**The IS curve**

def: a graph of all combinations of \( r \) and \( Y \) that result in goods market equilibrium,

\( i.e. \) actual expenditure (output) = planned expenditure

The equation for the IS curve is:

\[ Y = C(Y - T) + I(r) + G \]
**Understanding the IS curve’s slope**

- The IS curve is negatively sloped.
- Intuition:
  A fall in the interest rate motivates firms to increase investment spending, which drives up total planned spending ($E$).
  To restore equilibrium in the goods market, output (a.k.a. actual expenditure, $Y$) must increase.

**The IS curve and the Loanable Funds model**

(a) The L.F. model

(b) The IS curve
Fiscal Policy and the IS curve

- We can use the IS-LM model to see how fiscal policy (G and T) can affect aggregate demand and output.
- Let’s start by using the Keynesian Cross to see how fiscal policy shifts the IS curve...

Shifting the IS curve: ΔG

At any value of r, 
↑G ⇒ ↑E ⇒ ↑Y
...so the IS curve shifts to the right.

The horizontal distance of the IS shift equals

\[ \Delta Y = \frac{1}{1-MPC} \Delta G \]
Exercise: Shifting the IS curve

- Use the diagram of the Keynesian Cross or Loanable Funds model to show how an increase in taxes shifts the IS curve.

The Theory of Liquidity Preference

- due to John Maynard Keynes.
- A simple theory in which the interest rate is determined by money supply and money demand.
Money Supply

The supply of real money balances is fixed:

\[ \left( \frac{M}{P} \right)^s = \frac{\bar{M}}{\bar{P}} \]

Money Demand

Demand for real money balances:

\[ \left( \frac{M}{P} \right)^d = L(r) \]
**Equilibrium**

The interest rate adjusts to equate the supply and demand for money:

\[ \frac{M}{P} = L(r) \]

**How the Fed raises the interest rate**

To increase \( r \), Fed reduces \( M \)
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%
- Jan 1983: $\pi = 3.7\%$

*How do you think this policy change would affect interest rates?*

Volcker’s Monetary Tightening, cont.

The effects of a monetary tightening on nominal interest rates

<table>
<thead>
<tr>
<th>model</th>
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<tr>
<td></td>
<td>Liquidity Preference (Keynesian)</td>
<td>Quantity Theory, Fisher Effect (Classical)</td>
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<tr>
<td>prices</td>
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<tr>
<td>prediction</td>
<td>$\Delta i &gt; 0$</td>
<td>$\Delta i &lt; 0$</td>
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<td>actual outcome</td>
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<tr>
<td>8/1979: $i = 10.4%$</td>
<td></td>
<td>1/1983: $i = 8.2%$</td>
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<tr>
<td>4/1980: $i = 15.8%$</td>
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</tbody>
</table>
The LM curve

Now let's put $Y$ back into the money demand function:

$$(\frac{M}{P})^d = L(r, Y)$$

The **LM curve** is a graph of all combinations of $r$ and $Y$ that equate the supply and demand for real money balances.

The equation for the $LM$ curve is:

$$\frac{\bar{M}}{\bar{P}} = L(r, Y)$$

---

Deriving the LM curve

(a) The market for real money balances

(b) The LM curve
Understanding the $LM$ curve’s slope

- The $LM$ curve is positively sloped.
- Intuition:
  An increase in income raises money demand.
  Since the supply of real balances is fixed, there is now excess demand in the money market at the initial interest rate.
  The interest rate must rise to restore equilibrium in the money market.

How $\Delta M$ shifts the LM curve

(a) The market for real money balances

(b) The LM curve
Exercise: Shifting the LM curve

- Suppose a wave of credit card fraud causes consumers to use cash more frequently in transactions.
- Use the Liquidity Preference model to show how these events shift the LM curve.

The short-run equilibrium

The short-run equilibrium is the combination of $r$ and $Y$ that simultaneously satisfies the equilibrium conditions in the goods & money markets:

\[ Y = C(Y - T) + I(r) + G \]

\[ \frac{\bar{M}}{\bar{P}} = L(r, Y) \]

Equilibrium interest rate

Equilibrium level of income
The Big Picture

Keynesian Cross → IS curve → IS-LM model → LM curve → Agg. demand curve → Model of Agg. Demand and Agg. Supply → Agg. supply curve → Explanation of short-run fluctuations

Chapter summary

1. Keynesian Cross
   - basic model of income determination
   - takes fiscal policy & investment as exogenous
   - fiscal policy has a multiplied impact on income.

2. IS curve
   - comes from Keynesian Cross when planned investment depends negatively on interest rate
   - shows all combinations of r and Y that equate planned expenditure with actual expenditure on goods & services
Chapter summary

3. Theory of Liquidity Preference
   - basic model of interest rate determination
   - takes money supply & price level as exogenous
   - an increase in the money supply lowers the interest rate

4. *LM* curve
   - comes from Liquidity Preference Theory when money demand depends positively on income
   - shows all combinations of $r$ and $Y$ that equate demand for real money balances with supply

Chapter summary

5. *IS-LM* model
   - Intersection of *IS* and *LM* curves shows the unique point $(Y, r)$ that satisfies equilibrium in both the goods and money markets.
In Chapter 11, we will

- use the IS-LM model to analyze the impact of policies and shocks
- learn how the aggregate demand curve comes from IS-LM
- use the IS-LM and AD-AS models together to analyze the short-run and long-run effects of shocks
- learn about the Great Depression using our models