Aggregate Demand

Intermediate Macroeconomic Theory
Macroeconomic Analysis

University of North Texas
Outline

1. Keynes’s Theory
2. The Goods Market and the IS Curve
3. The Money Market and the LM Curve
4. The Short-Run Equilibrium
5. Explaining Fluctuations with IS-LM Model
6. IS – LM As a Theory of Aggregate Demand
1. Keynes’s Theory

2. The Goods Market and the IS Curve

3. The Money Market and the LM Curve

4. The Short-Run Equilibrium

5. Explaining Fluctuations with IS-LM Model

6. $IS - LM$ As a Theory of Aggregate Demand
Keynes’s Theory

John Maynard Keynes (1936)

1. Criticized classical theory for assuming that AS alone—capital, labor, and technology—determines national income.

2. Proposed that low AD is responsible for the low income and high unemployment that characterize economic downturns.

Study of economic fluctuations by looking more closely at AD

- Identifying the variables that shift the AD curve, causing fluctuations in national income.

- IS-LM model shows what determines national income for any given price level and what causes income to change in the SR when the price is fixed.
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6. IS – LM As a Theory of Aggregate Demand
The Keynesian Cross Model

- **Planned Expenditure**: the amount households, firms, and the government would like to spend on goods and services

- Determinants of planned expenditure ($E$)

  $$E = C + I + G = C(Y - T) + I + G$$

- The economy in equilibrium: $Y = E$

- How does the economy get to the equilibrium?
  - $\Rightarrow$ Changes in inventories

- If $I$ is not fixed? $\rightarrow$ IS curve
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Aggregate Demand
The Goods Market
The $IS$ curve

- Investment function: $I = I(r)$
- The $IS$ curve: the relationship between $r$ and $Y$ that arises in the market for goods and services
- Slope of the $IS$ curve
- Changes in the $IS$ curve
- A Loanable-funds interpretation of the $IS$ curve
Investment function: $I = I(r)$

The IS curve: the relationship between $r$ and $Y$ that arises in the market for goods and services

- Slope of the IS curve
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The Goods Market
The IS curve

- Investment function: $I = I(r)$

- The IS curve: the relationship between $r$ and $Y$ that arises in the market for goods and services
  
  1. The interaction between $r$ and $I$ expressed by the investment function
  
  2. The interaction between $I$ and $Y$ demonstrated by the Keynesian cross

- Slope of the IS curve

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The Goods Market

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- Slope of the IS curve

- Changes in the IS curve
  1. Changes in fiscal policy (\( G, T \))
  2. Shocks to the IS curve

- A Loanable-funds interpretation of the IS curve
Investment function: $I = I(r)$

The *IS* curve: the relationship between $r$ and $Y$ that arises in the market for goods and services

Slope of the *IS* curve

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The Goods Market
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- Changes in the IS curve
- A Loanable-funds interpretation of the IS curve
  - $S(Y) = I(r)$
  - An increase in income raises saving and thus lowers the interest rate that equilibrates the supply and demand for loanable funds
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6. *IS* – *LM* As a Theory of Aggregate Demand
Liquidity preference theory: $r$ adjusts to balance the supply and demand for the economy’s most liquid asset (money)

- Supply of real money balances:
  \[
  (M/P)^s = \frac{M}{P}
  \]

- Demand for real money balances:
  \[
  (M/P)^d = L(r)
  \]

- Equilibrium interest rate:
  \[
  (M/P)^s = (M/P)^d \quad \text{or} \quad \frac{M}{P} = L(r)
  \]

- If $Y$ affects demand for real money balances $\rightarrow LM$ curve
Liquidity preference theory: $r$ adjusts to balance the supply and demand for the economy’s most liquid asset (money)

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If \( Y \) affects demand for real money balances \( \rightarrow \) \( LM \) curve
Money demand function: \((M/P)^d = L(r, Y)\)

The *LM* curve: the relationship between \(r\) and \(Y\) that arises in the money market

Slope of the *LM* curve

Changes in the *LM* curve

A quantity-equation interpretation of the *LM* curve
Money demand function: \((M/P)^d = L(r, Y)\)

The **LM curve**: the relationship between \(r\) and \(Y\) that arises in the money market

- Slope of the **LM curve**
- Changes in the **LM curve**
- A quantity-equation interpretation of the **LM curve**
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1. Changes in monetary policy
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A quantity-equation interpretation of the LM curve
The money market

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Slope of the *LM* curve

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A quantity-equation interpretation of the *LM* curve

If people respond to a higher interest rate by holding less money, each dollar they hold must be used more often to support a given volume of transactions

\[ MV(r) = PY \]

\[ \Rightarrow \text{Given } M \text{ and } P, \ r \text{ is positively related to } Y \]
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The Short-Run Equilibrium

- **IS – LM model**
  1. \( IS : Y = C(Y - T) + I(r) + G \)
  2. \( LM : \frac{M}{P} = L(r, Y) \)

- The equilibrium of the economy is the point at which the IS curve and the LM curve cross.

- Equilibrium in both goods market and money market.
The Short-Run Equilibrium

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Equilibrium in both goods market and money market
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6. \textit{IS – LM} As a Theory of Aggregate Demand
Explaining Fluctuations with *IS* – *LM* Model

- How **Fiscal Policy** Shifts the *IS* curve and Changes the SR Equilibrium
- How **Monetary Policy** Shifts the *LM* curve and Changes the SR Equilibrium
- Fiscal policy or Monetary policy?
- Shocks in the *IS* – *LM* model
Explaining Fluctuations with *IS* – *LM* Model

- **How Fiscal Policy** Shifts the *IS* curve and Changes the SR Equilibrium
  1. Change in Government Purchases (*G*)
  2. Change in Taxes (*T*)

- **How Monetary Policy** Shifts the *LM* curve and Changes the SR Equilibrium

- Fiscal policy or Monetary policy?

- Shocks in the *IS* – *LM* model
Explaining Fluctuations with $IS – LM$ Model

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  1. Shocks to the *IS* curve
  2. Shocks to the *LM* curve
Assume the following model of the economy, with the price level fixed at 1 \((P = 1)\)

\[
\begin{align*}
C &= 0.8(Y - T) \\
I &= 800 - 20r \\
T &= 1000 \\
G &= 1000 \\
M^s &= 1200 \\
(M/P)^d &= 0.4Y - 40r
\end{align*}
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(i) Write a numerical formula for the IS curve, showing \(Y\) as a function of \(r\) alone
Assume the following model of the economy, with the price level fixed at 1 ($P = 1$)

- $C = 0.8(Y - T)$
- $I = 800 - 20r$
- $T = 1000$
- $G = 1000$
- $M^s = 1200$
- $(M/P)^d = 0.4Y - 40r$

(ii) Write a numerical formula for the $LM$ curve, showing $Y$ as a function of $r$ alone
Assume the following model of the economy, with the price level fixed at 1 \( (P = 1) \)

\[
C = 0.8(Y - T) \\
I = 800 - 20r \\
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G = 1000 \\
M^s = 1200 \\
(M/P)^d = 0.4Y - 40r
\]

(iii) What are the short-run equilibrium values of \( Y, r, Y - T, C, I, S^p, S^g, \) and \( S \)?
Assume the following model of the economy, with the price level fixed at 1 \((P = 1)\)

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(iv) Assume that \(G\) increases by 200. By how much \(Y\) increase in the short run?
Assume the following model of the economy, with the price level fixed at 1 ($P = 1$)

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\[ G = 1000 \]
\[ M^s = 1200 \]
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(v) Suppose $G$ is back its original level of 1000, but $M^s$ increases by 200. By how much $Y$ increase in the short run?
A change in one policy may influence the other, and this interdependence may alter the impact of a policy change.

Example: How the economy responds to a tax increase depends on how the monetary authority responds:

1. Fed holds $M$ constant
2. Fed holds $r$ constant
3. Fed holds $Y$ constant

⇒ What assumption is most appropriate depends on the case at hand and the many political considerations that behind economic policy making.
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Explaining Fluctuations with $\textit{IS} - \textit{LM}$ Model
Case Study: Volcker’s Monetary Tightening

- Late 1970s: $\pi > 10\%$
  - Oct 1979: Fed Chairman Paul Volcker announced that monetary policy would aim to reduce inflation
    - Aug 1979-April 1980: Fed reduces $M/P$ 8.0%
      - $\Rightarrow$ Jan 1983: $\pi = 3.7\%$
  - How do you think this policy change would affect interest rates?
Late 1970s: $\pi > 10\%$

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Late 1970s: $\pi > 10\%$

Oct 1979: Fed Chairman Paul Volcker announced that monetary policy would aim to reduce inflation

Aug 1979-April 1980: Fed reduces $M/P$ 8.0%

⇒ Jan 1983: $\pi = 3.7\%$

How do you think this policy change would affect interest rates?
Explaining Fluctuations with *IS – LM* Model

- **Volcker’s Monetary Tightening**

<table>
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<th>The effects of a monetary tightening on nominal interest rates</th>
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Use the IS – LM model to analyze the effects of

1. A boom in the stock market makes consumers wealthier
2. After a wave of credit card fraud, consumers use cash more frequently in transactions

For each shock

- Use the IS – LM diagram to show the effects of the shock on $Y$ and $r$
- Determine what happens to $C, I,$ and $u$
Explaining Fluctuations with \( IS - LM \) Model

Analyze shocks with the \( IS - LM \) model

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The Great Depression

- National income and unemployment during the Great Depression

![Graph showing national income and unemployment during the Great Depression. The x-axis represents years from 1929 to 1939, while the y-axis on the left shows billions of 1958 dollars for Real GNP, and the y-axis on the right shows percent of labor force for Unemployment.]
**The Spending Hypothesis**: the Depression was largely due to an exogenous fall in the demand for goods & services (shocks to the IS curve)

- Evidence: $Y$ and $r$ both fell, which is what a leftward IS shift would cause

- Reasons for the IS shift
  - Stock market crash
  - Drop in investment
  - Contractionary fiscal policy
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Reasons for the IS shift

1. Stock market crash
   - Oct-Dec 1929: S&P 500 fell 17%
   - Oct 1929-Dec 1933: S&P 500 fell 71%

2. Drop in investment

3. Contractionary fiscal policy
The Spending Hypothesis: the Depression was largely due to an exogenous fall in the demand for goods & services (shocks to the IS curve)

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- **Evidence:** $Y$ and $r$ both fell, which is what a leftward IS shift would cause

- **Reasons for the IS shift**
  1. Stock market crash
  2. Drop in investment
    - “correction” after overbuilding in the 1920s
    - Widespread bank failures made it harder to obtain financing for investment
  3. Contractionary fiscal policy
The Spending Hypothesis: the Depression was largely due to an exogenous fall in the demand for goods & services (shocks to the IS curve)

Evidence: $Y$ and $r$ both fell, which is what a leftward IS shift would cause

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1. Stock market crash
2. Drop in investment
3. Contractionary fiscal policy
The Spending Hypothesis: the Depression was largely due to an exogenous fall in the demand for goods & services (shocks to the IS curve).

Evidence: \( Y \) and \( r \) both fell, which is what a leftward IS shift would cause.

Reasons for the IS shift:
1. Stock market crash
2. Drop in investment
3. Contractionary fiscal policy
   - in the face of falling tax revenues and increasing deficits, politicians raised tax rates and cut spending.
The Money Hypothesis: the Depression was largely due to huge fall in the money supply (shocks to the $LM$ curve)

- Evidence: M1 fell 25% during 1929-33
- But, two problems with this hypothesis
- So, the money hypothesis asserts that the severity of the Depression was due to a huge deflation
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But, two problems with this hypothesis

1. $P$ fell even more, so $M/P$ actually rose slightly during 1929-31
2. Nominal interest rates fell, which is the opposite of what would result from a leftward $LM$ shift

So, the money hypothesis asserts that the severity of the Depression was due to a huge deflation
The Money Hypothesis: the Depression was largely due to huge fall in the money supply (shocks to the \( LM \) curve)

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So, the money hypothesis asserts that the severity of the Depression was due to a huge deflation

1. $P$ fell 25% during 1929-33

2. This deflation was probably caused by the fall in $M$, so perhaps money played an important role after all
In what ways does a deflation affect the economy?

The stabilizing effects of deflation: \( \downarrow P \Rightarrow \uparrow M/P \)

The destabilizing effects of deflation:

- Unexpected deflation: "debt-deflation theory"
- Expected deflation:
In what ways does a deflation affect the economy?

- The **stabilizing** effects of deflation: $P \downarrow \Rightarrow M/P \uparrow$

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  - Expected deflation:
In what ways does a deflation affect the economy?

The **stabilizing** effects of deflation: \( \downarrow P \Rightarrow \uparrow M/P \)

1. \( LM \) shifts right \( \Rightarrow \uparrow Y \)
2. Consumers’ wealth \( \uparrow \Rightarrow \uparrow C \Rightarrow \uparrow Y \) (Pigou effect)

The **destabilizing** effects of deflation:

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In what ways does a deflation affect the economy?

The stabilizing effects of deflation: $\downarrow P \Rightarrow \uparrow \frac{M}{P}

The destabilizing effects of deflation:

1. **Unexpected** deflation: “debt-deflation theory”
   - $\downarrow P \Rightarrow$ transfers purchasing power from borrowers to lenders
   - Borrowers spend less, lenders spend more
   - if borrowers’ propensity to spend is larger than lenders, then aggregate spending falls $\Rightarrow \downarrow Y$

2. **Expected** deflation:
In what ways does a deflation affect the economy?

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The destabilizing effects of deflation:

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The destabilizing effects of deflation:

1. **Unexpected** deflation: “debt-deflation theory”
2. **Expected** deflation:
   \( \downarrow \pi^e \Rightarrow \uparrow r \) for each value of \( i \) \( \Rightarrow \downarrow I \Rightarrow \downarrow Y \)
Policymakers (or their advisors) now know much more about macroeconomics:

1. The Fed knows better than to let $M$ fall so much, especially during a contraction.

2. Fiscal policymakers know better than to raise taxes or cut spending during a contraction.

- Federal deposit insurance makes widespread bank failures very unlikely.
- **Automatic stabilizers** make fiscal policy expansionary during an economic downturn.
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Outline

1. Keynes’s Theory
2. The Goods Market and the IS Curve
3. The Money Market and the LM Curve
4. The Short-Run Equilibrium
5. Explaining Fluctuations with IS-LM Model
6. *IS – LM* As a Theory of Aggregate Demand
**IS − LM** model provides a theory to explain the **position** and the **slope** of the AD curve

- Why national income falls as the price level rises
- What causes the AD curve to shift
- **IS − LM** Model in the Short Run and the Long Run
From the $IS - LM$ Model to the $AD$ Curve

- $IS - LM$ model provides a theory to explain the position and the slope of the AD curve
- Why national income falls as the price level rises
- What causes the AD curve to shift
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From the IS – LM Model to the AD Curve

- *IS – LM* model provides a theory to explain the position and the slope of the AD curve
- Why national income falls as the price level rises
  - $\uparrow P \Rightarrow \downarrow M/P \Rightarrow \text{shift } LM \text{ upward} \Rightarrow \downarrow Y$
  - The AD curve shows the set of equilibrium points that arise in the *IS – LM* model as we vary $P$ and see what happens to $Y$
- What causes the AD curve to shift
- *IS – LM* Model in the Short Run and the Long Run
From the *IS* – *LM* Model to the *AD* Curve

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- \textit{IS} – \textit{LM} Model in the Short Run and the Long Run
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- \( IS − LM \) model provides a theory to explain the position and the slope of the AD curve
- Why national income falls as the price level rises
- What causes the AD curve to shift
- \( IS − LM \) Model in the Short Run and the Long Run
  1. Recessionary gap (\( Y < \bar{Y} \))
  2. Inflationary gap (\( Y > \bar{Y} \))