Principles of Macroeconomics: Aggregate Demand and Aggregate Supply

Class 17

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Overview

- Announcements:
  - LC 12, GH 12 due Friday at 11:59pm
- Topics:
  - Aggregate Demand
  - Aggregate Supply
- Readings:
  - Chapters 12.1-12.2, chapters 12.3-12.4

Recall

$AE_{planned}$ and GDP in our Keynesian Cross model

- $AE_{planned}$: think of this as "demand"
- We solved for equilibrium where $GDP = AE_{planned}$
- There is no supply in this model.

Now, let's think about supply

- We will break up aggregate supply into two concepts
  - Long-run aggregate supply (LRAS)
  - Short-run aggregate supply (SRAS)

Why do we care? We can now model business cycles

Let's complicate our simple GDP model:

- First, let's make investment a function of the interest rate, $I(r)$. We will assume $I_{unplanned} = 0$ here
- Second, let's suppose that disposable income accounts for transfers, TR, and taxes, T: $Y^D = GDP + TR - T$
- We will continue to assume that G, T, and TR are exogenously determined

Our GDP equation is thus:

$$GDP = A + MPC \times (GDP + TR - T) + I(r) + G$$

Solve for GDP:

$$GDP = \left(\frac{1}{1 - MPC}\right)[A + MPC \times (TR - T) + I(r) + G]$$

Consider inflation π. Where might that enter this equation?

- $A \longrightarrow$ decrease in the real value of nominal wealth
- $I \longrightarrow$ increase in r will decrease I

Nominal Wealth

We all hold assets that are denominated nominally

- At the very least, all of us of some cash and probably a savings/checking accounts. Some of us have bonds
- Basically – any asset that has a fixed nominal payoff
- But when prices increase, nominal payoffs decline in real value
- We are therefore poorer

If we are poorer, then A falls in the consumption function (refer to class 15)

- Some assets are real assets
  - Inflation protected securities (TIPs bonds) adjust principle based on inflation
  - A house – prices roughly increase or decrease with the price level
  - Stocks are similar to houses

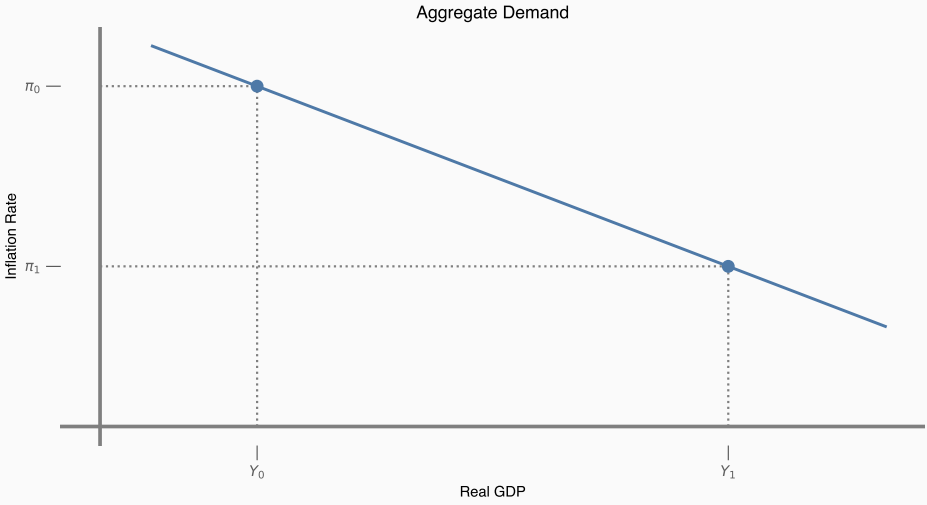
Interest Rates

An increase in π will increase interest rates

- If π increases, each of us need more cash to make a purchase
- If we need more cash, then the demand for money increases
- The price of money is the interest rate
- If demand increases, the price of money increases, so the interest rate increases
- If r increases, I decreases
- Stay tuned for monetary policy later on

Overall, then, an increase in π decreases the quantity of aggregate demand (and vice versa)

Aggregate Demand



$$GDP = \left(\frac{1}{1 - MPC}\right)[A + MPC \times (TR - T) + I(r) + G]$$

What will shift AD? Anything that changes autonomous planned expenditure for all π

(1) Changes in A NOT due to π

(2) Changes in $I(r)$ NOT due to π

- Changes in monetary policy
- Fundamental shifts in the market for loanable funds

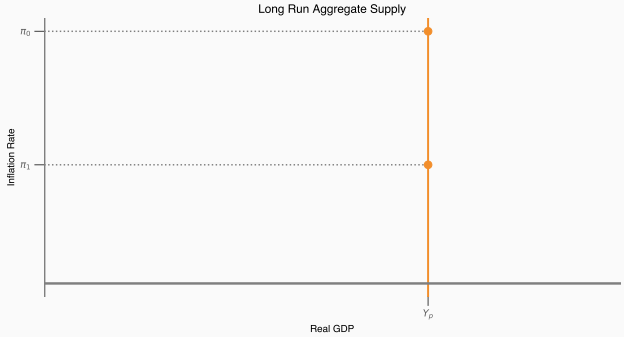
(3) Changes in G

(4) Changes in TR or T

Long Run Aggregate Supply

Go back to our simple production economy – the price level did not impact how much output the economy could produce

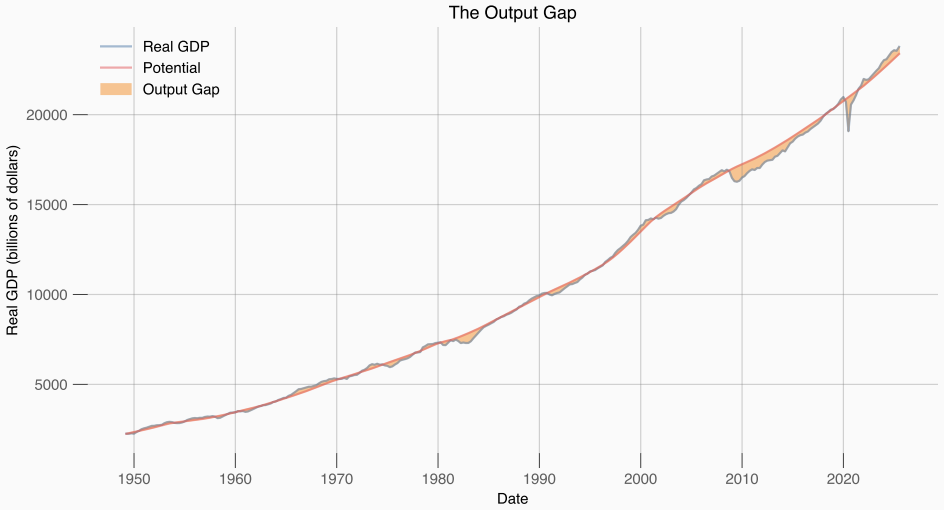
- Dependent on TFP, K, and L
- Thus, LRAS is independent of price



Potential GDP

- Where LRAS sits on the x-axis is the level of RGDP called potential GDP or potential output
  - Basically, if everything in the economy is working well, this is where we should be producing
- But, we rarely produce at potential exactly
  - Sometimes we produce *less* than when we are producing efficiently
  - Sometimes we produce *more* – how?
- We refer to the difference between actual RGDP and potential GDP as the output gap ($Y - Y_p$)

Output Gap


The Output Gap
Real GDP
Potential
Output Gap
Real GDP (billions of dollars)
20000
15000
10000
5000
1950
1960
1970
1980
1990
2000
2010
2020
Date

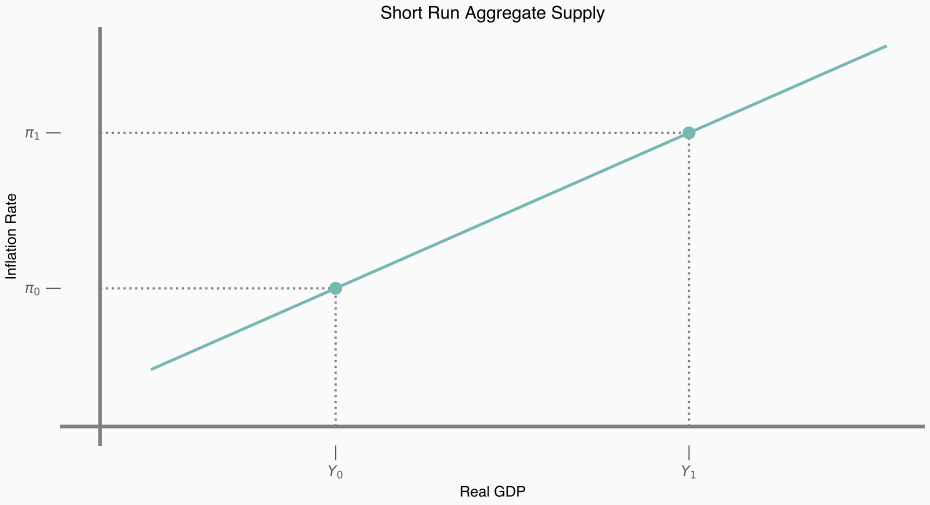
Let's think about our profit function:

$$\Pi = PY - wL - p^k K$$

- Suppose the firm signed a wage contract with their workers. If π increases, will wages increase proportionally? No
- Recall that labor share of income is about 60% in the US. Wage bills matter a lot
- If π increases, will firms increase Y? Yes

So overall, if π increases, firms will increase Y in the short-run to take advantage of the extra profits: SRAS slopes up

Short Run Aggregate Supply



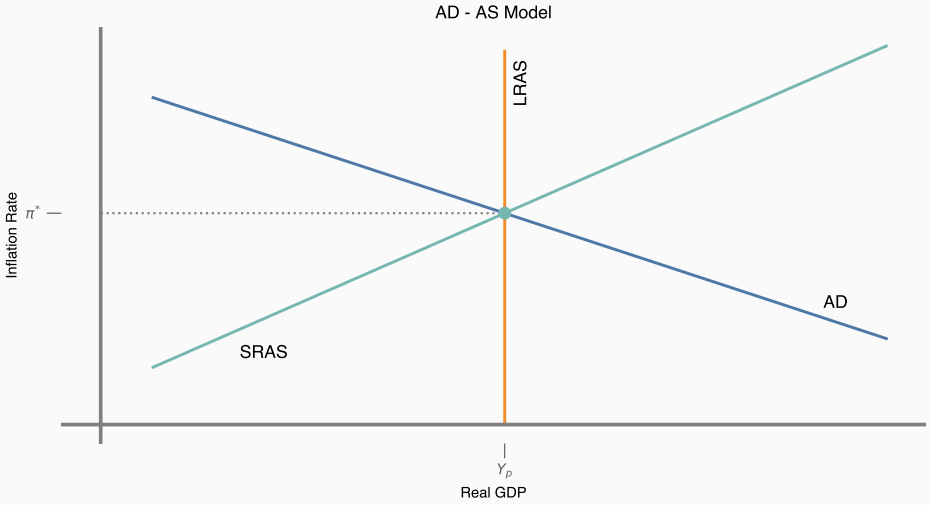
Shifters

(1) Commodity prices
- Suppose that the price of oil increases – pretty much every firm uses oil at some point
- Then input costs increase and profit decreases, regardless of π
- Aggregate supply shifts left

(2) Productivity
- Suppose that the general skill level in the economy increases such that all workers become more productive
- For a given level of output, we now have to pay fewer workers and employ less capital – profits increase
- Aggregate supply shifts right

(3) Inflation expectations
- Suppose that workers expect inflation to be very high next year – how will they barter new wages? This decreases profit per unit
- Aggregate supply shifts left

AD-AS Model



Practice Problem

(1) Determine which curve the following shift:
   - Oil prices temporarily fall
   - Interest rates on borrowing increase
   - The government requires firms to continue paying wages after workers retire, but forces workers to continue working until retirement age
   - Real estate values increase exogenously
   - War cuts the capital stock in half

(2) Suppose that we are at potential. Then, we observe that output increases. What observable information do you need to know to determine whether LRAS increased or we moved *along* the SRAS?

(3) Suppose that the SRAS curve is given by: $\pi = \mathbb{E}[\pi] + \kappa(Y - Y_p) + u$. Potential is 100, κ is 0.5. u is a supply shock and is equal to zero here. A demand shock moves observed output to 102 and inflation to 3.
   - What is expected inflation?
   - Suppose the demand shock disappears, but expected inflation moves to 2.5. Given that inflation returns to 2, what is Y?

(1) The following curves move:
   - SRAS shifts right
   - Demand shifts left
   - SRAS shifts left
   - Demand shifts right
   - LRAS shifts left (SRAS may shift left as well)

(2) What happens with prices? If π increases, demand shifted. If π does not move or falls, then supply shifted. If LRAS shifted, then we would expect Y to remain elevated and prices to remain lower or flatten.

(3) Use the SRAS equation:
   - $3 = \mathbb{E}[\pi] + 0.5(102 - 100) + 0 \longrightarrow \mathbb{E}[\pi] = 2$
   - $2 = 2.5 + 0.5(Y - 100) \longrightarrow Y = 99$

Summary

- Aggregate Demand
- Aggregate Supply
- Long run equilibrium

- Remember: homework due Friday night
- Read chapter 12.3-12.4