Course 2: The Goods Market
Intermediate Macroeconomics, Econ 102

François Geerolf

UCLA

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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
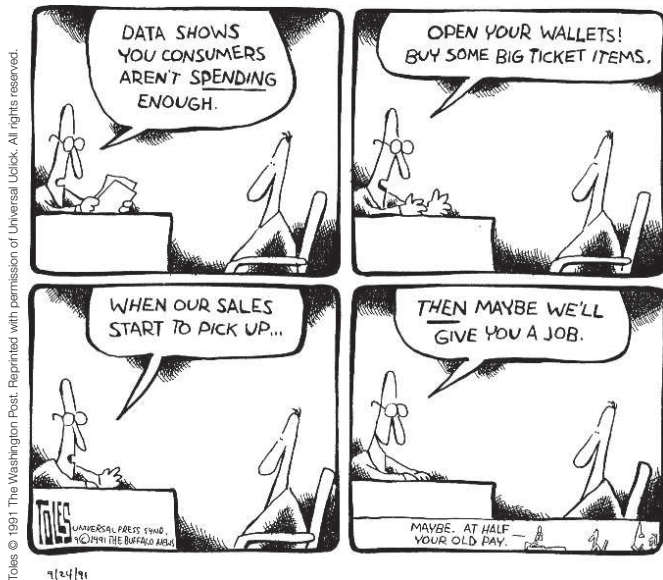
Components of GDP: Closed Economy

- **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".

		Billions of Dollars	Percent of GDP
	Table 3-1 The Composition of U.S. GDP, 2014		
	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

Definition of Z

- The total demand for goods (Z) is defined ($\equiv$) as consumption, plus investment, plus government, plus export, minus imports:

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

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

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

- Open economy considerations will come much later in the class.

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?

Linear consumption function

- 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) with:

$$0 < c_1 < 1$$

  ▸ c_0 is what people would consume if their disposable income equals zero. Changes in c_0 reflect changes in consumption for a given level of disposable income. We provide an example later.
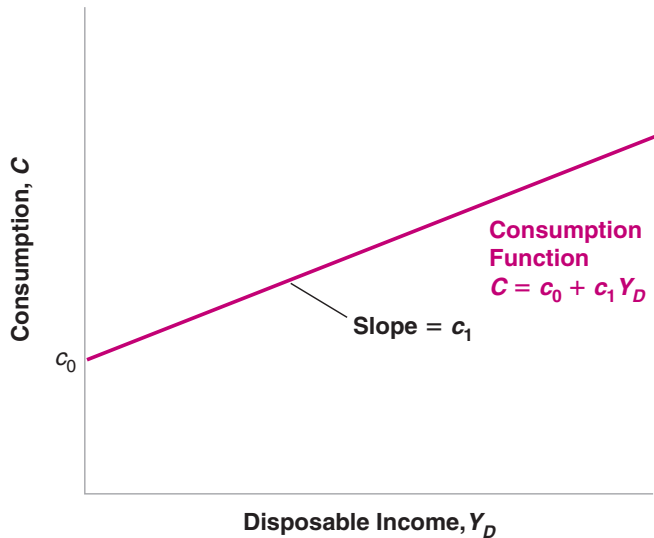
- Disposable income is:

$$Y_D \equiv Y - T,$$

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

- Replacing Y_D in the consumption function:

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

Consumption and Disposable Income

Consumption, C

c_0

Consumption Function
$C = c_0 + c_1 Y_D$

Slope $= c_1$

Disposable Income, Y_D

Investment

- Investment will be taken to be "exogenous":

$$I = \bar{I}.$$

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

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

- **Exogenous variables**: variables not explained within the model but are instead taken as given.

Fiscal Policy

- T and G describe fiscal policy – the choice of taxes and spending by the government.

- G and T are taken as exogenous in our analysis because:

  - Governments do not behave with the same regularity as consumer or firms.

  - This lecture will more often than not treat G and T as variables chosen by the government and will not try to explain them within the model.

Demand-Driven Output

- 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 the following **equilibrium condition**:

$$Y = Z.$$

- Therefore:

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

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

Algebra

- 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.**
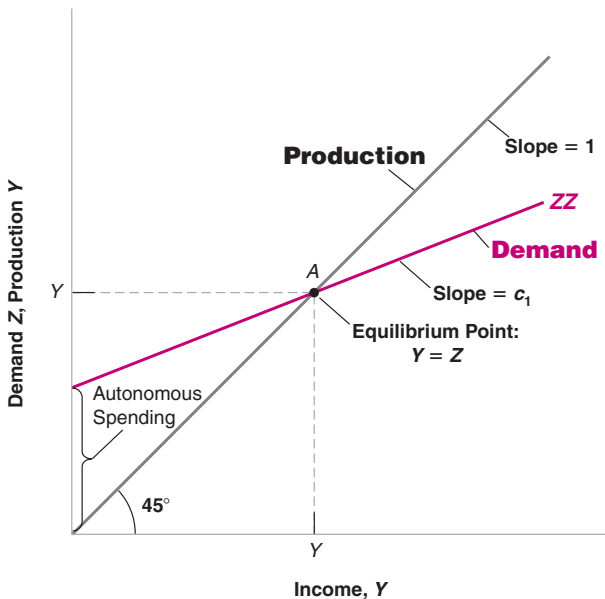
Graphical Determination

- 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.
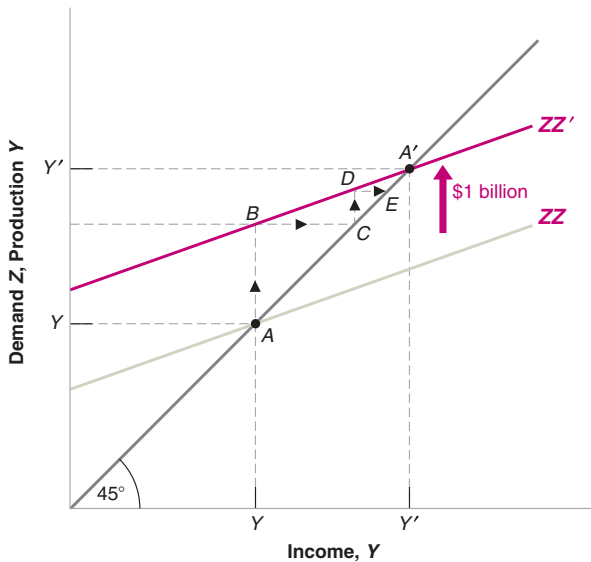
  2. Plot demand as a function of income:

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

  3. In equilibrium, production equals demand.

Graphical Interpretation

Graphical Interpretation

Different steps for the analysis

- AB: first-round increase in production

- BC: first-round increase in income

- CD: second-round increase in demand, coming from the increase in consumption

- 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 $1/(1 - c_1)$, when $n \to \infty$.

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.

- Another way is to estimate the Keynesian multiplier directly.

What is the MPC?

- In Appendix 3 to the textbook, you are given some "estimates of the MPC (Marginal Propensity to Consume)" using aggregate data. Olivier Blanchard reports estimates of the MPC from 0.58 to 0.66.

- Today, the Marginal Propensity to Consume may be estimated using individual-level data on saving behavior, or proprietary data from major credit card companies (such as Visa and Mastercards). These methods are methodologically more sound than the use of aggregate data.

- The level of the MPC is however still a matter of fierce controversy. Depending on the value for the MPC, stimulus policy may more or less effective.

- If you want to know more, or make up your own mind on the MPC, you are encouraged to read Parker (1999), Johnson et al. (2006), Parker et al. (2013), Parker (2017).

What is the multiplier?

- This is a matter of even more scientific controversy for at least two reasons:
  - First, the multiplier comes from feedback effects from one individual to another, and thus cannot be estimated using individual-level data.
  - Second, the multiplier depends on the type of taxes, since different taxes fall disproportionaly on people with different MPC. The higher the MPC, the higher the multiplier...

- There is no academic agreement on the subject. Research is still in progress...

- If you are interested, you are encouraged to read Romer and Romer (2010), Barro and Redlick (2011), Mertens and Ravn (2013).

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.

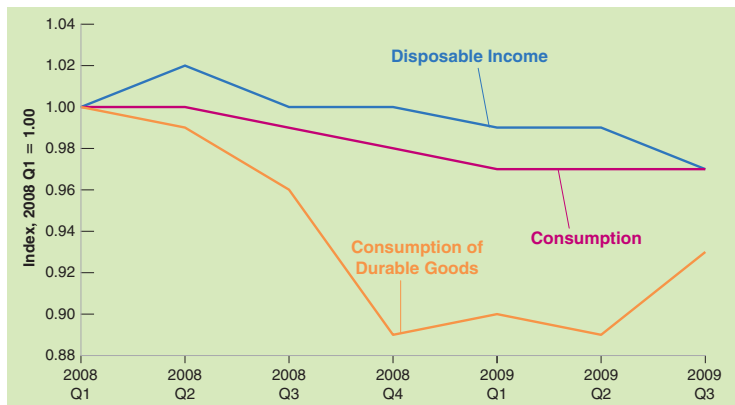- Thinking about the consumption function given by:

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

this corresponds to a change in c_0.

Scared by the Prospect of another Great Depression?
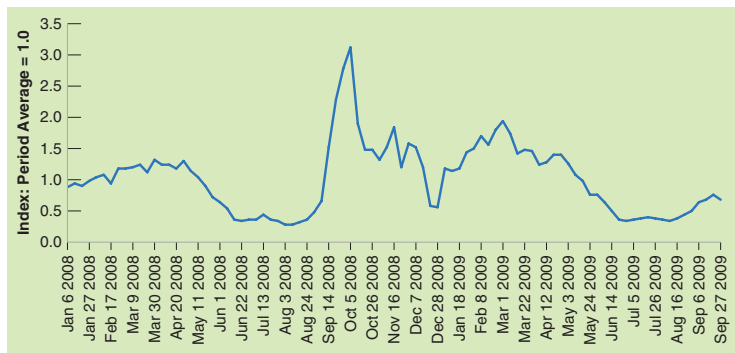
Consumption changes more than Disposable Income

I = S Model

- Keynes (1936) first articulated his model in 1936, in *The General Theory of Employment, Interest and Money*.

- Let's start by looking at saving. Total saving is the sum of private saving and public saving.

- By definition, private saving (S), that is saving by 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 I=S

- 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".

Starting from I=S

- In fact, we may start from "**I**nvestment equals **S**aving" to derive the value for the private saving.

- If c_1 is the marginal propensity to consume, then $(1 - c_1)$ is the marginal propensity to save, again between 0 and 1.

- In equilibrium, $I = S + (T - G)$, so that:

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

- 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 we have studied in this lecture tells a different story.

- Suppose that consumers decide to save more, so that c_0 decreases. Then output decreases. Reduced output lead to less saving. What happens to saving on balance? Does it increase?

- It turns out that these 2 effects exactly cancel out, because in equilibrium: $I = S + (T - G)$. S cannot change because I, T or G do not change by assumption.

- This is called the **paradox of thrift**: **efforts to save** are **self-defeating**.

From the Economic Consequences of the Peace (Keynes (1919))

The duty of 'saving' became nine-tenths of virtue and the growth of the cake the object of true religion. *There grew round the non-consumption of the cake all those instincts of puritanism which in other ages has withdrawn itself from the world and has neglected the arts of production as well as those of enjoyment.* **And so the cake increased; but to what end was not clearly contemplated.** *Individuals would be exhorted not so much to abstain as to defer, and to cultivate the pleasures of security and anticipation.* **Saving was for old age or for your children; but this was only in theory -- the virtue of the cake was that it was never to be consumed, neither by you nor by your children after you.**

- The previous model implies that the government can choose the level of G or T to affect the level of output it wants. This is a very optimistic view of government spending, and of tax cuts.

- There are many aspects of reality that we have not incorporated in our model:
    ▸ Changing G or T is not easy. In particular, there are "implementation lags": changes in taxes need to be passed through Congress, etc.
    ▸ 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 may 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), which require future tax increases and budget cuts.

Suggested Readings / Exercises

☞ Chapter 3, *Macroeconomics*, 7th Edition, Olivier Blanchard.

☆☆☆ Exercises 5, 6, 7, Chapter 3, page 65, *Macroeconomics*, 7th Edition, Olivier Blanchard.

☆☆ Exercises 4, 8, 9, Chapter 3, page 65-66, *Macroeconomics*, 7th Edition, Olivier Blanchard.

☆ Exercise 10, Chapter 3, page 66, *Macroeconomics*, 7th Edition, Olivier Blanchard.

Keynes, John Maynard. The Economic Consequences of the Peace, 1919. Link

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

In Japan, the Government Gets Paid to Borrow Money, *Wall Street Journal*, March 1, 2016. Link

What Is Keynesian Economics?, Finance & Development, September 2014, Sarwat Jahan, Ahmed Saber Mahmud, and Chris Papageorgiou. Link

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Barro, Robert J. and Charles J. Redlick, "Macroeconomic Effects From Government Purchases and Taxes," *The Quarterly Journal of Economics*, February 2011, *126* (1), 51–102.

Johnson, David S., Jonathan A. Parker, and Nicholas S. Souleles, "Household Expenditure and the Income Tax Rebates of 2001," *American Economic Review*, December 2006, *96* (5), 1589–1610.

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Parker, Jonathan A., "The Reaction of Household Consumption to Predictable Changes in Social Security Taxes," *The American Economic Review*, 1999, *89* (4), 959–973.

— , "Why Don't Households Smooth Consumption? Evidence from a \$25 Million Experiment," *American Economic Journal: Macroeconomics*, October 2017, *9* (4), 153–183.

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Romer, Christina D. and David H. Romer, "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks," *American Economic Review*, June 2010, *100* (3), 763–801.