Problem Set #3

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Discussed and/or compared answers with Sarah Bass, Emily Case, Katherine Kwok, Michael Nattinger, and Alex Von Hafften

For all of the problems below, all computational work is performed in `edgel_ps3.m`, which is attached. This code is heavily commented so as to mostly stand on its own. As a result, I will provide little explicit information about the code in this document, leaving it only for answering justifications, deriving relationships, etc.

Questions 1 and 2

See first two sections of the attached code.

Question 3

Since both capital and investment have moving steady states, it is reasonable to pick an arbitrary date to assume a steady state at some period prior to the sample period, then carrying the variables forward. With enough periods, the effect of assuming a steady state in the prior period is minimal-to-nonexistent. By the time the sample period begins, the steady state that k_t is relative to actually comes from the data rather than the earlier assumption.

Question 4

The table below displays the persistence parameters from the three wedges, a_t, g_t, and τ_{Lt}.

ρ_a	0.801
ρ_g	0.954
ρ_{τ_L}	0.911

Question 5

Implementing Blanchard-Kahn to solve this model results in a linear relationship between c_t and k_t in the saddle path of the model. Log-linearizing the Euler equation and resource constraint, results in (after some serious algebra) a system of the following form:

$$x_{t+1} = \begin{pmatrix} k_{t+1} \\ c_{t+1} \end{pmatrix} = A \begin{pmatrix} k_t \\ c_t \end{pmatrix} + B \begin{pmatrix} a_t \\ g_t \\ \tau_{It} \\ \tau_{Lt} \end{pmatrix} = Ax_t + Bz_t$$

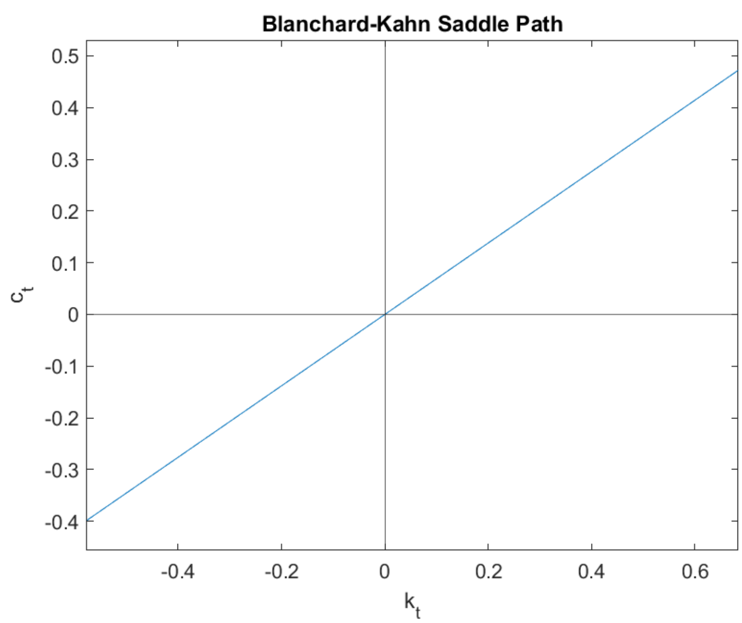
Where B does not need to be directly parametrically solved, and:

$$A = \begin{pmatrix} \frac{\alpha\delta\overline{Y}}{\overline{I}} + 1 - \delta + \frac{\delta(1-\alpha)\alpha\overline{Y}}{\overline{I}(\phi+\alpha)} & \frac{\delta(\alpha-1)\sigma\overline{Y}}{\overline{I}(\phi+\alpha)} - \frac{\delta\overline{C}}{\overline{I}} \\ \left(\frac{\phi\Gamma}{1-\Gamma}\right)\left(\frac{\alpha\delta\overline{Y}}{\overline{I}} + 1 - \delta + \frac{\delta(1-\alpha)\alpha\overline{Y}}{\overline{I}(\phi+\alpha)}\right) & \frac{1}{1-\Gamma}\left(\sigma + \phi\Gamma\left(\frac{\delta(\alpha-1)\sigma\overline{Y}}{\overline{I}(\phi+\alpha)} - \frac{\delta\overline{C}}{\overline{I}}\right)\right) \end{pmatrix}$$

Where $\overline{X}$ is the steady state of everything in the parentheses of the RHS of the Euler equation and:

$$\theta = \alpha\overline{AK}^{\alpha-1}\overline{L}^{1-\alpha}, \; \Gamma = \frac{\theta(1-\alpha)}{\overline{X}(\phi+\alpha)}$$

The saddle path, holding all wedges constant, is displayed in the chart below.

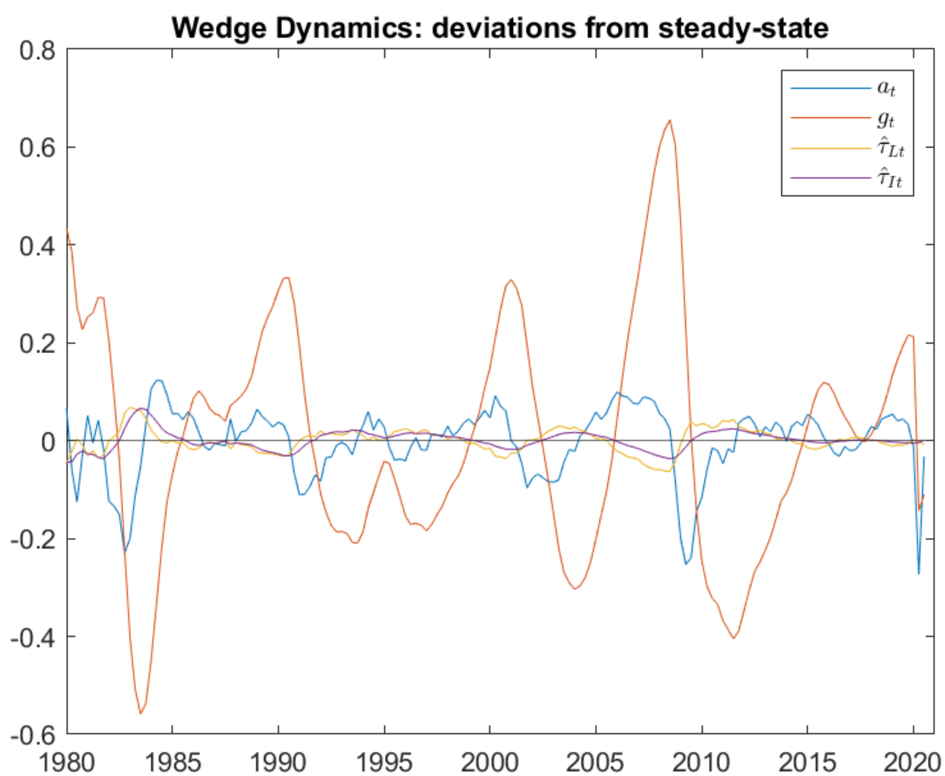


Question 6

include equations used to solve for τ_{It} and its steady state

Solving for the fixed-point estimate of τ_{It} results in a persistence parameter of $\rho_{\tau_I} = 0.944$.

Question 7



Question 8