Course 2: The Goods Market
Intermediate Macroeconomics, Econ 102

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Today's class

- What are the different components of the **demand for goods**? What do they correspond to? What is the difference between consumption and investment?

- What determines the demand for goods **in the short run**?

- What is the "**consumption function**"? What is the Keynesian multiplier?

- What happens if all consumers decide to buy less and save more at the same time? What is the "paradox of thrift"?

The Keynesian Multiplier
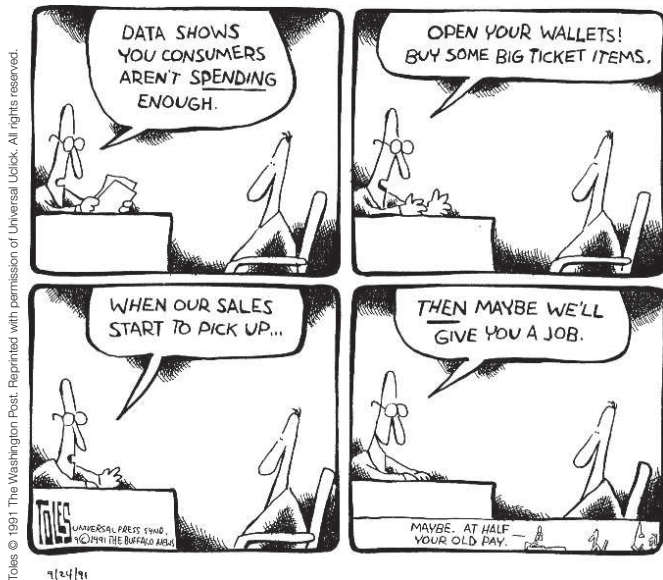
Components of GDP: Closed Economy

- **Consumption** (C): goods and services purchased by consumers.
  - Includes education, cars (durables) but excludes houses.

- **Investment** (I) or fixed investment: the sum of non-residential investment and residential investment. (it includes *newly built* houses)
  - Goods produced currently for use in future production.
  - Excludes education, cars (durables)

- **Government spending** (G): purchases of goods and services by the federal, state, and local governments; excluding government transfers:
  - Government spending technically also may be divided into consumption (C^G) and investment (I^G), with $C^G + I^G = G$. This is important for debt sustainability analysis.
  - However, for simplicity, we shall just call it G.
  - G **does not** include government transfers, like medicare or Social Security payments.

Components of GDP: Open Economy

- Exports (X): purchases of U.S. goods and services by foreigners.

- Imports (denoted IM or M): purchases of foreign goods and services by U.S. consumers, U.S. firms and the U.S. government.

- Net exports or trade balance: X - IM or X - M:

$$NX \equiv X - IM$$

- Exports > Imports $\Rightarrow NX > 0 \Rightarrow$ **Trade Surplus**

- Imports > Exports $\Rightarrow N < 0 \Rightarrow$ **Trade Deficit**

- Inventory investment: difference between production and sales. Investment is a bad word, as it is often "involuntary".

Table 3-1 The Composition of U.S. GDP, 2014		
	Billions of Dollars	**Percent of GDP**
GDP (*Y*)	17,348	100.0
1 Consumption (*C*)	11,865	68.3
2 Investment (*I*)	2,782	16.0
Nonresidential	2,233	12.9
Residential	549	3.1
3 Government spending (*G*)	3,152	18.1
4 Net exports	−530	−3.1
Exports (*X*)	2,341	13.5
Imports (*IM*)	−2,871	−16.6
5 Inventory investment	77	0.4
Source: Survey of Current Business, July 2015, Table 1-1-5		

More detail

Table A1-3 GDP: The Product Side, 2014 (billions of dollars)			
1 **Gross domestic product**	17,348		
2 **Personal consumption expenditures**	11,866		
3 Durable goods		1,280	
4 Nondurable goods		2,668	
5 Services		7,918	
6 **Gross private domestic fixed investment**	2,860		
7 Nonresidential		2,234	
8 Structures			507
9 Equipment and Software			1,727
10 Residential		549	
11 **Government purchases**	3,152		
12 Federal		1,220	
13 National Defense			748.2
14 Nondefense			471.6
15 State and local		1,932	
16 **Net exports**	−530		
17 Exports		2,342	
18 Imports		−2,872	
19 **Change in business inventories**	77		

Source: Survey of Current Business, July 2015, Table 1-1-5

$$Z \equiv C + I + G + X - IM$$

- The above identity defines the total demand for goods (Z) as consumption, plus investment, plus government, plus export, minus imports.

- For now, we shall consider mainly a closed economy, one with ($X = IM = 0$):

$$Z \equiv C + I + G$$

Consumption

- Consumption (C) is a function of disposable income (Y_D), which is the income that remains once consumers have received government transfers and paid their taxes $Y_D \equiv Y - T$:

$$C = C(Y_D), \quad \text{with} \quad C'(Y_D) \geq 0.$$

- $C(Y_D)$ is called the **consumption function**.
- This is a "behavioral" function that captures the behavior of consumers: when faced with a disposable income Y_D, how much do they consume.
- Assume that the consumption function is a linear relation with two parameters, c_0 and c_1:

$$C(Y_D) = c_0 + c_1 Y_D$$

- c_1 is the Marginal Propensity to Consume. (MPC)
- c_0 is what people would consume if their disposable income equals

Consumption and Disposable Income
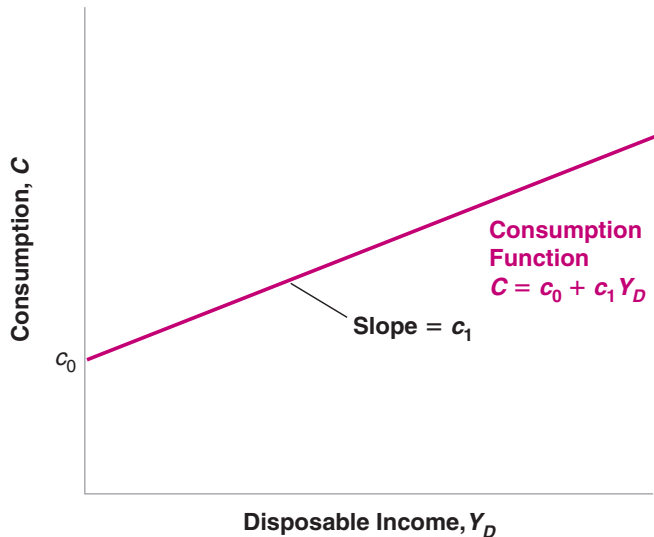
Consumption

- Disposable income is:

$$Y_D \equiv Y - T,$$

  where Y is income and T is taxes minus government transfers.

- Replacing Y_D in the consumption function:

$$C(Y, T) = c_0 + c_1 (Y - T).$$

Investment

- **Endogenous variables**: variables depend on other variables in the model

- **Exogenous variables**: variables not explained within the model but are instead taken as given:
$$I = \bar{I}.$$

- A bar on investment means investment is an exogenous variable, which is taken as given in the economic model we shall write.

Fiscal Policy

- T and G describe fiscal policy—the choice of taxes and spending by the government.
- G and T are exogenous because:
  - ▶ Governments do not behave with the same regularity as consumer or firms.
  - ▶ This book will typically treat G and T as variables chosen by the government and will not try to explain them within the model.

- Consider a closed economy:

$$X = IM = 0 \quad \Rightarrow \quad Z = C + I + G$$

- Replacing C and I from previous equations:

$$Z = c_0 + c_1(Y - T) + \bar{I} + G$$

- Equilibrium in the goods markets requires:

$$Y = Z.$$

- This is an equilibrium condition
- Finally:

$$Y = c_0 + c_1(Y - T) + \bar{I} + G$$

- In equilibrium, production (Y) is equal to demand, which in turn depends on income (Y), which is itself equal to production.

- Macroeconomists always use three tools:
  1. Algebra to make sure that the logic is correct
  2. Graphs to build the tuition
  3. Words to explain the results

- Rewriting the multiplier model, one gets:

$$(1 - c_1)Y = c_0 + \bar{I} + G - c_1 T$$
$$\Rightarrow Y = \frac{1}{1 - c_1}\left(c_0 + \bar{I} + G - c_1 T\right)$$

which characterizes equilibrium output in algebra.

- Autonomous spending: $\left[c_0 + \bar{I} + G - c_1 T \right]$.

- Autonomous spending is positive because if $T = G$ (balanced budget) and c_1 is between 0 and 1, then $(G - c_1 T)$ is positive, and so is autonomous spending.

- The term $1/(1 - c_1)$ is the **multiplier**, which is larger when c_1 is closer to 1.

- If c_1 equals 0.6, the multiplier equals $1/(1–0.6) = 2.5$, meaning that an increase of consumption by \$1 billion will increase output by 2.5 x \$1 billion = \$2.5 billion.

Graphical Determination

- Steps to characterize the equilibrium graphically:

    1. Plot production as a function of income. Because production equals income, their relation is the 45-degree line.
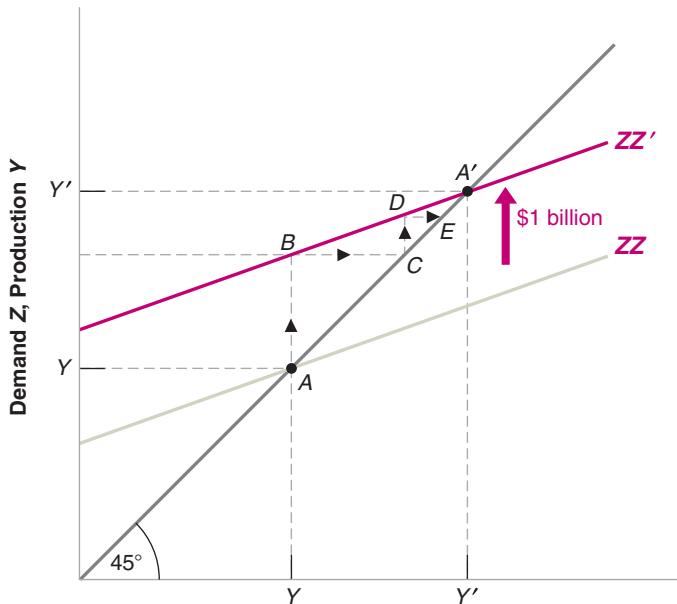
    2. Plot demand as a function of income.

    $$Z = \left(c_0 + \bar{I} + G - c_1 T\right) + c_1 Y$$

    3. In equilibrium, production equals demand.

Graphical Interpretation
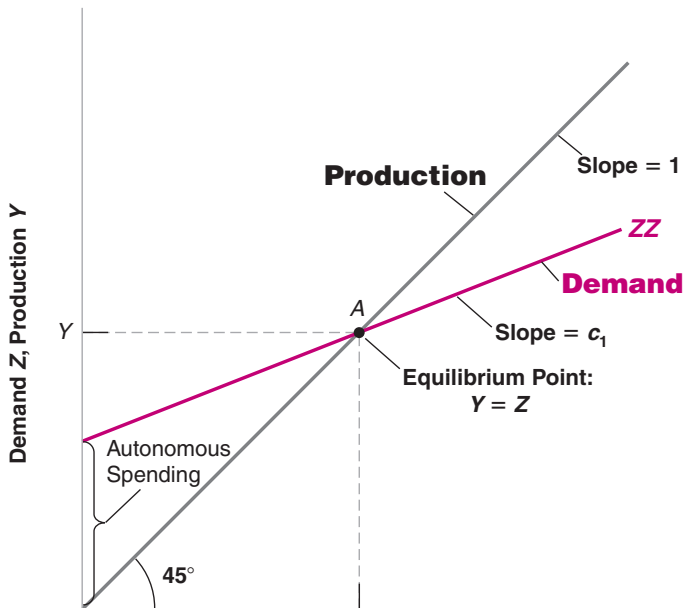
Graphical Interpretation

Different steps

- AB: first-round increase in production

- BC: first-round increase in income

- CD: second-round increase in demand

- DE: second-round increase in production and income

- The total increase in production after n+1 rounds:

$$1 + c_1 + c_1^2 + ... + c_1^n$$

which is a geometric series with a limit of $1/(1 - c1)$.

Different steps

- Production depends on demand, which depends on income, which is itself equal to production.

- An increase in demand leads to an increase in production and income, which in turn leads to a future increase in demand.

- The increase in output that is larger than the initial shift in demand, by a factor equal to the multiplier.

- The multiplier depends on the propensity to consume, which can be estimated using **econometrics** - the set of statistical methods used in economics.

FOCUS: The Lehman Bankruptcy, Fears of Another Great Depression, and Shifts in the Consumption Function

- When people start worrying about the future, they decide to save more even if their current income has not changed.
- News about Lehman Brothers going bankrupt in September 2008 reminded people of the Great Depression, as confirmed by the number of searches for "Great Depression" in Google.
- Consumption fell even if disposable income had not yet changed.
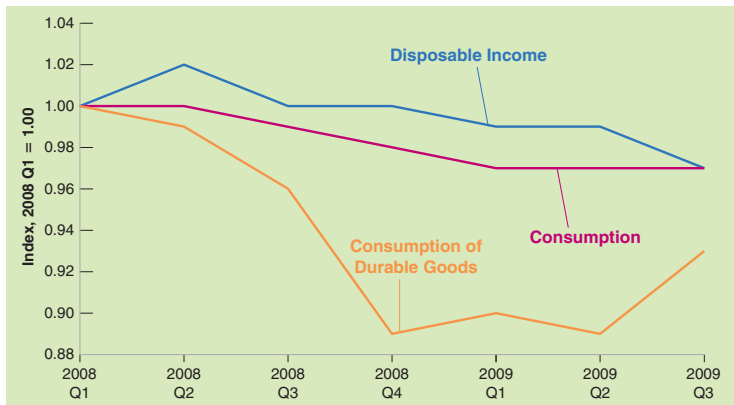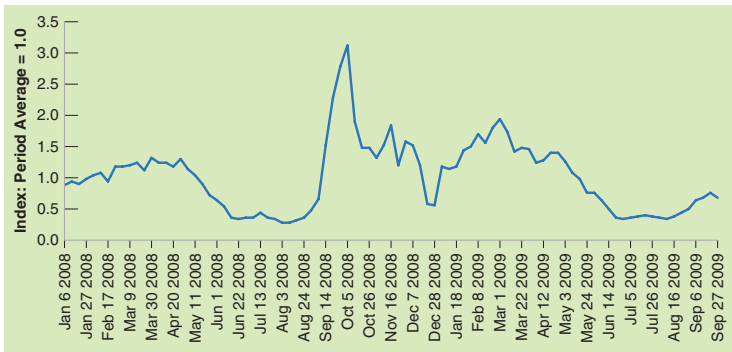
- Keynes (1936) first articulated his model in 1936, in *The General Tehory of Employment, Interest and Money*. Let's start by looking at saving. Saving is the sum of private saving and public saving.

- By definition, private saving (S), that is saving buy consumers is equal to their disposable income minus their consumption:

$$S \equiv Y_D - C$$
$$\equiv Y - T - C$$

- Public saving is given by:

$$S_G = T - G$$

- Public saving > 0 corresponds to a **budget surplus**.
- Public saving < 0 corresponds to a **budget deficit**.

- Starting from Production = Demand:

$$Y = C + I + G$$

- Therefore:

$$Y - T - C = I + G - T$$

- Or equivalently:

$$I = S + (T - G)$$

- This is the **IS relation**, which stands for "**I**nvestment equals **S**aving".

- We can start from "**I**nvestment equals **S**aving" to derive the value for the private saving

$$S = Y - T - C$$
$$= Y - T - c_0 - c_1 (Y - T)$$
$$S = -c_0 + (1 - c_1) (Y - T).$$

- $(1 - c_1)$ is called the propensity to save, which is between 0 and 1
- In equilibrium, $I = S + (Y - G)$, so that:

$$I = -c_0 + (1 - c_1) (Y - T) + (Y - G)$$

- Solving for output:

$$Y = \frac{1}{1 - c_1} \left[c_0 + \bar{I} + G - c_1 T \right]$$

The Paradox of Thrift

- We are told about the virtues of thrift as we grow up, but the model in this chapter tells a different story.
- Suppose that consumers decide to save more, so c_0 decreases.
- Then output decreases.
- Saving cannot change either, because equation (3.10) implies that at equilibrium: $I = S + (T - G)$
- S cannot change because I, T or G does not change by assumption.

- Equation (3.8) implies that the government can choose the level of G or T to affect the level of output it wants.
- However, there are many aspects of reality that we have not incorporated in our model:
  - Changing G or T is not easy.
  - Investment and imports may change, making it hard for governments to assess the effects of their policies (Chapters 5, 9, and 18 to 20).
  - Expectations are likely to matter (Chapters 14 to 16).
  - The effects on output may be unsustainable in the medium run (Chapter 9).
  - Cutting T or increasing G can lead to large budget deficits and public debt in the long run (Chapters 9, 11, 16 and 22).

Bibliography I

Keynes, John Maynard, *The General Theory of Employment, Interest, and Money* 1936.