The IS Curve

Chapter 20

Econ 351 – Monetary Economics

University of Tennessee, Knoxville

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Preview and Learning Objectives

This chapter develops the *IS* curve, which describes the relationship between real interest rates and aggregate output when the market for real goods and services is in equilibrium.

Key question: at each real interest rate, what level of output makes total production equal to total planned spending?

Outline

Planned Expenditure and Aggregate Demand

Components of Aggregate Demand

Goods Market Equilibrium

The IS Curve

Shifts in the IS Curve

Planned Expenditure and Aggregate Demand

Planned Expenditure

Planned expenditure is the total amount of spending on domestically produced goods and services that households, firms, the government, and foreigners plan to make.

Aggregate Demand

Aggregate demand is the total amount of output demanded in the economy:

$$Y^{ad} = C + I + G + NX$$

- **Consumption (C)**: household spending on goods and services
- **Investment (I)**: planned spending by firms on capital goods and by households on new homes
- **Government purchases (G)**: government spending on goods and services
- **Net exports (NX)**: exports minus imports

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Components of Aggregate Demand: Consumption

Disposable Income

Consumption spending depends mainly on **disposable income**:

$$Y_D = Y - T$$

where Y is income and T is taxes.

Consumption Function

$$C = \bar{C} + mpc \cdot Y_D$$

- $\bar{C}$ = autonomous consumption
- mpc = marginal propensity to consume
- Higher disposable income $\Rightarrow$ higher consumption

Components of Aggregate Demand: Investment

Economic Meaning of Investment

In macroeconomics, **investment** means the purchase of **new physical capital**: new machines, factories, buildings, and houses.

Important Distinction

Purchasing stocks or bonds is **not** investment in the macroeconomic sense.

Types of Investment

- **Fixed investment** is always planned.
- **Inventory investment** may be planned or unplanned.

Determinants of Planned Investment

Planned investment spending depends on:

- **Interest rates**
- **Expectations**

Components of Aggregate Demand: Government

Government Purchases and Taxes

The government affects aggregate demand through:

- **Government purchases**
- **Taxes**

Simple Assumptions

$$G = \bar{G} \qquad T = \bar{T}$$

- Government purchases directly affect aggregate demand.
- Taxes affect aggregate demand indirectly through disposable income.

Components of Aggregate Demand: Net Exports

Net exports consist of:

- an autonomous component
- a component affected by the real interest rate

Net Export Equation

$$NX = \bar{NX} - xr$$

- $\bar{NX}$ = autonomous net exports
- r = real interest rate
- Higher real interest rates reduce net exports

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Goods Market Equilibrium

Equilibrium Condition

$$Y = Y^{ad}$$

total output equals total planned expenditure.

Planned Expenditure

$$Y = C + I + G + NX$$

Because inventory investment can be unplanned, output can temporarily differ from planned expenditure; the goods market is in equilibrium only when the two are equal, and output tends to move toward such points.

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Understanding the IS Curve

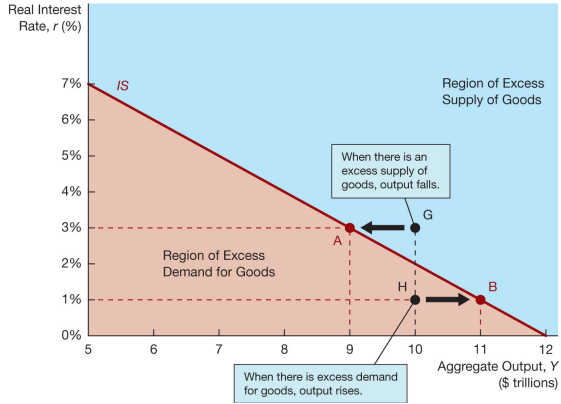
The **IS curve** shows combinations of:

- equilibrium output Y
- real interest rate r

for which the goods market is in equilibrium.

Key Idea

The IS curve is the relationship between **equilibrium aggregate output** and the **real interest rate**.



The IS curve: a lower real interest rate raises investment and net exports, so equilibrium output is higher.

Source: Mishkin, The Economics of Money, Banking and Financial Markets

Why the Economy Heads Toward the Equilibrium

Negative Relationships

- Interest rates and planned investment spending have a **negative relationship**.
- Interest rates and net exports also have a **negative relationship**.

Implication for the IS Curve

The IS curve contains the points at which the total quantity of goods produced equals the total quantity of goods demanded. Output tends to move toward points on the IS curve.

Points to the right of the IS curve have output above planned expenditure (unsold goods pile up); points to the left have output below it. In both cases firms adjust production back toward the curve.

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Shifts in the IS Curve

Factors That Shift the IS Curve

General Rule

The IS curve shifts whenever there is a change in **autonomous spending**.

Important Examples

- Government purchases
- Taxes
- Autonomous consumption
- Autonomous investment
- Autonomous net exports
- Financial frictions

Changes in Government Purchases

Increase in Government Purchases

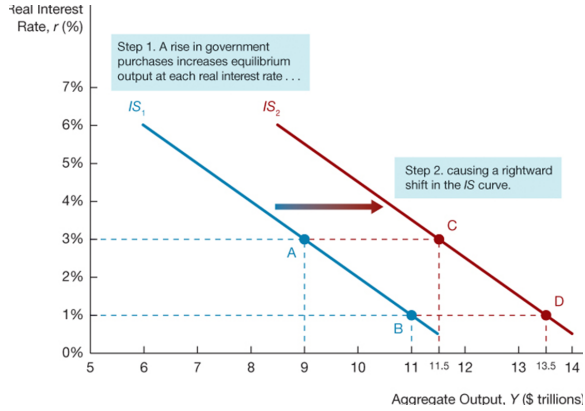
At any given real interest rate, an increase in government purchases raises aggregate demand and equilibrium output.

Effect on IS Curve

Higher $G \Rightarrow$ IS shifts right

Decrease in Government Purchases

Lower $G \Rightarrow$ IS shifts left



Shift in the IS curve from an increase in government purchases.

Source: Mishkin, The Economics of Money, Banking and Financial Markets

Application: The Vietnam War Buildup, 1964–1969

Historical Context

U.S. involvement in Vietnam escalated sharply in the 1960s.

- Government purchases increased rapidly.
- Normally, central banks would raise real interest rates to prevent overheating.
- During this period, the Federal Reserve kept real interest rates relatively constant.

Lesson

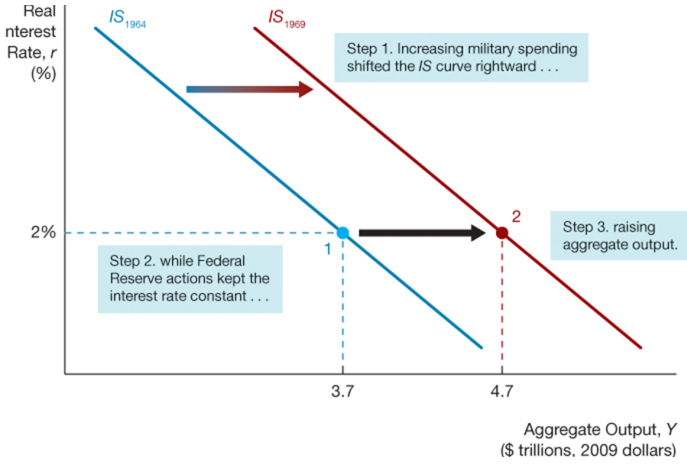
This episode illustrates how changes in government spending shift the IS curve.



U.S. Army UH-1D helicopters in Vietnam, 1966: military spending rose rapidly.

Wikimedia Commons, James K. F. Dung, SFC, Public domain

Vietnam War Buildup and the IS Curve



With the real interest rate held constant, higher government purchases shifted IS right and raised output.

Source: Mishkin, The Economics of Money, Banking and Financial Markets

Changes in Taxes

Increase in Taxes

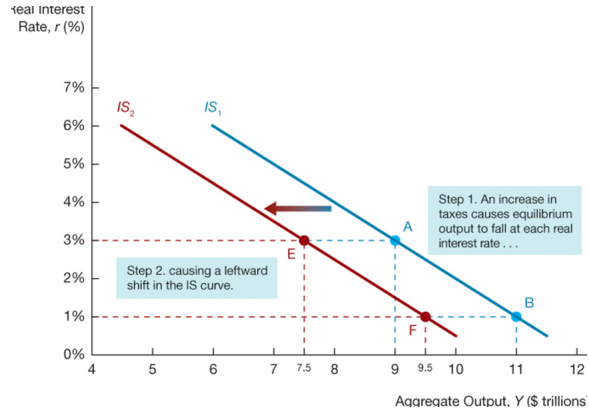
At any given real interest rate, a rise in taxes reduces disposable income, consumption, aggregate demand, and equilibrium output.

Effect on IS Curve

Higher $T \Rightarrow$ IS shifts left

Tax Cut

Lower $T \Rightarrow$ IS shifts right



Shift in the IS curve from an increase in taxes.

Source: Mishkin, The Economics of Money, Banking and Financial Markets

Application: The Fiscal Stimulus Package of 2009

Policy Response

In response to the 2008–2009 recession, the Obama administration adopted a large fiscal stimulus package:

- about $288 billion in tax cuts
- about $499 billion in increased federal spending

Expected Effect

These policies were expected to raise aggregate demand and shift the IS curve to the right.



President Obama signs the American Recovery and Reinvestment Act, February 17, 2009.

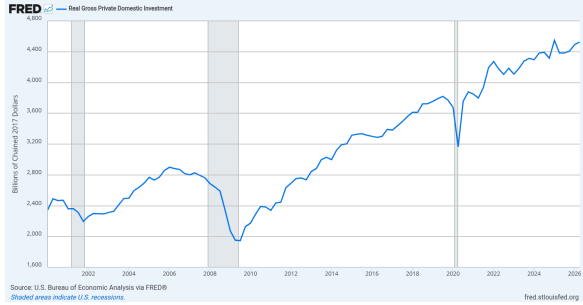
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The 2009 Stimulus: What Actually Happened?

What Actually Happened?

Although tax cuts and spending increases were intended to stimulate demand, other components of autonomous spending weakened significantly:

- autonomous consumption fell
- autonomous investment fell
- government purchases increased only gradually



Real gross private domestic investment collapsed in 2008–09, offsetting much of the stimulus.

Source: FRED, Federal Reserve Bank of St. Louis

Result

The IS curve did not shift right as much as policymakers hoped.

Autonomous Consumption, Investment, and Net Exports

Each of these raises aggregate demand and equilibrium output at any given real interest rate, so an increase shifts the IS curve to the right and a decrease shifts it to the left.

Autonomous spending component	Increase	Decrease
Autonomous consumption $\bar{C}$	IS shifts right	IS shifts left
Autonomous investment	IS shifts right	IS shifts left
Autonomous net exports $\bar{NX}$	IS shifts right	IS shifts left

Whatever the source, a change in autonomous spending moves the IS curve horizontally by the change in equilibrium output at each real interest rate.

Financial Frictions and the IS Curve

Financial Frictions

Another factor that shifts the IS curve is a change in **financial frictions**.

- Greater financial frictions raise borrowing costs for firms.
- Higher borrowing costs reduce investment spending.
- Lower investment spending reduces aggregate demand.

Effect on IS Curve

More financial frictions $\Rightarrow$ IS shifts left

Summary: Shifts in the IS Curve

Variable	Change in Variable	Shift in *IS* Curve	Reason
Autonomous consumption expenditure, $\overline{C}$	↑		$C \uparrow Y \uparrow$
Autonomous investment, $\overline{I}$	↑		$I \uparrow Y \uparrow$
Government spending, $\overline{G}$	↑		$G \uparrow Y \uparrow$
Taxes, $\overline{T}$	↑		$T \uparrow \Rightarrow C \downarrow Y \downarrow$
Autonomous net exports, $\overline{NX}$	↑		$\overline{NX} \uparrow Y \uparrow$
Financial frictions, $\overline{f}$	↑		$I \downarrow Y \downarrow$

Note: Only increases (↑) in the variables are shown; the effects of decreases in the variables on aggregate output would be the opposite of those indicated in the last two columns.

Factors that shift the IS curve and the direction of the shift.

Source: Mishkin, The Economics of Money, Banking and Financial Markets

Chapter summary

- Aggregate demand is $Y^{ad} = C + I + G + NX$; consumption depends on disposable income, while investment and net exports fall when the real interest rate rises.
- The goods market is in equilibrium when output equals planned expenditure, $Y = Y^{ad}$.
- The IS curve traces the combinations of the real interest rate and output at which the goods market clears; it slopes downward because higher r lowers I and NX.
- Changes in autonomous spending (government purchases, taxes, autonomous consumption, investment, net exports) and in financial frictions shift the IS curve.
- Applications: the Vietnam War buildup shifted IS right; the 2009 stimulus shifted it right by less than hoped because autonomous consumption and investment fell.