

Lecture 21: IS-MP-PC-AD Model

ECON 30020: Intermediate Macroeconomics

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Readings

GLS Ch. Appendix E

Optimal Monetary Policy

We just talked about optimal monetary policy:

- Adjust policy (M_t) so that $Y_t = Y_t^f$
- Alternatively, target a constant price level, implying a zero output gap (Divine Coincidence)

Two unrealistic/undesirable features of existing framework:

- Focuses on price level rather than inflation rate
- Formulates policy in terms of the money supply rather than an interest rate

“New” Model

At its core, we are going to replace the LM curve (liquidity = money) with the MP curve (monetary policy) and focus on the inflation rate rather than the price level

- This is more modern and more realistic
- It is easier to formulate proscriptions for systematic monetary policy
- Allows us to more easily think about constraints on policy like the zero lower bound (ZLB)

Will not worry too much about micro foundations

The IS Curve

Same as before: set of (r_t, Y_t) pairs consistent with household optimization and income equaling expenditure

Let's just denote this as:

$$\text{IS : } Y_t = D(\bar{A}_t, r_t)$$

Here, $\bar{A}_t$ is anything other than the interest rate that affects autonomous desired expenditure

In terms of partial derivatives, we have $D_A(\cdot) > 0$ and $D_r(\cdot) < 0$

The Taylor Rule

Taylor (1993) argued that a good prescriptive and prospective description of monetary policy is:

$$i_t = \pi^* + r^* + \phi_\pi(\pi_t - \pi^*) + \phi_y(Y_t - Y_t^f)$$

Taylor argued $\phi_\pi \approx 3/2$ and $\phi_y \approx 1/2$

Raise interest rate (more than one-for-one) whenever inflation is above target and cut interest rate if output is below target

The MP Rule in our New Keynesian Model

Simplified Taylor rule (call it the MP rule):

$$i_t = i^* + \phi (\pi_t - \pi^*) + ms_t$$

i^* is the long-run target interest rate and π^* is the long-run target inflation rate

ms_t is an exogenous monetary shock

The Taylor Principle

Taylor Principle: $\phi > 1$

Fisher relationship: $r_t = i_t - \pi_{t+1}^e$

Assume adaptive expectations: $\pi_{t+1}^e = \pi_t$

So, $r_t = i_t - \pi_t$. Then:

$$r_t = r^* + (\phi - 1) (\pi_t - \pi^*) + ms_t$$

Here, $r^* = i^* - \pi^*$ is the “natural rate” of interest

So long as $\phi > 1$, this is an upward-sloping relationship between r_t and π_t

AD Curve

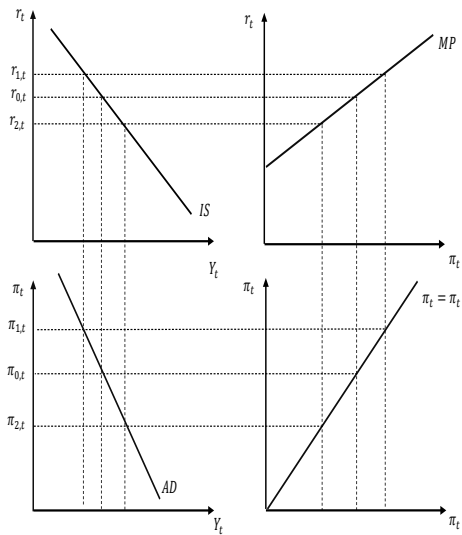
$$AD = IS + MP$$

Algebraically:

$$AD : Y_t = D(\bar{A}_t, r^* + (\phi - 1)(\pi_t - \pi^*) + ms_t)$$

Since $D_r(\cdot) < 0$, so long as $\phi > 1$, this is an downward-sloping relationship between π_t and Y_t

Graphical Derivation of AD



Some more on the AD Curve

AD curve will shift horizontally if:

- Autonomous expenditure ($\bar{A}_t$) changes (e.g., change in government spending)
- There is a monetary policy shock, ms_t

The slope of the AD curve depends on many things; one important thing is the size of ϕ

- The bigger is ϕ , the flatter is the AD curve

Supply Side

Recall the partial sticky price AS curve:

$$P_t = \bar{P}_t + \gamma (Y_t - Y_t^f)$$

Re-interpret this in terms of inflation rates:

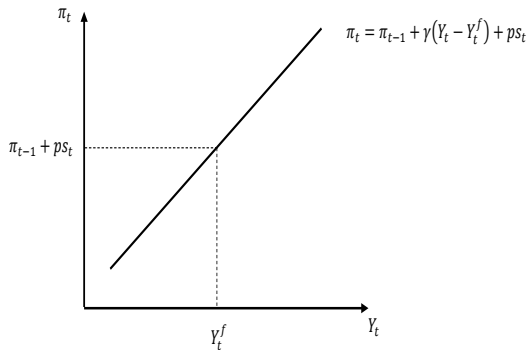
$$\pi_t = \pi_t^e + \gamma (Y_t - Y_t^f)$$

Assume adaptive expectations, and add in a “price shock” (e.g., oil prices):

$$\pi_t = \pi_{t-1} + \gamma (Y_t - Y_t^f) + p s_t$$

We'll call this the Phillips curve (PC). Can also do more straightforward dynamics than earlier

The Phillips Curve



The AD-PC Model

IS + MP $\Rightarrow$ AD:

$$Y_t = D(\bar{A}_t, r^* + (\phi - 1)(\pi_t - \pi^*) + ms_t)$$

PC (or AS):

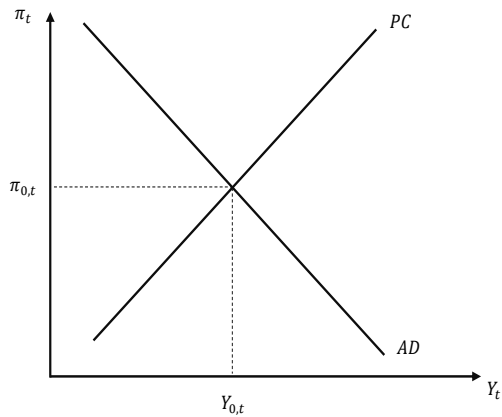
$$\pi_t = \pi_{t-1} + \gamma(Y_t - Y_t^f) + ps_t$$

Two equations, two endogenous variables: π_t and Y_t

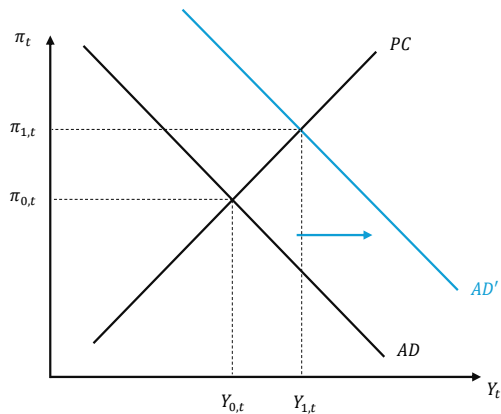
Exogenous:

- $\bar{A}_t, ms_t$ (demand)
- Y_t^f, ps_t (supply)

Equilibrium



Demand Shock ($\uparrow \bar{A}_t$ or $\downarrow ms_t$)



Supply Shock ($\uparrow Y_t^f$ or $\downarrow ps_t$)

