Elements of Macroeconomics

Week 10

13 Finance I

13.1 Saving, Investment and Capital Markets

Fisher Equation Relation between the nominal rate (i), inflation (π) and the real rate (r).

$$i = r + \pi$$

Bonds

1. Basic vocabulary:
   - **Principal**: the amount of money loaned out
   - **Market price**: the price paid for a bond in the bond market ("price" referred to by Barbera) → This may not be equal to the principal!
   - **Yield/Coupon rate**: the interest paid on that loan
2. Market price of a specific bond and interest rate/yield are inversely related! This works in TWO (connected) WAYS.
   (a) Bond price and the CURRENT/MARKET interest rates are inversely related. New bonds are issued all the time. If they have higher interest rates than the ones before them, then the older bonds are less valuable. Demand goes down for those old bonds, decreasing its market price.
   (b) bond price and its OWN yield are inversely related. The principal and the coupon payment is fixed, but the market price is not.
   - E.g. bond with principal of \$100, coupon rate of 10% (meaning \$10 per year)
   - Price drops to \$90, but coupon of \$10 is unchanged

   → Price (\$100 → \$90); Yield (10% → 11%)
3. All bond yields follow the Fed Funds rate (set by the Federal Reserve)—if the ffr increases, so do long-term treasury bond yields and corporate bond yields.
4. Yield is determined by duration (time to maturity) and default risk.
   (a) Corporate bonds are risky
   (b) Government bonds are risk-free
   (c) Risky/risk free spread: interest rate on risky bonds minus interest rate on risk-free (Treasury) bonds

Learning expectations from the market Observing bond prices, we can learn what the financial market expect for *inflation, default risk*, and *interest rates*

1. **Expected inflation based on TIPS (treasury inflation protection securities)**

$$\text{TIPS yield} = \text{T-bond yield} - \text{expected inflation}$$

2. **Expected default risk based on corporate spread**

   - Government bonds are risk-free (almost)
   - Corporate bonds are risky (riskier)
   - Comparing the *same duration* of bonds, when the risk spread is larger, default risk is higher and needs to be compensated more.

$$\text{risk spread} = \text{Corporate bonds prices - Government bonds prices}$$

3. **Expected interest rates based on term structure of T-Bills**

   - Government bonds of different maturities are both risk free
   - Government bonds increase with interest rates (fed funds rate)
   - Comparing the two gives us the expected interest rate
   - In theory, we could just roll-over the bond with a shorter maturity
   - Example we have a 1-yr US treasury and a 5-yr US treasury. We are ignoring the term premium (the premium for lending money for a longer time)
   - If we expect interest rates to stay the same and, we could either buy each year a 1-yr US treasury or buy the 5-yr US treasury.

$$(1 + r_t^{5y})^5 = (1 + r_t^{1y}) * (1 + r_{t+1}^{1y}) * (1 + r_{t+2}^{1y}) * (1 + r_{t+3}^{1y}) * (1 + r_{t+4}^{1y}) + \text{term premium}$$

   - If we expect higher interest rates $\rightarrow$ 5-yr US treasury: $\uparrow$ yield $\rightarrow \downarrow$ price
   - If we expect lower interes rates $\rightarrow$ 5-yr US treasury: $\downarrow$ yield $\rightarrow \uparrow$ price

13.2 From AD-AS To Phillips Curve

We can derive the Phillips Curve from the AD-AS model. Spoiler alert: monetary policy changes the real interest rate on the T-Bill, T-Bond, and corporate bond market. This shifts the AD curve in the AD-AS model. We will see that very clearly in the *loanable funds model*.

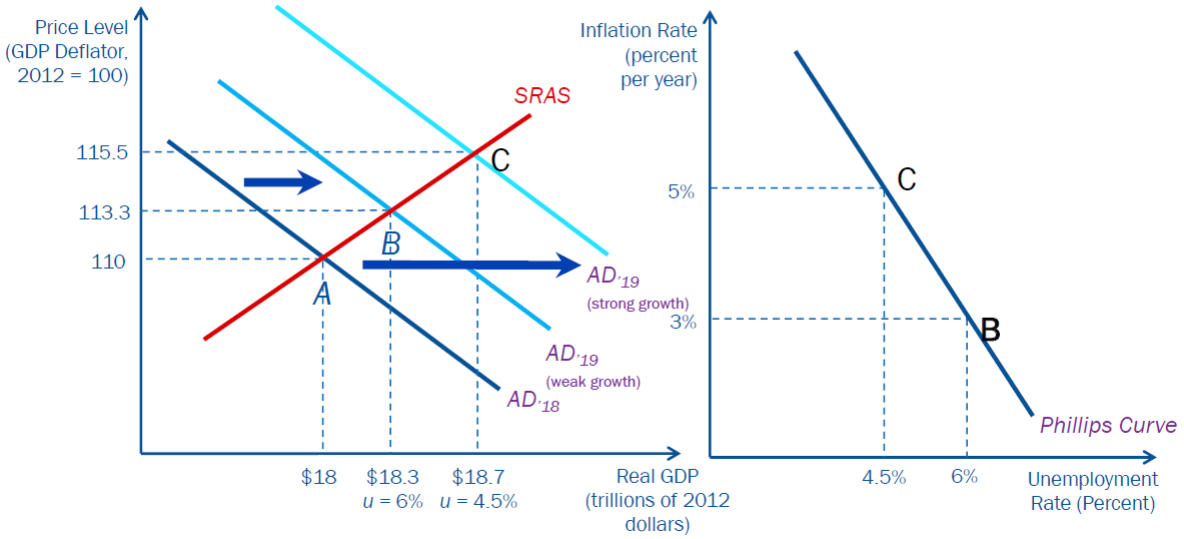

Figure 1: From AD-AS to Phillips Curve

Things to remember:

- We start from point A. The Phillips curve reflects the deviation from this point.
- In the AD-AS model, we have output on the x-axis, in the Phillips curve we have u. Remember: when y increases, u decreases!
- In the AD-AS model, we have price level on the y-axis, in the Phillips curve, we have inflation. Remember: Inflation is the change in price levels!
- The short run Phillips curve is downward sloping. Why? Because of sticky prices and wages!

13.3 Inflation Expectations and the Phillips Curve

The impact of monetary policy depends on the formation process of inflation expectations. Two helpful ways to think about it:

1. **adaptive expectations**: You expect inflation rate today to be similar to last periods.
2. **perfect foresight**: You know exactly what the inflation rate will be

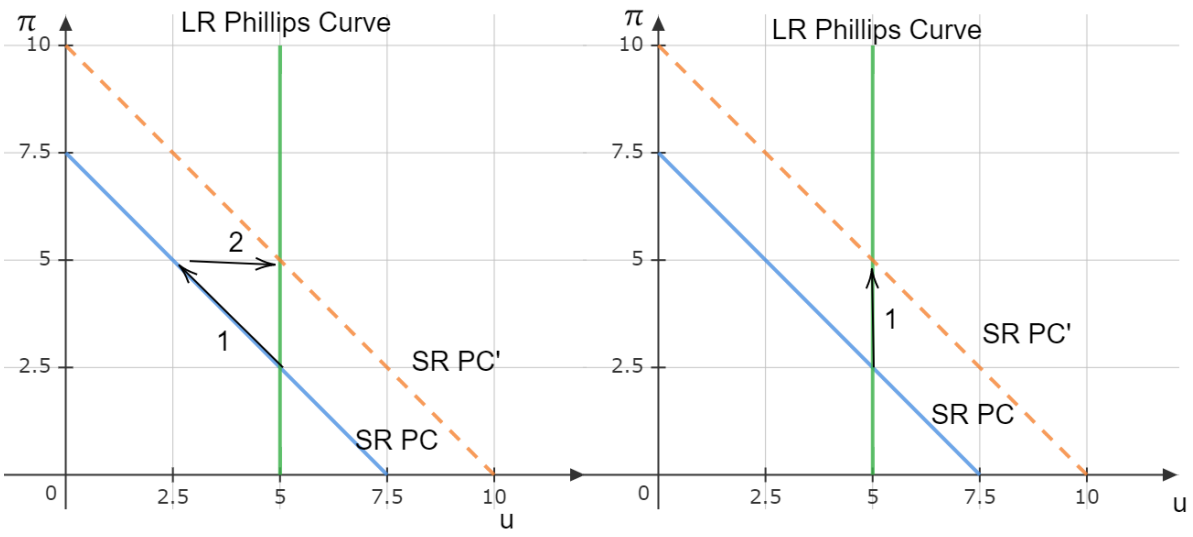

Figure 2: Phillips Curve and Expectations. Adaptive (left) and rational (right)

Bottom Line: Monetary policy does only work in the short run and when households/firms get surprised.

13.4 Exercises

Q1: The Phillips Curve can be written as:

$$\pi_t = \pi_e + \alpha(U_t - U^*)$$

Note that in the lecture notes it is written as $\alpha(U^* - U_t)$. To make the graphs look more familiar, we use this form.

1. Explain each part.
2. What is $U_t - U^*$?
3. Draw the short run Phillips Curve for $\pi_e = 2\%$ and α = -0.5 in an $U_t - U^*/\ \pi_t$ graph.
4. Assume NAIRU and unemployment are at 3.5%. Draw the long run Phillips Curve
5. The FED reduces interest rates which increases inflation rate to 3%. Assuming adaptive expectations, what happens to $U_t - U^*$ and U_t in the short run? What happens in the long run?
6. Assuming rational expectations, what happens to $U_t - U^*$ and U_t in the short run? What happens in the long run?

Q2: 2.3 Use the following information to draw a graph showing the short-run and long-run Phillips curves:

- Natural rate of unemployment = 4.5 percent
- Current rate of unemployment = 4.0 percent
- Expected inflation rate = 2.0 percent
- Current inflation rate = 3.0 percent

Be sure your graph shows the point where the short-run and long-run Phillips curves intersect.

Q3: Assume $\pi^* = 2^{\%}$, $U^* = 5\%$, $\alpha = 0.5$ in the Phillips Curve Equation. Further, assume adaptive inflationary expectations.

year	π	U
2021	2%	5%
2022	3%	3%
2023	?	3%

- Use an equation to predict the inflation rate for 2023.
- Suppose the Fed wants to get back to 2% inflation in 2024. What will the unemployment rate have to be?