Principles of Macroeconomics: Monetary Policy, the Long Run, Okun's Law, and the Phillips Curve

Class 22

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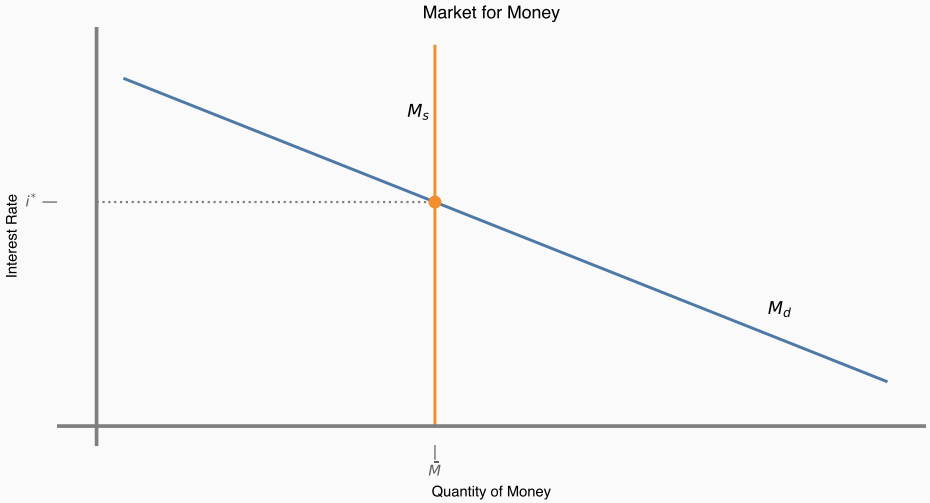
Overview

- Announcements:
  - LC 13/15, GH 13/15 due Friday at 11:59pm
- Topics:
  - Monetary policy and AD
  - Prices in the long-run
  - Okun's Law
  - The Phillips Curve
- Readings:
  - Chapters 15.3-15.4

$M_s = L(r)PY$


Market for Money
M_s
M_d
i^*
Interest Rate
$\bar{M}$
Quantity of Money

Aggregate Demand

Remember why AD slopes downward?

- Wealth effect
- Interest rate effect

We can now more fully understand the interest rate effect

- Inflation increases
- Increases $PY \longrightarrow M_d$ shifts out
- Increases the interest rate in equilibrium
- $I(r)$ decreases due to a higher interest rate
- Y is lower

AD and M_s

But shifts in the money supply will shift AD – holding π constant

Suppose that M_s shifts out

- The interest rate decreases (holding π constant)
- Investment increases (holding π constant)
- GDP increases (holding π constant)

Then AD shifts out, as Y is higher at any given π

Demand Shocks

Suppose that autonomous consumer spending falls

- AD shifts left, π and $Y \downarrow$ in the SR

How does the Fed conduct monetary policy? Remember the dual mandate

- $\uparrow M_s \rightarrow \downarrow i$
- $\downarrow i \rightarrow \uparrow I(r)$
- $\uparrow I(r) \rightarrow \uparrow Y$
- For every π, Y has increases $\longrightarrow$ AD shifts right
  - The Fed can return the economy back to potential

What happens if the government increases G?

Supply Shocks

Suppose that OPEC lowered oil prices unexpectedly

- *SRAS* shifts right, $\pi \downarrow$, $Y \uparrow$ in the SR

How does the Fed conduct monetary policy here?

- Increase $M_s \longrightarrow AD$ shifts right
  - But then the output gap gets larger! We are pushing output beyond potential, usually meaning we are borrowing too much from the future
- Decrease $M_s \longrightarrow AD$ shifts left
  - But then π falls and we are below our price target
  - Lowering π below target can dislodge inflation expectations – disinflationary spiral?
  - We don't want π too low either – ballooning government debt, very high real interest rates

Tough tradeoff for monetary policy here – Fed tends to focus on prices

Suppose that the Fed permanently increases M_s – what happens?

- The interest rate falls $\longrightarrow I(r) \uparrow$
- AD shifts right $\longrightarrow \pi,\ Y \uparrow$
- Higher $PY \longrightarrow$ higher M_d
- Higher $M_d \longrightarrow \uparrow$ interest rate
- AD shifts back left

The price level increases (no deflation), but Y does not change in the long-run

Money Neutrality

- Money is neutral in the long-run
- A higher M_s raises prices, but not output in the long-run

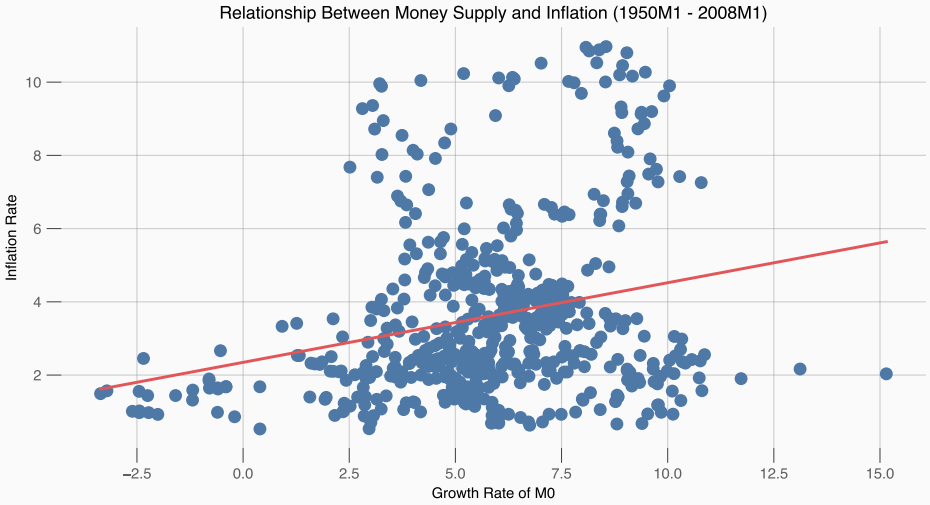
  Or think of it this way:

  - Set $Y = Y_p$
  - Then $M = L(r)PY_p$
  - If $M_s \uparrow$, then either $L(r)$ or P must increase in the long-run
    - Since $Y = Y_p$, there is no shift in the loanable funds – the interest rate stays the same
    - So only P must adjust

Inflation is always and everywhere a monetary phenomenon.

Milton Friedman

Money Supply vs. Inflation



Finishing the AD-AS Intuition

In our AD-AS model, we have yet to link:

- The output gap to unemployment
  - We've just stated that output falling leads to an increase in unemployment
- Unemployment to inflation
  - We made a qualitative argument for why the SRAS slopes up in (Y, π) space
  - Now, we will formally link inflation to unemployment
  - We can then link inflation to output

The Unemployment Gap

Recall in our labor market chapter that there will always be some unemployment in the economy

- We call this amount of unemployment the natural rate of unemployment

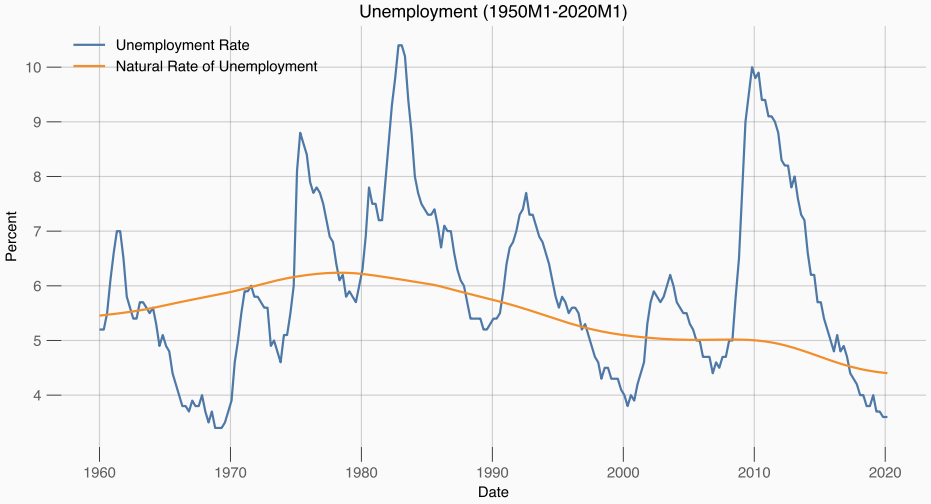
$$u = \text{Natural} + \text{Cyclical}$$

where natural unemployment was:

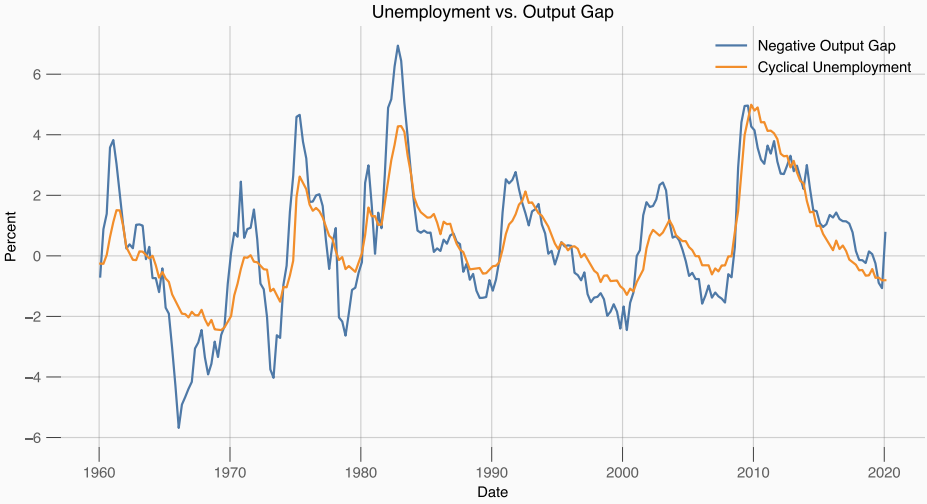
$$\text{Natural} = \text{Frictional} + \text{Structural}$$

- Natural unemployment is unrelated to the business cycle
  - Still important, and we still want to minimize structural unemployment
  - But policy in response to business cycles will not address structural unemployment

Unemployment



Compare to the Output Gap



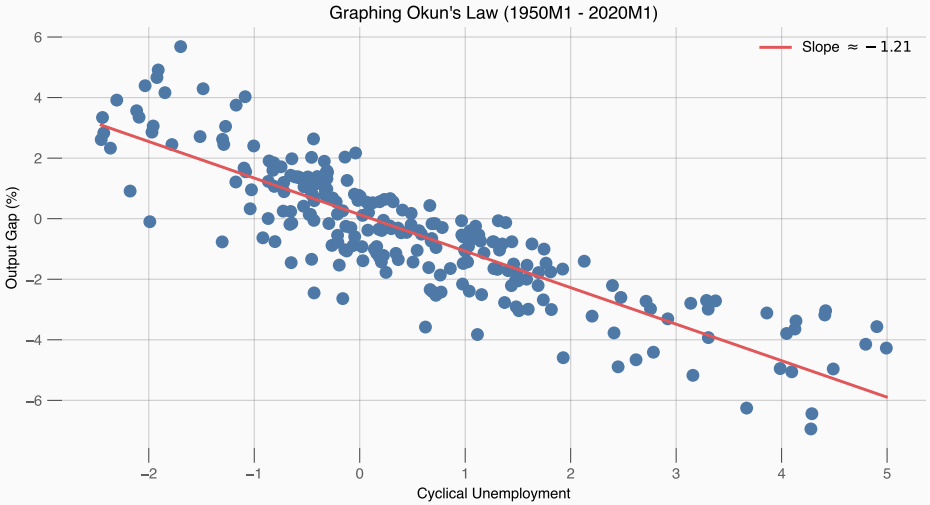
Okun's Law

Okun's Law links cyclical unemployment to the output gap:

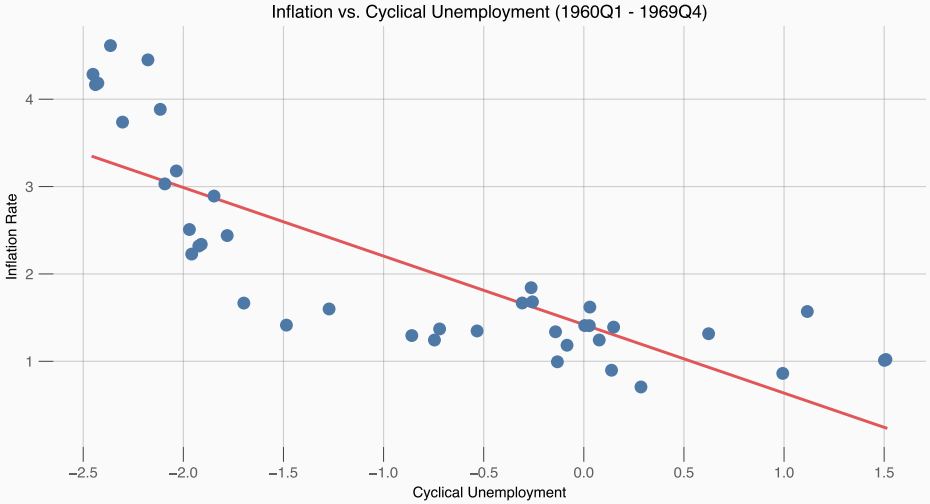
$$(u - \bar{u}) \approx -\frac{1}{2}\left(\frac{Y - Y_p}{Y_p}\right)$$

- Where $-\frac{1}{2}$ is a "rule of thumb" weight

In Data


Graphing Okun's Law (1950M1 - 2020M1)
Slope ≈ −1.21
Output Gap (%)
Cyclical Unemployment
6
4
2
0
−2
−4
−6
−2
−1
0
1
2
3
4
5

Linking Unemployment to Inflation



The Phillips curve links unemployment to inflation:

$$\pi = \bar{\pi} - \kappa(u - \bar{u})$$

where:

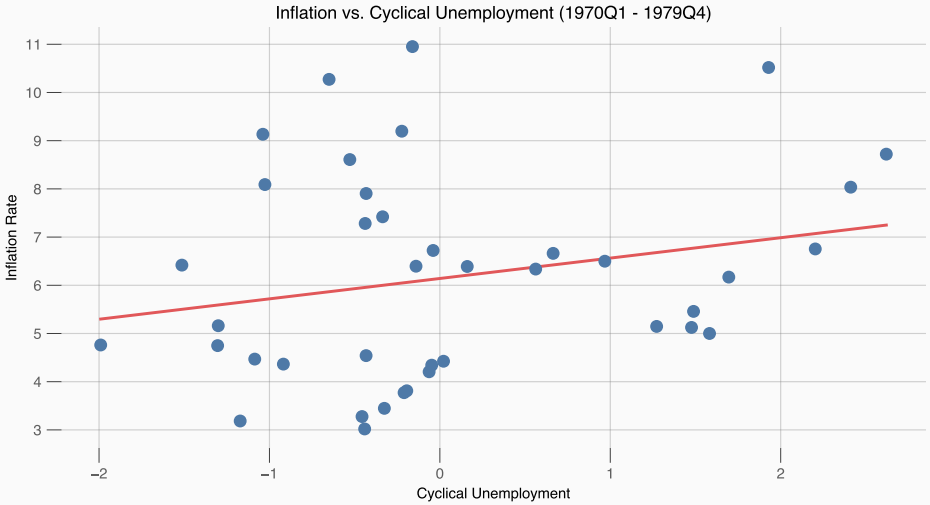
- $\pi \equiv$ inflation
- $\bar{\pi} \equiv$ long-run value of inflation
- $\kappa \equiv$ weight on cyclical unemployment, $\kappa > 0$

This relationship is a demand-side relationship

- When unemployment increases, π falls
- Think about the AD-AS model – this only holds when AD is shifting
  - AD shifts left $\rightarrow Y$, $\pi \downarrow \rightarrow$ Okun's Law $\rightarrow u \uparrow$

Problem: What happens if SRAS moves instead? What happens if $\mathbb{E}[\pi]$ changes?

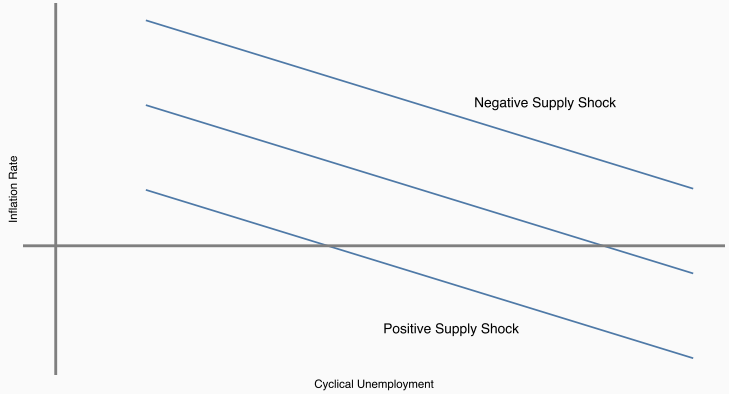
The 1970s – What a Mess!



Supply Shocks

If we get hit with a supply shock, production is more expensive at every output level

- Which means that production is more expensive at every unemployment level (Okun's Law)
- Changes $\bar{\pi}$ in Phillips Curve



Changing Inflation Expectations

Suppose that people begin to expect higher inflation

- People know that nominal wages are sticky
- People know that inflation diminishes purchasing power
- High expected inflation $\longrightarrow$ higher wage negotiation
- Higher wages $\longrightarrow$ higher π today

Then π is higher for every level of unemployment $\longrightarrow$ the Phillips curve shifts up

Posit that $\bar{\pi} = \beta \mathbb{E}[\pi] + \nu$

- $\mathbb{E}[\pi] \equiv$ expected inflation
- $\nu \equiv$ supply shock
- $\beta \equiv$ weight on expected inflation, $\beta > 0$

So the Phillips curve becomes:

$$\pi = \beta \mathbb{E}[\pi] - \kappa(u_t - \bar{u}) + \nu$$

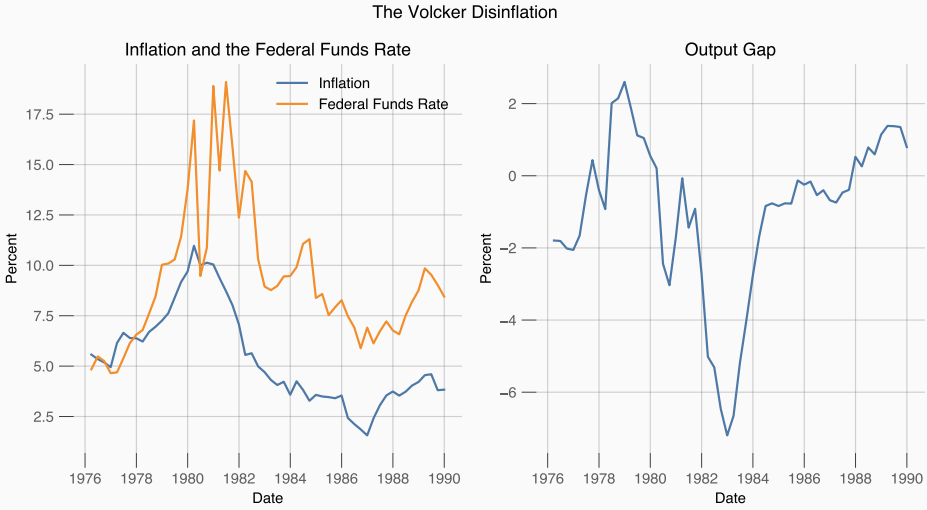
So What Happened in the 1970s?

(1) Oil shocks
- 1973-1974: OPEC restricted oil due to the Yom Kippur War
- 1978-1979: Iranian Revolution restricted oil

Negative supply shocks $\longrightarrow \pi \uparrow$

(2) Inflation expectations
- The Fed did not have credibility in fighting inflation
  - Political business cycles
- $\mathbb{E}[\pi]$ increased $\longrightarrow \pi$ increased $\longrightarrow \mathbb{E}[\pi]$ increased ...
- Ended when Paul Volcker raised interest rates dramatically
- But restoring inflation fighting credibility comes at a cost...

Volcker Disinflation



Plug Okun's Law into the Phillips curve:

$$\pi = \beta \mathbb{E}[\pi] + \frac{\kappa}{2}\left(\frac{Y - Y_p}{Y_p}\right) + \nu$$

This is our SRAS curve!

- If $Y \uparrow \longrightarrow \pi \uparrow$, so it is upward sloping
- $\mathbb{E}[\pi]$ shifts it
- Commodity price changes are supply shocks, which shift it

Summary

- Long-run money neutrality
- Okun's Law connects unemployment and the output gap
- The Phillips curve connects inflation to unemployment
- Combining Okun's Law with the Phillips curve gives us SRAS

- Prepare for presentations