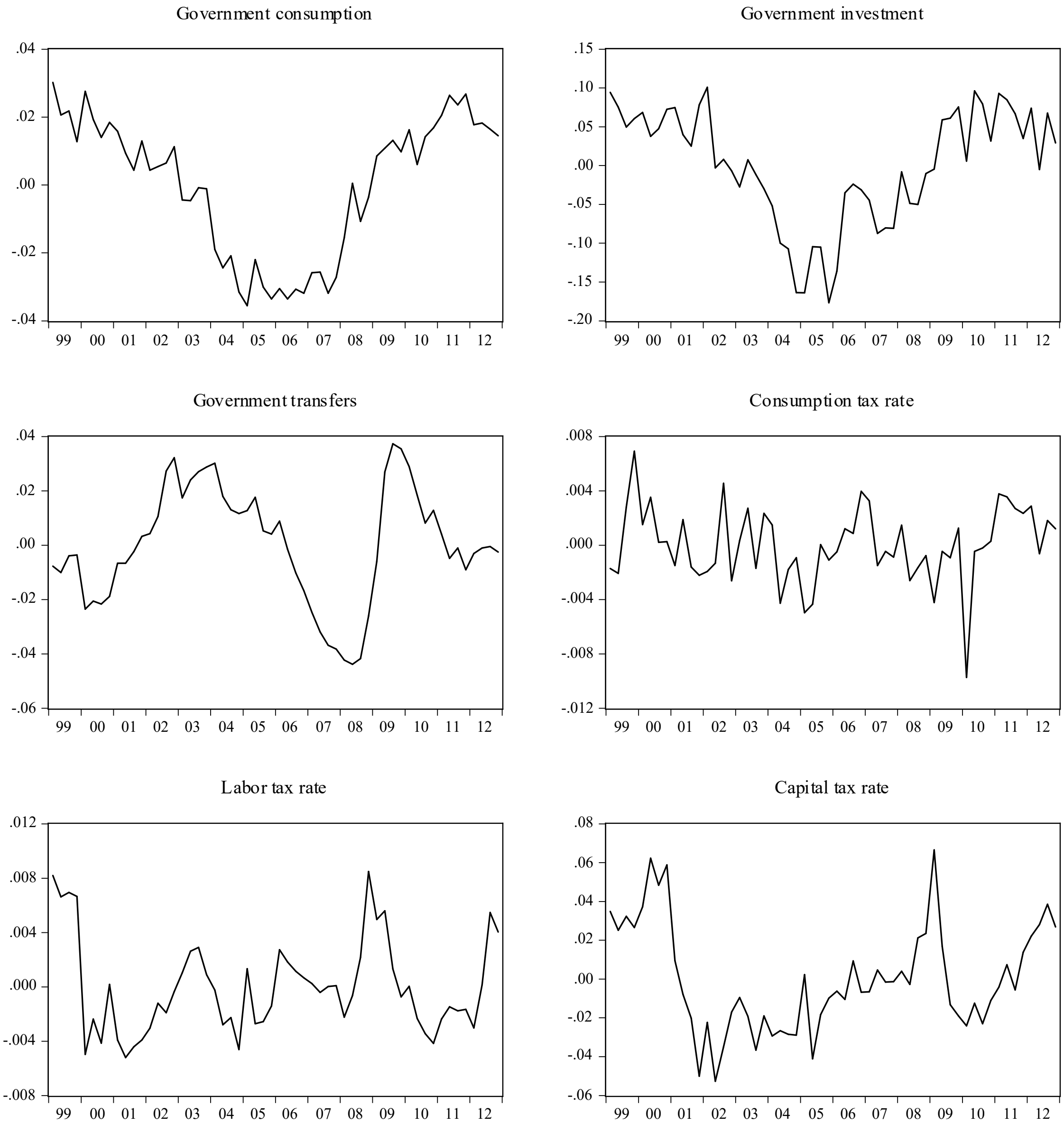


**Figure A.2: Fiscal variables**

The figure shows the fiscal time series used for estimation. Details on the original variables and its transformations are provided in Section D.

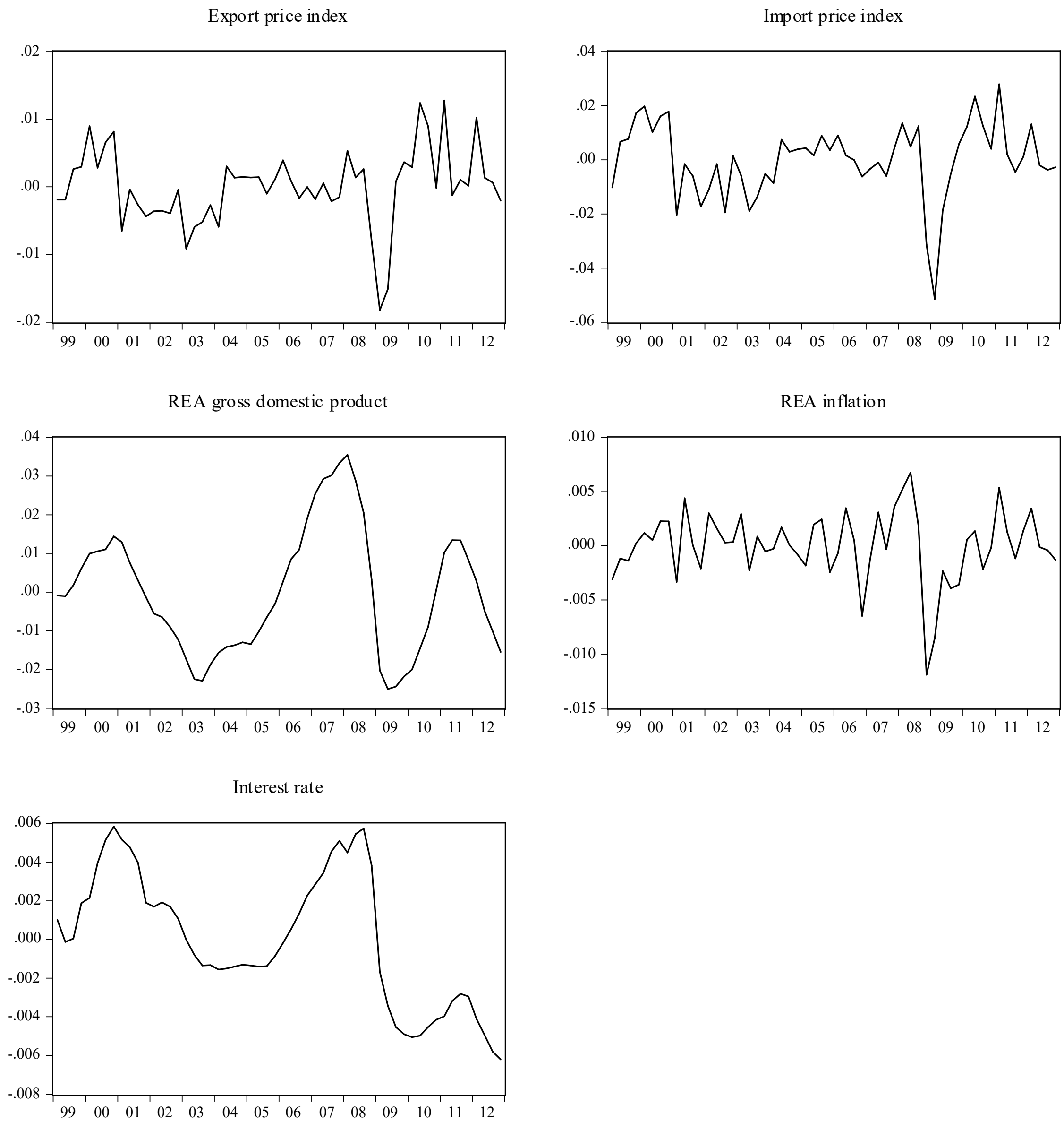


**Figure A.3: International variables**

The figure shows the time series related to international trade and the euro area monetary policy used for estimation. Details on the original variables and its transformations are provided in Section D.

# E Forecast Error Variance Decomposition

| | $\eta^{gc}$ | $\eta^{gi}$ | $\eta^{tr}$ | $\eta^{\tau c}$ | $\eta^{\tau w}$ | $\eta^{\tau k}$ | $\eta^{z}$ | $\eta^{i}$ | $\eta^{b}$ | $\eta^{rp}$ | $\eta^{l}$ | $\eta^{cph}$ | $\eta^{cpx}$ | $\eta^{cpm}$ | $\eta^{uip}$ | $\eta^{r}$ | $\eta^{yrea}$ | $\eta^{\pi rea}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $y$ | 3.09 | 1.48 | 0.70 | 0.36 | 1.56 | 0.48 | 15.95 | 8.29 | 2.46 | 12.41 | 17.59 | 8.96 | 5.97 | 3.52 | 2.55 | 9.49 | 3.28 | 1.85 |
| $\Delta y$ | 5.39 | 0.86 | 1.02 | 0.53 | 1.52 | 0.86 | 5.12 | 8.48 | 2.05 | 31.12 | 9.09 | 7.20 | 3.98 | 0.47 | 8.28 | 7.23 | 2.20 | 4.60 |
| $c$ | 0.33 | 1.55 | 1.46 | 1.47 | 1.74 | 0.12 | 9.42 | 7.77 | 44.76 | 7.57 | 5.84 | 8.05 | 0.80 | 3.22 | 0.37 | 4.56 | 0.89 | 0.09 |
| $c^{o}$ | 0.23 | 1.25 | 0.03 | 0.39 | 0.14 | 0.07 | 7.58 | 9.03 | 53.68 | 6.10 | 8.18 | 2.39 | 1.33 | 2.25 | 0.42 | 5.61 | 1.19 | 0.13 |
| $c^{nr}$ | 0.83 | 0.75 | 14.14 | 4.64 | 11.82 | 0.15 | 6.97 | 2.04 | 0.26 | 6.07 | 15.15 | 26.77 | 2.12 | 5.95 | 0.43 | 0.61 | 0.73 | 0.55 |
| $i$ | 0.20 | 0.17 | 0.07 | 0.02 | 0.28 | 0.11 | 7.40 | 62.84 | 0.10 | 1.94 | 7.51 | 10.59 | 1.95 | 3.87 | 0.63 | 1.22 | 0.95 | 0.16 |
| $l$ | 2.95 | 1.01 | 0.65 | 0.34 | 1.52 | 0.44 | 13.62 | 13.46 | 2.59 | 11.35 | 22.17 | 5.22 | 5.33 | 2.24 | 2.60 | 9.52 | 3.16 | 1.83 |
| $w$ | 0.17 | 1.30 | 0.06 | 0.02 | 0.01 | 0.08 | 7.11 | 2.58 | 0.18 | 3.24 | 45.34 | 31.14 | 0.63 | 7.49 | 0.06 | 0.51 | 0.03 | 0.02 |
| $tr$ | 0.97 | 0.45 | 68.07 | 0.10 | 0.55 | 0.13 | 3.56 | 5.27 | 1.07 | 2.37 | 7.33 | 1.31 | 1.89 | 1.14 | 0.54 | 3.93 | 1.06 | 0.27 |
| $\pi$ | 1.30 | 0.15 | 0.68 | 0.23 | 0.97 | 0.87 | 3.06 | 0.99 | 1.16 | 12.04 | 9.49 | 38.29 | 0.76 | 18.22 | 1.21 | 9.85 | 0.55 | 0.18 |
| $r$ | 0.43 | 0.11 | 0.21 | 0.07 | 0.40 | 0.26 | 0.73 | 0.14 | 0.28 | 2.51 | 0.73 | 2.53 | 0.21 | 0.91 | 0.08 | 82.68 | 6.35 | 1.39 |

**Table A.1: Unconditional forecast error variance decomposition at the infinite horizon based on the parameter posterior means (in percent).**

# F Priors and posteriors

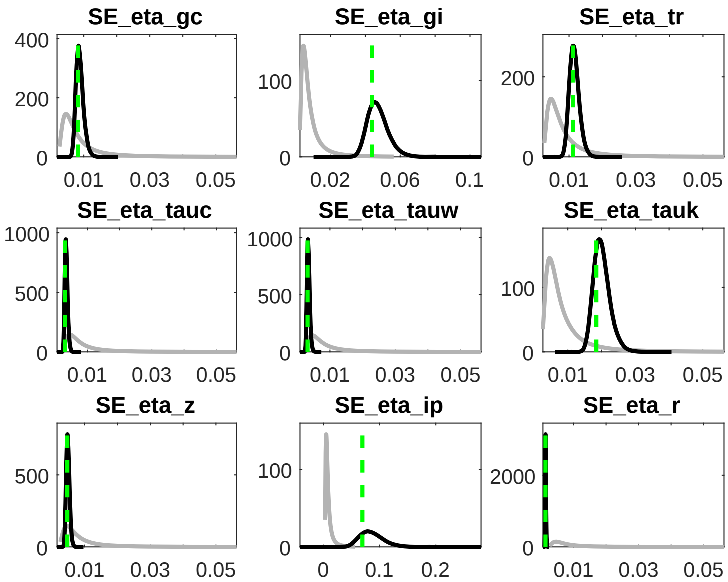


**Figure A.4: Priors and posteriors**

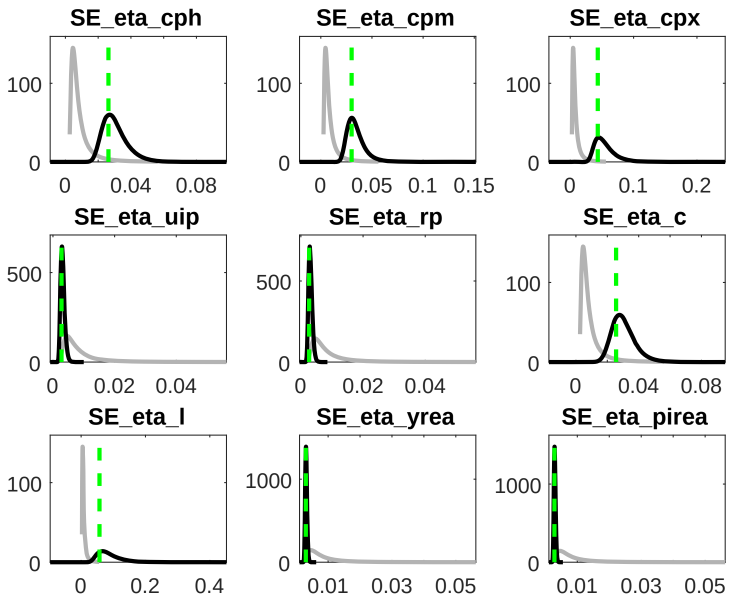


**Figure A.5: Priors and posteriors (cont.)**

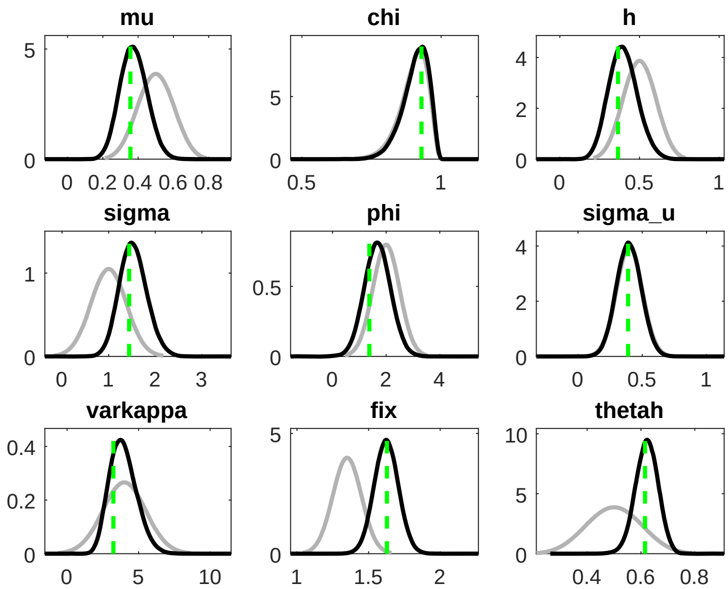


**Figure A.6: Priors and posteriors (cont.)**

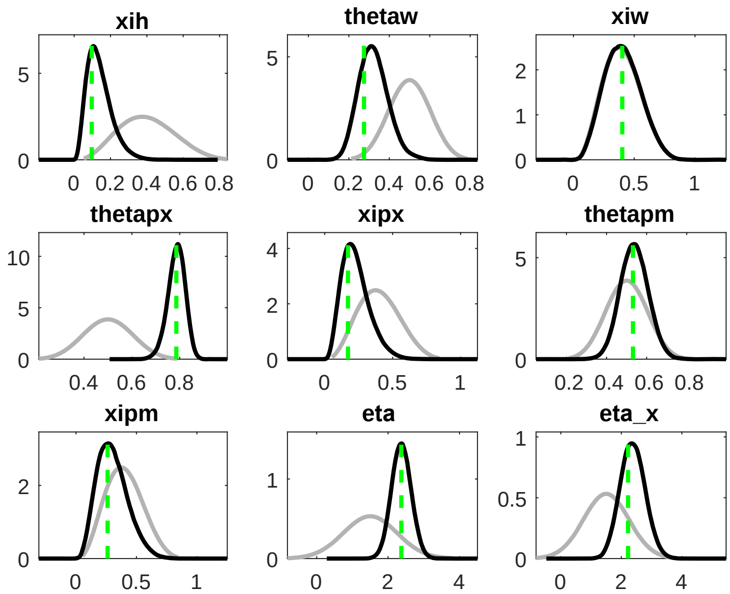


**Figure A.7: Priors and posteriors (cont.)**

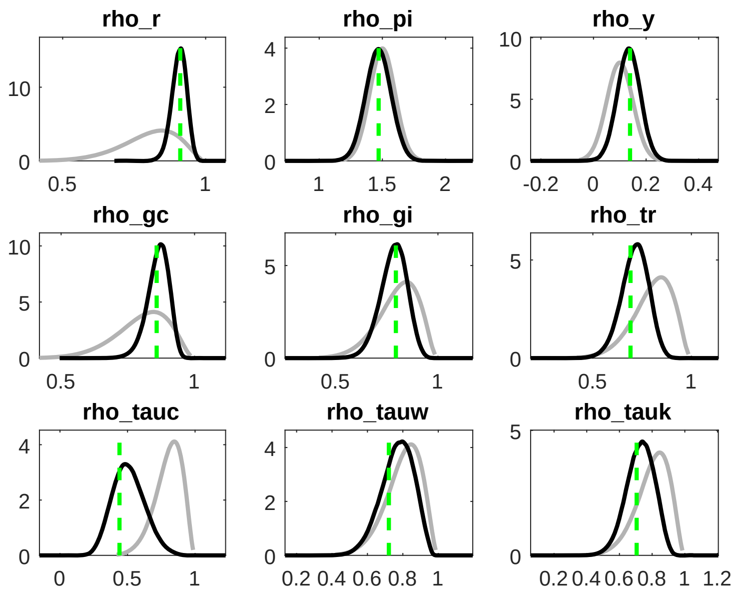


**Figure A.8: Priors and posteriors (cont.)**

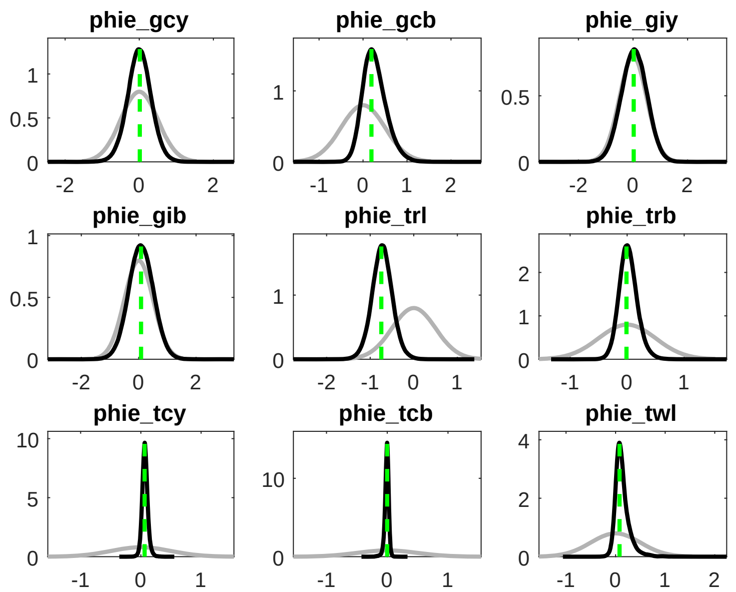


**Figure A.9: Priors and posteriors (cont.)**

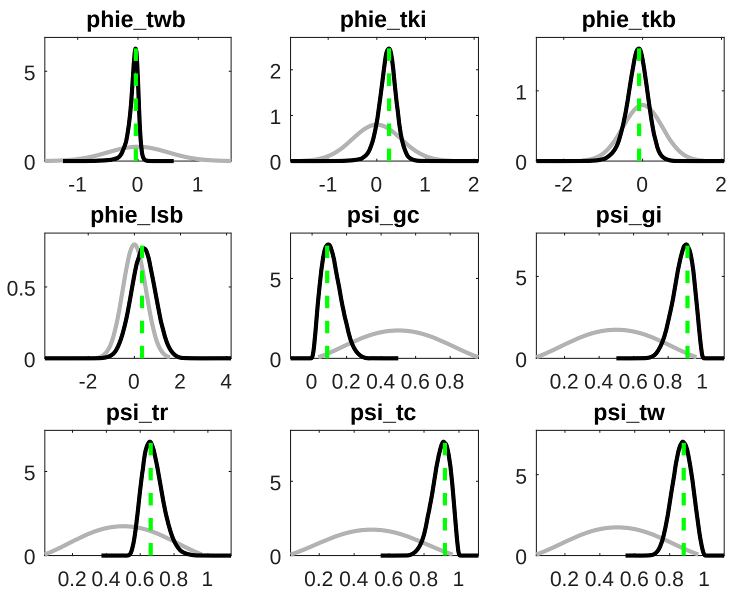

Figure A.10: Priors and posteriors (cont.)

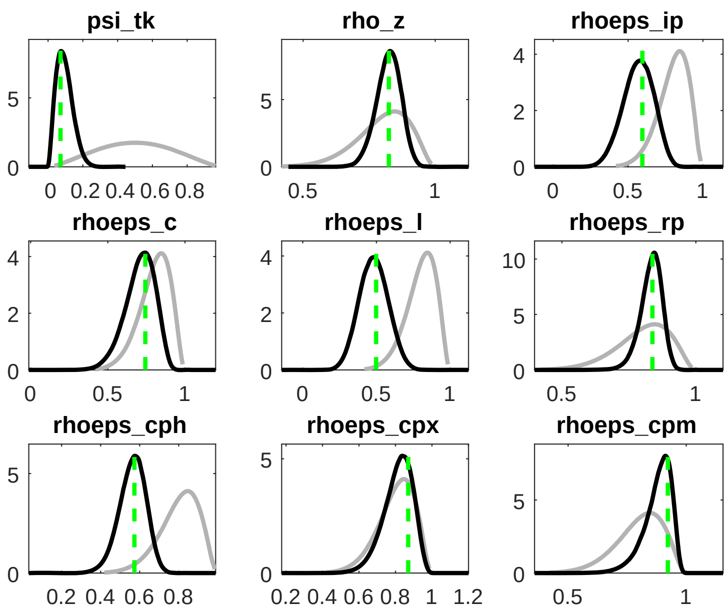

Figure A.11: Priors and posteriors (cont.)

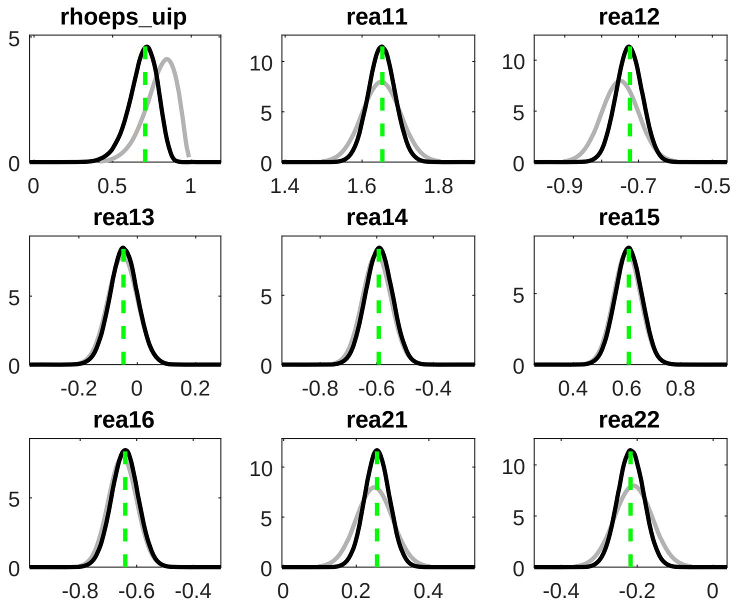


**Figure A.12: Priors and posteriors (cont.)**

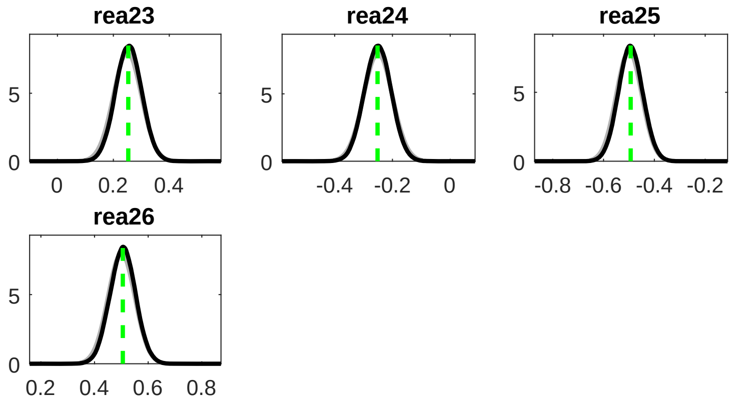


**Figure A.13: Priors and posteriors (cont.)**

# G Mode check plots

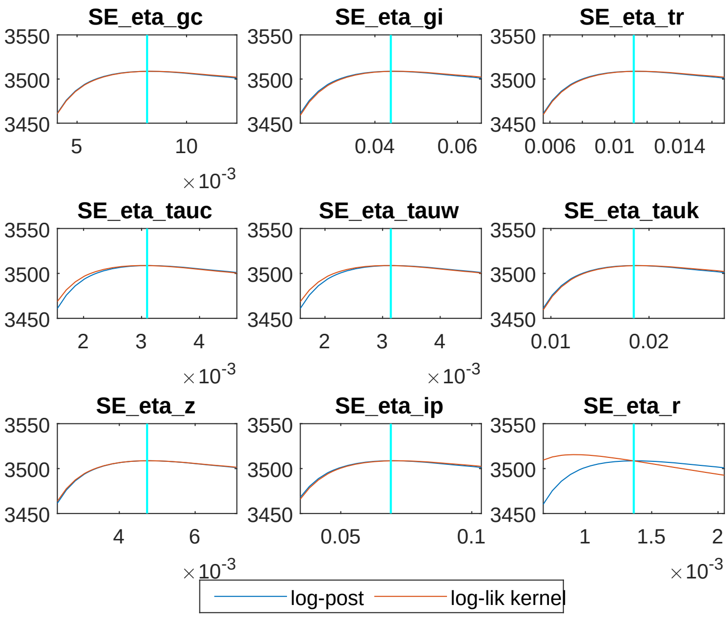


**Figure A.14: Mode check plots**

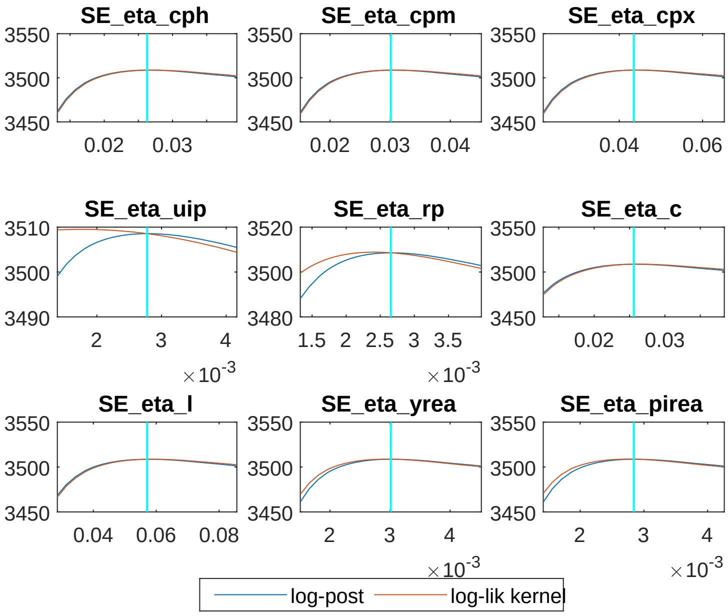


Figure A.15: Mode check plots (cont.)

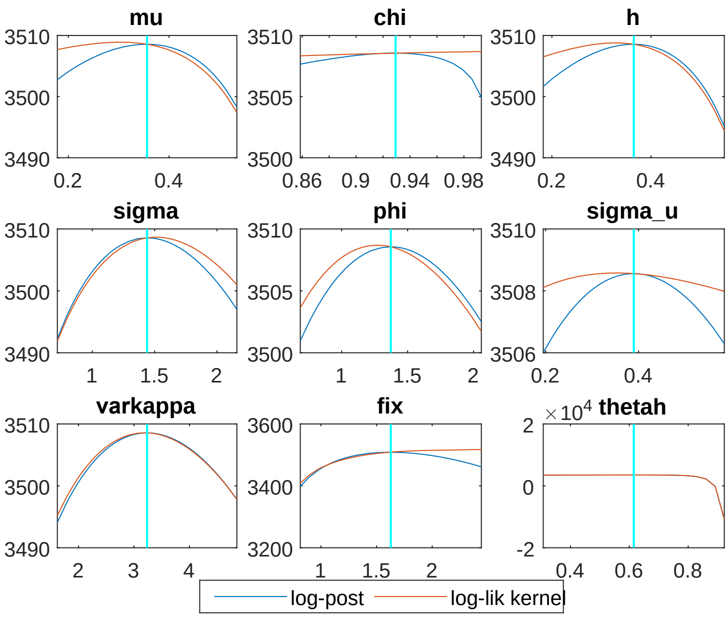


Figure A.16: Mode check plots (cont.)

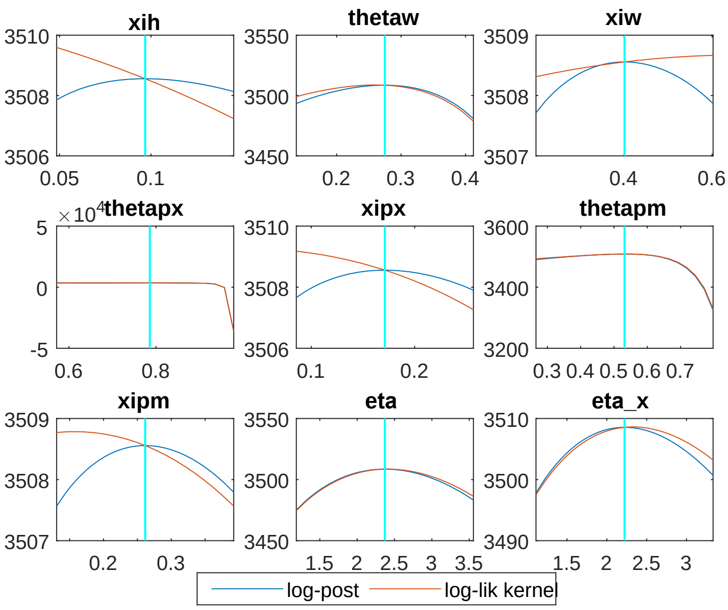


Figure A.17: Mode check plots (cont.)

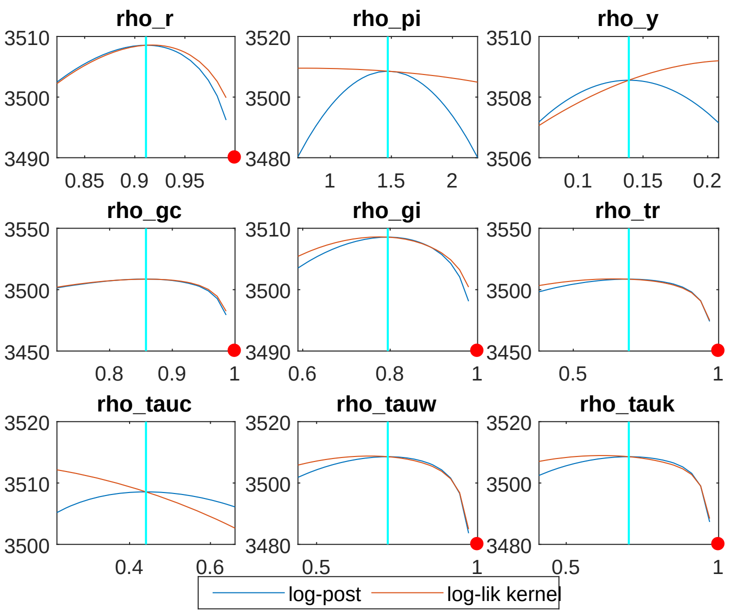


Figure A.18: Mode check plots (cont.)

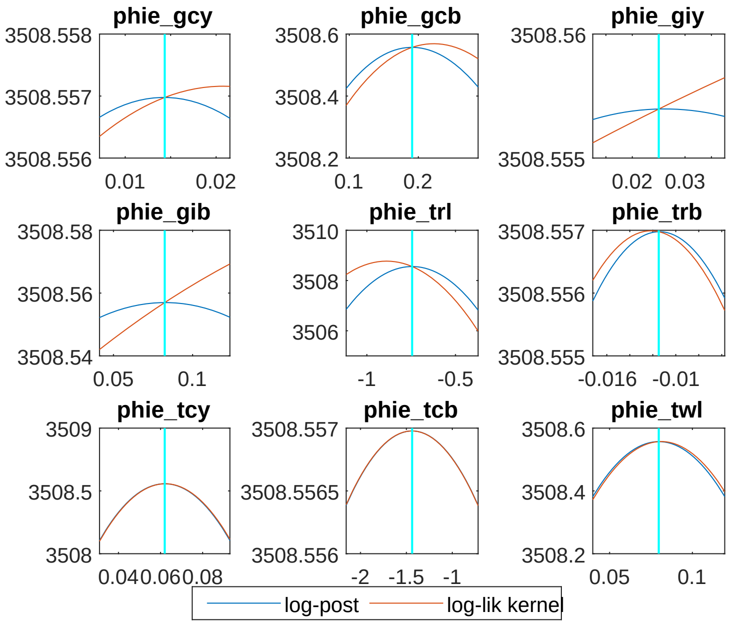


**Figure A.19: Mode check plots (cont.)**

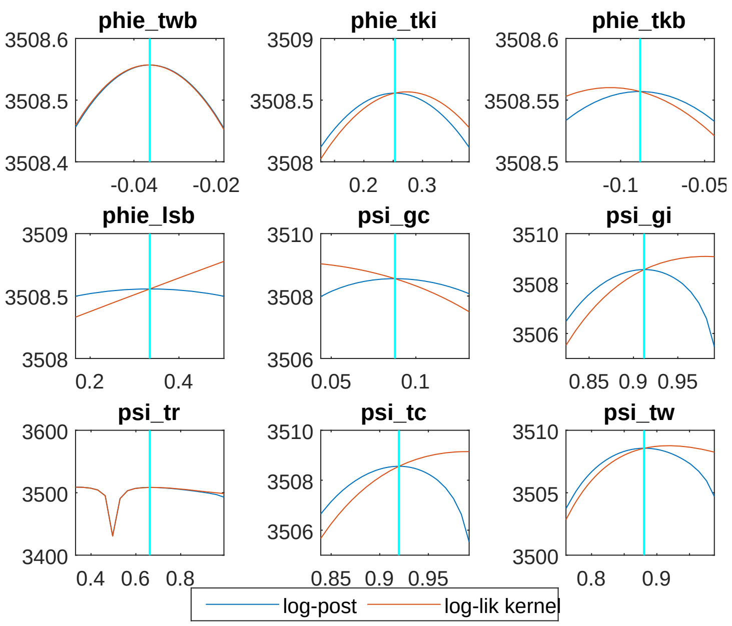


**Figure A.20: Mode check plots (cont.)**

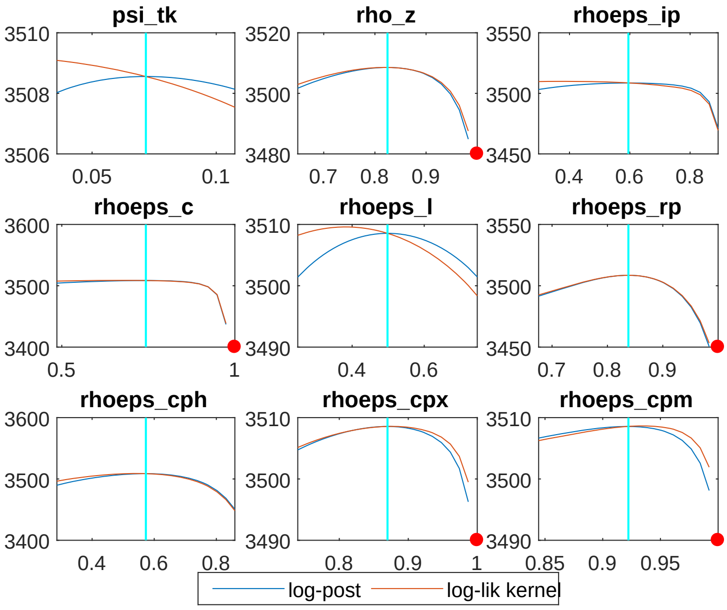


**Figure A.21: Mode check plots (cont.)**

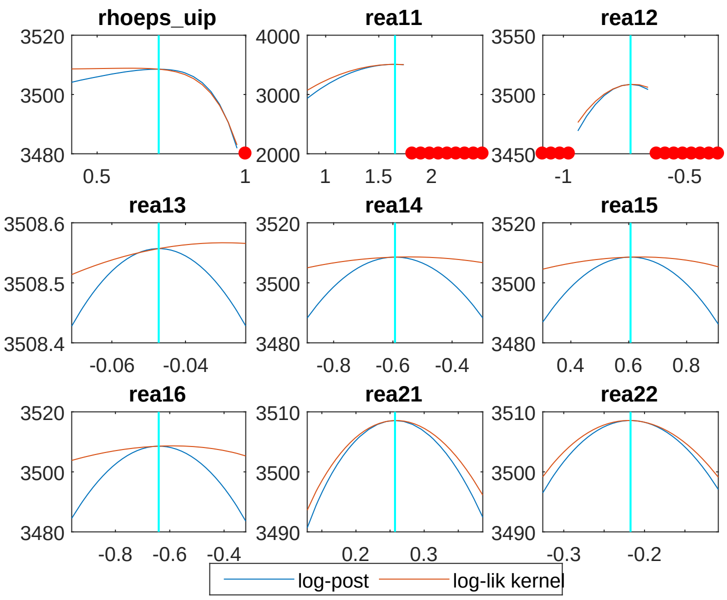


**Figure A.22: Mode check plots (cont.)**

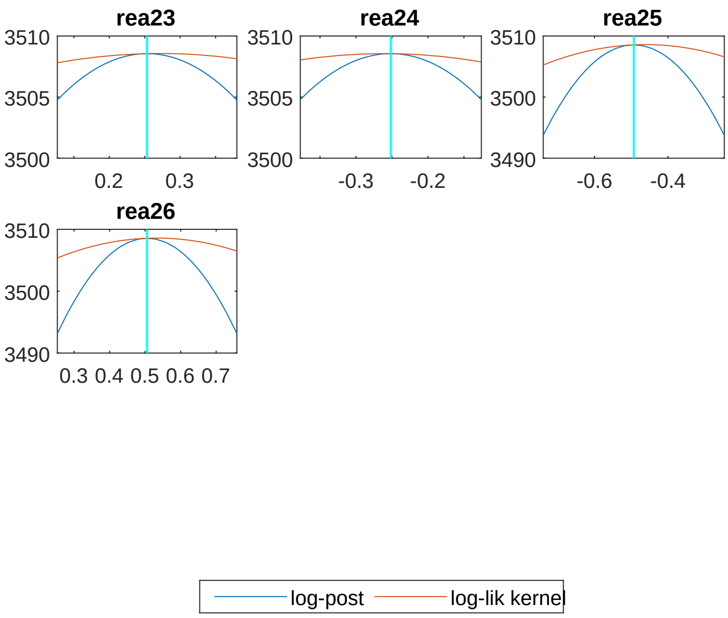


**Figure A.23: Mode check plots (cont.)**

# H Convergence diagnostics

| Parameter | | 4% taper | 8% taper | 15% taper |
|---|---|---|---|---|
| Habit persistence | $h$ | 0.738 | 0.740 | 0.732 |
| Share of non-Ricardians | $\mu$ | 0.981 | 0.981 | 0.981 |
| Non-Ricard. Cons. Share | $\chi$ | 0.020 | 0.007 | 0.003 |
| Consumption utility | $\sigma$ | 0.480 | 0.475 | 0.456 |
| Labor utility | $\varphi$ | 0.070 | 0.084 | 0.071 |
| Calvo domestic prices | $\theta^h$ | 0.619 | 0.575 | 0.479 |
| Indexation domestic prices | $\xi^h$ | 0.716 | 0.714 | 0.719 |
| Calvo export prices | $\theta^x$ | 0.109 | 0.106 | 0.101 |
| Indexation export prices | $\xi^x$ | 0.667 | 0.677 | 0.657 |
| Calvo import prices | $\theta^m$ | 0.528 | 0.535 | 0.539 |
| Indexation import prices | $\xi^m$ | 0.243 | 0.182 | 0.162 |
| Elasticity imports | $\eta$ | 0.221 | 0.221 | 0.231 |
| Elasticity exports | $\eta^x$ | 0.119 | 0.130 | 0.154 |
| Calvo wages | $\theta^w$ | 0.235 | 0.268 | 0.248 |
| Indexation wages | $\xi^w$ | 0.749 | 0.753 | 0.742 |
| Capital utilization adj. | $\sigma_u$ | 0.849 | 0.851 | 0.841 |
| Fixed cost | $\phi$ | 0.935 | 0.939 | 0.936 |
| Investment adj. cost | $\varkappa$ | 0.076 | 0.056 | 0.035 |
| AR(1) technology shock | $\rho_z$ | 0.449 | 0.432 | 0.389 |
| AR(1) investment shock | $\rho_{\varepsilon,i}$ | 0.501 | 0.462 | 0.411 |
| AR(1) preference shock | $\rho_{\varepsilon,c}$ | 0.074 | 0.080 | 0.056 |
| AR(1) risk premium shock | $\rho_{\varepsilon,rp}$ | 0.397 | 0.359 | 0.333 |
| AR(1) labor supply | $\rho_{\varepsilon,l}$ | 0.251 | 0.270 | 0.226 |
| AR(1) cost push domestic | $\rho_{\varepsilon,cph}$ | 0.373 | 0.350 | 0.308 |
| AR(1) cost push exports | $\rho_{\varepsilon,cpx}$ | 0.065 | 0.064 | 0.084 |
| AR(1) cost push imports | $\rho_{\varepsilon,cpm}$ | 0.383 | 0.367 | 0.342 |
| AR(1) UIP condition | $\rho_{\varepsilon,uip}$ | 0.524 | 0.536 | 0.517 |
| Interest rate smoothing | $\rho_r$ | 0.399 | 0.358 | 0.305 |
| Taylor coeff. inflation | $\rho_\pi$ | 0.590 | 0.581 | 0.549 |
| Taylor coeff. output | $\rho_y$ | 0.866 | 0.864 | 0.845 |
| AR(1) gov. consumption | $\rho_{gc}$ | 0.704 | 0.690 | 0.657 |
| AR(1) gov. investment | $\rho_{gi}$ | 0.995 | 0.995 | 0.994 |
| AR(1) gov. transfers | $\rho_{tr}$ | 0.410 | 0.359 | 0.309 |
| AR(1) cons. tax rule | $\rho_{\tau c}$ | 0.614 | 0.590 | 0.539 |
| AR(1) labor tax rule | $\rho_{\tau w}$ | 0.528 | 0.561 | 0.541 |
| AR(1) capital tax rule | $\rho_{\tau k}$ | 0.085 | 0.066 | 0.069 |
| Gov. Cons. Output Reac. | $\rho_{gc,y}$ | 0.012 | 0.010 | 0.003 |
| Gov. Cons. Debt Reac. | $\rho_{gc,b}$ | 0.785 | 0.798 | 0.782 |
| Gov. Inv. Output Reac. | $\rho_{gi,y}$ | 0.132 | 0.136 | 0.135 |
| Gov. Inv. Debt Reac. | $\rho_{gi,b}$ | 0.850 | 0.837 | 0.813 |

| Parameter | | 4% taper | 8% taper | 15% taper |
|---|---|---|---|---|
| Gov. Tran. Labor Reac. | $\rho_{tr,l}$ | 0.313 | 0.276 | 0.245 |
| Gov. Tran. Debt Reac. | $\rho_{tr,b}$ | 0.616 | 0.595 | 0.576 |
| Cons. Tax Output Reac. | $\rho_{\tau c,y}$ | 0.903 | 0.903 | 0.904 |
| Cons. Tax Debt Reac. | $\rho_{\tau c,b}$ | 0.617 | 0.614 | 0.644 |
| Labor Tax Labor Reac. | $\rho_{\tau w,l}$ | 0.646 | 0.670 | 0.648 |
| Labor Tax Debt Reac. | $\rho_{\tau w,b}$ | 0.934 | 0.940 | 0.938 |
| Capital Tax Investm. Reac. | $\rho_{\tau k,i}$ | 0.583 | 0.569 | 0.564 |
| Capital Tax Debt Reac. | $\rho_{\tau k,b}$ | 0.882 | 0.874 | 0.863 |
| Lump-sum Debt Reac. | $\rho_{ls,b}$ | 0.396 | 0.397 | 0.385 |
| Pre-ann. gov. consumption | $\psi_{gc}$ | 0.697 | 0.691 | 0.674 |
| Pre-ann. gov. investment | $\psi_{gi}$ | 0.306 | 0.299 | 0.258 |
| Pre-ann. gov. transfers | $\psi_{tr}$ | 0.925 | 0.922 | 0.920 |
| Pre-ann. cons. tax rule | $\psi_{\tau c}$ | 0.819 | 0.810 | 0.787 |
| Pre-ann. labor tax rule | $\psi_{\tau w}$ | 0.798 | 0.805 | 0.812 |
| Pre-ann. capital tax rule | $\psi_{\tau k}$ | 0.193 | 0.144 | 0.159 |
| | | | | |
| S.d. gov. consump. shock | $\eta^{gc}$ | 0.090 | 0.038 | 0.008 |
| S.d. gov. investm. shock | $\eta^{gi}$ | 0.274 | 0.254 | 0.129 |
| S.d. gov. transf. shock | $\eta^{tr}$ | 0.663 | 0.663 | 0.635 |
| S.d. cons. tax shock | $\eta^{\tau c}$ | 0.917 | 0.915 | 0.904 |
| S.d. labor tax shock | $\eta^{\tau w}$ | 0.808 | 0.814 | 0.811 |
| S.d. capital tax shock | $\eta^{\tau k}$ | 0.260 | 0.265 | 0.303 |
| S.d. technology shock | $\eta^{z}$ | 0.246 | 0.249 | 0.240 |
| S.d. investment shock | $\eta^{i}$ | 0.331 | 0.304 | 0.267 |
| S.d. preference shock | $\eta^{c}$ | 0.873 | 0.874 | 0.876 |
| S.d. risk premium shock | $\eta^{rp}$ | 0.657 | 0.640 | 0.599 |
| S.d. labor supply shock | $\eta^{l}$ | 0.224 | 0.252 | 0.229 |
| S.d. dom. cost push shock | $\eta^{cph}$ | 0.906 | 0.898 | 0.873 |
| S.d. exp cost push shock | $\eta^{cpx}$ | 0.031 | 0.034 | 0.046 |
| S.d. imp. cost push shock | $\eta^{cpm}$ | 0.798 | 0.795 | 0.772 |
| S.d. UIP condition shock | $\eta^{uip}$ | 0.216 | 0.167 | 0.080 |
| S.d. monetary policy | $\eta^{r}$ | 0.461 | 0.424 | 0.349 |
| S.d. foreign output shock | $\eta^{yrea}$ | 0.365 | 0.323 | 0.230 |
| S.d. foreign infl. shock | $\eta^{\pi_{rea}}$ | 0.877 | 0.866 | 0.838 |

**Table A.2: Geweke (1992) Convergence Diagnostics**

Numbers are p-values of the $\chi^2$-test for equal means of the first 20% and the last 50% of the draws.