Readme

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December 2025

1 Notes on the model

Estimated models are based on Gertler and Karadi (2011). I modified sample code by Karadi. I use them to generate impulse response functions to the capital quality shock. IRFs are presented in the figures in files and may be easily generated again using the *main.m* file. For all the models, I implement modifications as follows:

- To remove household habit formation from the model, I set the habit formation parameter $hh = 0$.
- I remove all shocks other than the capital quality shock by setting their variance equal to 0.
- I change the capital adjustment cost function. It depends on the investment/capital ratio. I implement Tobin's Q mechanism with quadratic cost adjustment and parameter $\eta = 1$. The new problem of the capital producer is:

$$\max E \sum_{t=\tau}^{\infty} \beta^{T-\tau} \Lambda_{t,\tau} \left\{ \left(Q_\tau - 1\right) I_t - G\left(\frac{I_{t-1}}{K_t}\right) \right\}$$

where

$$G\left(\frac{I_t}{K_{t-1}}\right) = \frac{\eta}{2}\left(\frac{I_t}{K_{t-1}} - \delta\right)^2 K_{t-1}$$

The new market-clearing equation (14) of the model is:

$$Y_t = C_t + G_t + I_t + \frac{\eta_i}{2}\left(\frac{I_t}{K_{t-1}} - \delta\right)^2 K_{t-1}$$

And the new optimal investment decision (8):

$$Q_t = 1 + \eta_i \left(\frac{I_t}{K_{t-1}} - \delta\right)$$

Though there are also differences across the three estimated models:

Model 1

As described above.

Model 2

Without price stickiness. To remove price stickiness, I set the Calvo parameter $\gamma = 0$.

Model 3

Without price stickiness and an elastic labor supply. I set labor supply as a fixed parameter equal to the steady-state level - equation (5).

2 Notes on capital depreciation shock

ξ_t denotes the quality of the capital. $\xi_t K_t$ denotes the effective quantity of the capital. The aim of the quality of capital is to provide a variation in its value. It corresponds rather to the economic depreciation of the capital than to physical decline. For example, the shock on ξ_t may be understood as a sudden change of capital valuation. The effects of the shock are associated with the financial leverage mechanism. Because of that, a relatively small drop in capital quality may lead to a significant decline in net worth. That results in a sharp fall in capital, investment, and output level.