Centralized RBC Model with Stochastic Government Consumption

Introduction

The Baseline Centralized RBC Model (without Labor)

$$
\begin{aligned}
Y_t &= A_t K_t^{\alpha} \\
K_{t+1} &= I_t + (1-\delta)K_t \\
Y_t &= C_t + I_t \\
\log A_{t+1} &= \rho \log A_t + \epsilon_{t+1}
\end{aligned}
$$

The Centralized RBC Model with Stochastic Government Consumption (without Labor)

$$
\begin{aligned}
Y_t &= A_t K_t^{\alpha} \\
K_{t+1} &= I_t + (1-\delta)K_t \\
Y_t &= C_t + I_t + G_t \\
\log A_{t+1} &= \rho_A \log A_t + \epsilon_{t+1}^{A} \\
\log G_{t+1} &= (1-\rho_G)\log \overline{G} + \rho_G \log G_t + \epsilon_{t+1}^{G}
\end{aligned}
$$

$$
C_t + K_{t+1} + T_t = A_t K_t^{\alpha} + (1-\delta)K_t,
$$

Equilibrium Conditions

$$Y_t = A_t K_t^{\alpha}$$

$$\frac{1}{C_t} = \beta E_t \left[\frac{\alpha A_{t+1} K_{t+1}^{\alpha-1} + 1 - \delta}{C_{t+1}} \right]$$

$$K_{t+1} = I_t + (1-\delta) K_t$$

$$Y_t = C_t + I_t + G_t$$

$$\log A_{t+1} = \rho_A \log A_t + \epsilon_{t+1}^A$$

$$\log G_{t+1} = (1-\rho_G) \log \overline{G} + \rho_G \log G_t + \epsilon_{t+1}^G$$

The Production Equation

The Household's First-order Condition for K_{t+1} (the Euler Equation)

The Capital Evolution Equation

The Goods Market Clearing Equation

The Government Budget Constraint

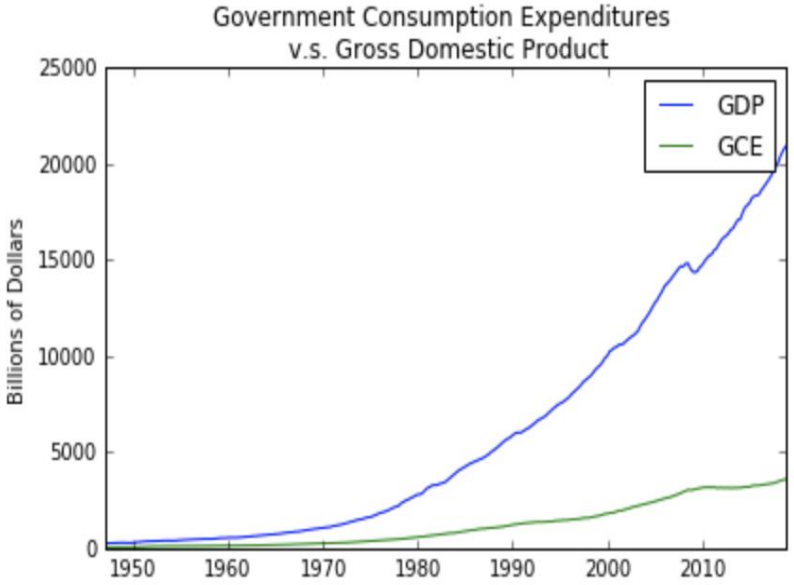
The TFP Evolution Equation

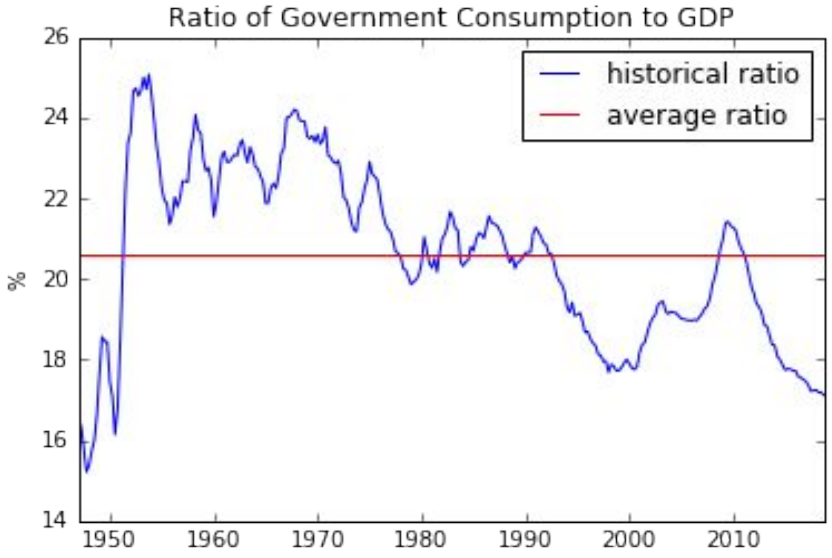
The Government Consumption Evolution Equation

β	α	σ	ρ_A	σ_A	$\overline{G}$	ρ_G	σ_G	T
0.99	0.35	0.025	0.75	0.006	-	0.9	0.015	41

But $\overline{G}$ is unknown.

Computer Steady State Government Consumption





Average ratio of Government Consumption to GDP = 0.2060

$$\bar{G} = \bar{Y} \times \left[\text{Avg. G-to-Y ratio}\right]$$

Steady State Values

$$\bar{A} = 1$$

$$\bar{K} = \left(\frac{\frac{1}{\beta} - 1 + \delta}{\alpha}\right)^{\frac{1}{\alpha - 1}}$$

$$\bar{I} = \delta \bar{K}$$

$$\bar{Y} = \bar{A}\bar{K}^{\alpha}$$

$$\bar{G} = \bar{Y} * [Avg.\,G - to - Yratio]$$

$$\bar{C} = \bar{Y} - \bar{I} - \bar{G}$$

$$\bar{A} = 1$$

$$\bar{K} = 34.398$$

$$\bar{I} = 3.450$$

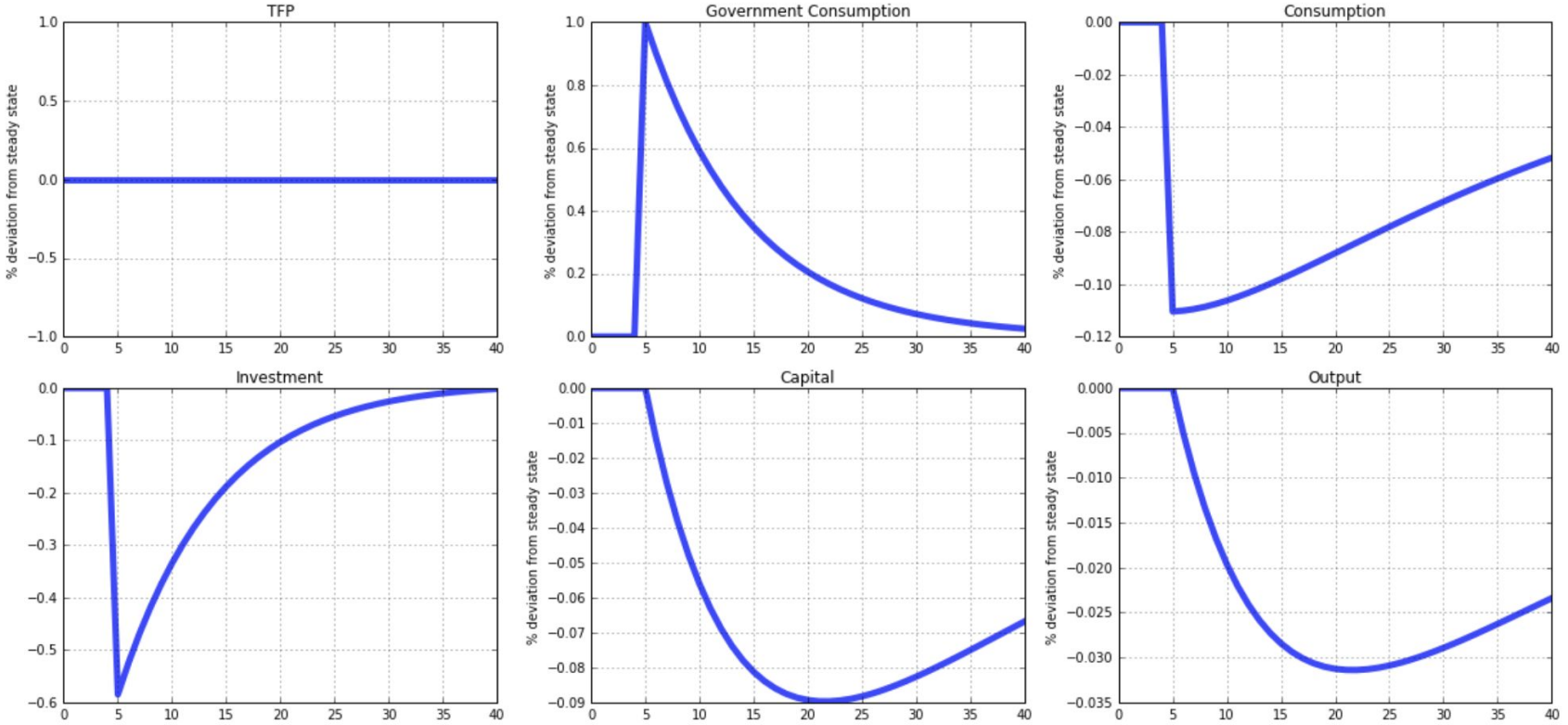
$$\bar{Y} = 0.860$$

$$\bar{G} = 0.711$$

$$\bar{C} = 1.879$$

β	α	σ	ρ_A	σ_A	$\bar{G}$	ρ_G	σ_G	T
0.99	0.35	0.025	0.75	0.006	0.711	0.9	0.015	41

Impulse Responses



Thank you !