Lecture 15: AD-AS

November 3, 2016

Prof. Wyatt Brooks
What Can Governments Do about Recessions?

- Basically two approaches:
  - Monetary Policy: Adjust money supply to affect interest rates and therefore employment
  - Fiscal Policy: Adjust taxes and/or spending to affect the amount of products that are demanded

- Goal for the rest of this class: understand the different options, and their costs and benefits

- Simplest model to do this: AD-AS model
The Model of Aggregate Demand and Aggregate Supply

The price level

The model determines the eq’m price level

and eq’m output (real GDP).

Real GDP, the quantity of output

“Aggregate Demand”

“Short-Run Aggregate Supply”

\( P \)

\( P_1 \)

\( Y \)

\( Y_1 \)
The **AD curve** shows the quantity of all goods demanded in the economy at any given price level.
Why the $AD$ Curve Slopes Downward

$Y = C + I + G + NX$

Assume $G$ fixed by govt policy.

To understand the slope of $AD$, must determine how a change in $P$ affects $Y$. 

![Graph showing the AD curve and relationship between price ($P$) and income ($Y$). Points $P_1$ and $P_2$ demonstrate the effect of price change on income.]
The Wealth Effect \((P\text{ and } C)\)

Suppose \(P\) rises.

- The dollars people hold buy fewer g&s, so real wealth is lower.
- People feel poorer.

Result: \(C\) falls.
The Wealth Effect \((P \text{ and } I)\)

Suppose \(P\) rises.

- Nominal interest rate = Real interest rate + inflation
- Higher prices means more inflation
- If real rates are constant, then nominal increases
- Higher interest rates discourage real investment
  - Imagine someone trying to borrow to build a factory or start a new business

Result: \(I\) falls.
The Slope of the $AD$ Curve: Summary

An increase in $P$ reduces the quantity of goods & services demanded, which generates the downward sloping $AD$ curve.
Why the $AD$ Curve Might Shift

Any event that changes $C$, $I$, $G$, or $NX$ – except a change in $P$ – will shift the $AD$ curve.

Example:
A stock market boom makes households feel wealthier, $C$ rises, the $AD$ curve shifts right.
Why the AD Curve Might Shift

- Changes in C
  - Stock market boom/crash
  - Preferences re: consumption/saving tradeoff
  - Tax hikes/cuts
  - Interest rates, monetary policy

- Changes in I
  - Firms buy new computers, equipment, factories
  - Expectations, optimism/pessimism
  - Interest rates, monetary policy
  - Investment Tax Credit or other tax incentives
Why the \textit{AD} Curve Might Shift

- Changes in $G$
  - Federal spending, \textit{e.g.}, defense
  - State & local spending, \textit{e.g.}, roads, schools

- Changes in $NX$
  - Booms/recessions in countries that buy our exports.
  - Appreciation/depreciation resulting from international speculation in foreign exchange market

- General idea: AD shifts whenever people \textit{demand} more goods and services at any given price level
The Aggregate-Supply (AS) Curves

The **AS curve** shows the total quantity of g&s firms produce and sell at any given price level.

**AS is:**
- upward-sloping in short run
- vertical in long run
The Long-Run Aggregate-Supply Curve (LRAS)

The **natural rate of output** \( (Y_N) \) is the amount of output the economy produces when unemployment is at its natural rate.

\( Y_N \) is also called **potential output** or **full-employment output**.
Why LRAS Is Vertical

\( Y_N \) determined by the economy’s stocks of labor, capital, and natural resources, and on the level of technology.

An increase in \( P \) does not affect any of these, so it does not affect \( Y_N \).
Why the LRAS Curve Might Shift

Any event that changes any of the determinants of $Y_N$ will shift LRAS.

Example:
Immigration increases $L$, causing $Y_N$ to rise.
Why the LRAS Curve Might Shift

- Changes in $L$ or natural rate of unemployment
  - Immigration
  - Baby-boomers retire
- Changes in $K$ (physical capital) or $H$ (human capital)
  - Investment in factories, equipment
  - More people get college degrees
Why the LRAS Curve Might Shift

- Changes in natural resources
  - Reduction in supply of imported oil
  - Changing weather patterns that affect agricultural production

- Changes in technology
  - Productivity improvements from technological progress
Using \( AD \) & \( AS \) to Depict \( LR \) Growth and Inflation

Over the long run, tech. progress shifts \( LRAS \) to the right and growth in the money supply shifts \( AD \) to the right.

Result: ongoing inflation and growth in output.
Short Run Aggregate Supply (SRAS)

The SRAS curve is upward sloping:

Over the period of 1-2 years, an increase in $P$ causes an increase in the quantity of g & s supplied.
Why the Slope of SRAS Matters

If AS is vertical, fluctuations in AD do not cause fluctuations in output or employment.

If AS slopes up, then shifts in AD do affect output and employment.
Three Theories of SRAS

In each,

- some type of market imperfection
- result: 
  \[ \text{Output deviates from its natural rate when the actual price level deviates from the price level people expected.} \]
1. The Sticky-Wage Theory

- Nominal wages are **sticky** in the short run, they adjust sluggishly.
  - Due to labor contracts, social norms

- Firms and workers set the nominal wage in advance based on $P_E$, the price level they expect to prevail.
  - So if actual prices are **higher** than expected, labor is relatively **cheap**
  - With lower production costs, firms produce more, increasing GDP.
2. The Sticky-Price Theory

- Many prices are sticky in the short run.
  - Due to **menu costs**, the costs of adjusting prices.
  - Firms set sticky prices in advance based on expected prices $P_E$.
  - If prices are unexpectedly high, then the firm’s good is relatively cheap
  - Hence, people buy a lot of it, increasing GDP
3. The Misperceptions Theory

- If firms see a lot of people buying their goods, they can’t tell the difference between:
  - Their price being “too low” \( (P > P_E) \), but the firm hasn’t adjusted its price
  - Demand from their product is high, but \( P = P_E \) causing them to increase production

- If they sometimes confuse the two, inflation can cause them to produce more.

- Then inflation causes GDP to increase due to this misperception.
What these Theories Have in Common:

In both theories, $Y$ deviates from $Y_N$ when $P$ deviates from $P_E$.

$$Y = Y_N + a(P - P_E)$$

- **Output**
- **Natural rate of output (long-run)**
- **$a > 0$, measures how much $Y$ responds to unexpected changes in $P$**
- **Expected price level**
- **Actual price level**
What the Theories Have in Common:

\[ Y = Y_N + \alpha(P - P_E) \]

When \( P > P_E \)

When \( P < P_E \)

the expected price level

\[ Y < Y_N \] \quad \text{and} \quad \text{\textcolor{red}{Y > Y_N}} \]
SRAS and LRAS

- The imperfections in these theories are temporary. Over time,
  - sticky wages and prices become flexible
  - misperceptions are corrected
- In the LR,
  - $P_E = P$
  - AS curve is vertical
In the long run, \( P_E = P \)
and
\( Y = Y_N \).

\[
Y = Y_N + a(P - P_E)
\]
Why the SRAS Curve Might Shift

Everything that shifts LRAS shifts SRAS, too.

In addition, $P_E$ shifts SRAS:

If $P_E$ rises, workers & firms set higher wages.

At each $P$, production is less profitable, $Y$ falls, SRAS shifts left.
In the long-run equilibrium, 

\[ P_E = P, \]
\[ Y = Y_N, \]

and unemployment is at its natural rate.
RBC vs. New Keynesian Revisited

We discussed the “New Keynesian” and “Real Business Cycle” perspectives

- Heart of the disagreement: How important are nominal rigidities?
- That is, are the three theories discussed quantitatively relevant?
- If not, then the only thing that can affect GDP is changes in LRAS
- Hence the name “Real Business Cycle”
Examples
What are the short run effects of all of these:

- Increase in spending on new hospitals
- Decrease in the supply of money (higher interest rates)
- Draught in agricultural areas
- Temporary reduction in the international price of oil
- New technology makes production permanently cheaper