Total Factor Productivity Estimation

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Abstract

After finishing the investigation on investment risk, we will move on to the examination of total factor productivity (TFP). We will estimate TFP based on the Solow growth model. In then end, I hope we can find something interesting on the time series of TFP.

1 Introduction

Based on the growth model of Solow (1956) the discipline of growth accounting tries to assess the relative contribution of labour, capital and technology to the economic growth of a country. It departs from the idea that the economy can be described by a single production function of the form

$$Y = AK^{\alpha}L^{1-\alpha} \tag{1.1}$$

Now, if we define $y = K/L$ as GDP per capita and $k = K/L$ as capital per capita, then we should have

$$y = \frac{AK^{\alpha}L^{1-\alpha}}{L} = Ak^{\alpha} \tag{1.2}$$

This implies the equation for growth rate

$$\ln y_t = \ln A_t + \alpha \ln k_t \quad \Rightarrow \frac{dy_t/dt}{y_t} = \frac{dA_t/dt}{A_t} + \alpha \frac{dk_t}{dt} \tag{1.3}$$

Write it in concisely,

$$\frac{\dot{A}_t}{A_t} = g_t - \alpha \frac{\dot{k_t}}{k_t} \tag{1.4}$$

With the penn world table dataset, the TFP estimated from the above equation does not fit GARCH(1, 1) well. However, with the dataset by Federal Reserve Bank of San Francisco, the TFP time series fit GARCH(1, 1) significantly. One can down load TFP from the following dataset

- TFP Dataset Link

References

Solow, R. M. (1956). A contribution to the theory of economic growth. *The quarterly journal of economics*, 70(1):65–94.