ECON 3123: Macroeconomic Theory I

Tutorial Note 8: IS-LM-PC Framework

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Deriving the PC Relation

To put IS-LM and PC together, we need either interest rate or output appear in the PC relation. By this, we mean that we would like to derive a step further from the Phillips curve so that, obviously easier to show, output appears.

Recall that the production function is

$$Y_t = AN_t,$$

where Y_t is the output, A is the productivity, and N_t is the labour force, and that unemployment rate u_t is defined to be

$$u_t = \frac{L - N_t}{L},$$

where L is total labour force minus discouraged worker. Hence,

$$u_t = 1 - \frac{1}{A}\frac{Y_t}{L} \iff Y_t = AL(1 - u_t).$$

We can thus define **the natural level of employment**, N_n, and **the natural level of output**, Y_n:

$$N_n = L(1 - u_n),\ Y_n = AL(1 - u_n),$$

where u_n is the natural rate of unemployment.

Then we can rewrite the Phillips Curve equation to obtain the **PC relation**:

$$\begin{aligned}
\pi_t - \pi_t^e &= -\alpha(u_t - u_n) \\
&= -\alpha\left[\left(1 - \frac{1}{A}\frac{Y_t}{L}\right) - \left(1 - \frac{1}{A}\frac{Y_n}{L}\right)\right] \\
&= \frac{\alpha}{AL}(Y_t - Y_n).
\end{aligned}$$

Figure 1 demonstrates how a PC curve looks like in a $(Y, \pi - \pi^e)$ diagram. From the mathematical formulation, we know that the line must pass $(Y_n, 0)$. This is supported

by economics: when the market is in medium-run equilibrium, inflation expectation matches the true inflation, and the output is at the natural level. Let $\pi^e = \bar{\pi}$, the targeted inflation. Then in this diagram, the corresponding output Y_t is larger than the natural level. In this case $N_t > N_n$, and $u_t < u_n$.

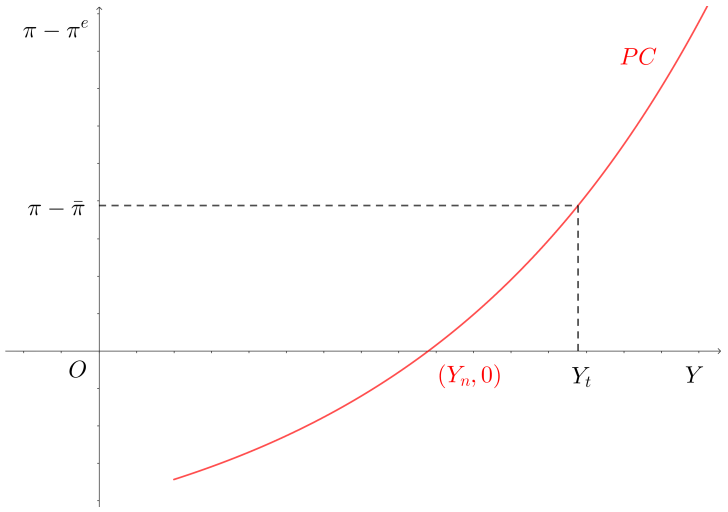

Figure 1: PC Relation