

Econ 1115: Principles of Macroeconomics

Lecture 9: Circular Flow of Income

Rizwanur Rob

rob.r@husky.neu.edu

302 Holmes Hall
Department of Economics
Northeastern University

May 20, 2019

Outline

- 1 Assignment 1
- 2 Review, GDP and Standard of Living
- 3 Circular Flow

	Minutes needed to make 1 bushel of wheat	Minutes needed to make 1 pound of beef
Brad	10	12
Theresa	6	10

	Minutes to make 1 wheat	Minutes to make 1 beef	In 1 hour wheat produced	In 1 hour beef produced
Brad	10	12	6	5
Theresa	6	10	10	6

Brad's OC of producing one pound of beef - 1.2 bushels of wheat

Brad's OC of producing one bushel of wheat - 0.833 pounds of beef

Theresa's OC of producing a bushel of wheat - 0.6 pounds of beef

Theresa's OC of producing a pound of beef - 1.67 bushels of wheat

The demand curve is downward sloping because

- Income effect
- Substitution effect
- Diminishing marginal utility

Outline

- 1 Assignment 1
- 2 Review, GDP and Standard of Living
- 3 Circular Flow

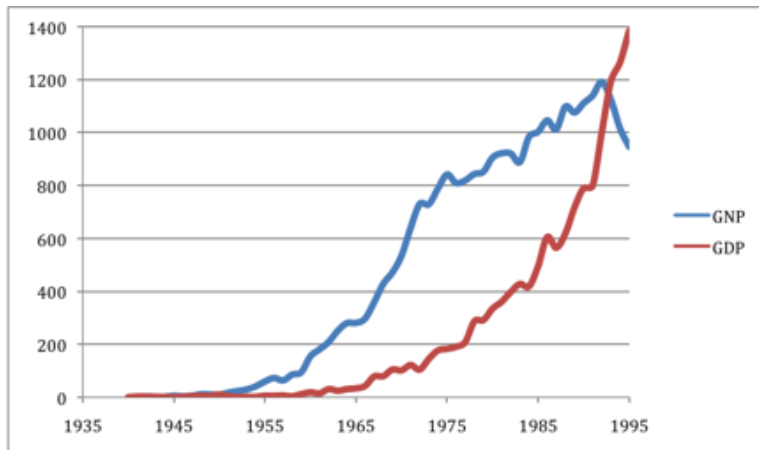


Figure: Ireland's GDP vs GNP

U.S. GDP and U.S. GNP are related as follows:

- a. $GNP = GDP + \text{Value of exports} - \text{Value of imports}$.
- b. $GNP = GDP - \text{Value of exports} + \text{Value of imports}$.
- c. $GNP = GDP + \text{Income earned by foreigners in the U.S.} - \text{Income earned by U.S. citizens abroad}$.
- d. $GNP = GDP - \text{Income earned by foreigners in the U.S.} + \text{Income earned by U.S. citizens abroad}$.

U.S. GDP and U.S. GNP are related as follows:

- a. $GNP = GDP + \text{Value of exports} - \text{Value of imports}$.
- b. $GNP = GDP - \text{Value of exports} + \text{Value of imports}$.
- c. $GNP = GDP + \text{Income earned by foreigners in the U.S.} - \text{Income earned by U.S. citizens abroad}$.
- d. $GNP = GDP - \text{Income earned by foreigners in the U.S.} + \text{Income earned by U.S. citizens abroad}$.

Answer: d

Sheri, a U.S. citizen, works only in Germany. The value she adds to production in Germany is included

- a. in both German GDP and U.S. GDP.
- b. in German GDP, but is not included in U.S. GDP.
- c. in U.S. GDP, but is not included in German GDP.
- d. in neither German GDP nor U.S. GDP.

Sheri, a U.S. citizen, works only in Germany. The value she adds to production in Germany is included

- a. in both German GDP and U.S. GDP.
- b. in German GDP, but is not included in U.S. GDP.
- c. in U.S. GDP, but is not included in German GDP.
- d. in neither German GDP nor U.S. GDP.

Answer: b

Detroit Cranberry Company sold \$10 million worth of cranberries it produced. In producing cranberries, it purchased \$1 million dollars worth of supplies from foreign countries and paid workers who reside in Canada but commute to the U.S. \$1 million. How much did these transactions add to U.S. GDP?

- a. \$8 million
- b. \$11 million
- c. \$10 million
- d. \$9 million

Detroit Cranberry Company sold \$10 million worth of cranberries it produced. In producing cranberries, it purchased \$1 million dollars worth of supplies from foreign countries and paid workers who reside in Canada but commute to the U.S. \$1 million. How much did these transactions add to U.S. GDP?

- a. \$8 million
- b. \$11 million
- c. \$10 million
- d. \$9 million

Answer: d

Thomas, a U.S. citizen, works only in Canada. The value of the output he produces is

- a. included in both U.S. GDP and U.S. GNP.
- b. included in U.S. GDP, but it is not included in U.S. GNP.
- c. included in U.S. GNP, but it is not included in U.S. GDP.
- d. included in neither U.S. GDP nor U.S. GNP.

Thomas, a U.S. citizen, works only in Canada. The value of the output he produces is

- a. included in both U.S. GDP and U.S. GNP.
- b. included in U.S. GDP, but it is not included in U.S. GNP.
- c. included in U.S. GNP, but it is not included in U.S. GDP.
- d. included in neither U.S. GDP nor U.S. GNP.

Answer: c

GDP per capita

- Let's compare the GDP of a large populous country like Brazil, which has a GDP of \$1.8 trillion to Belgium's GDP of \$0.45 trillion.

GDP per capita

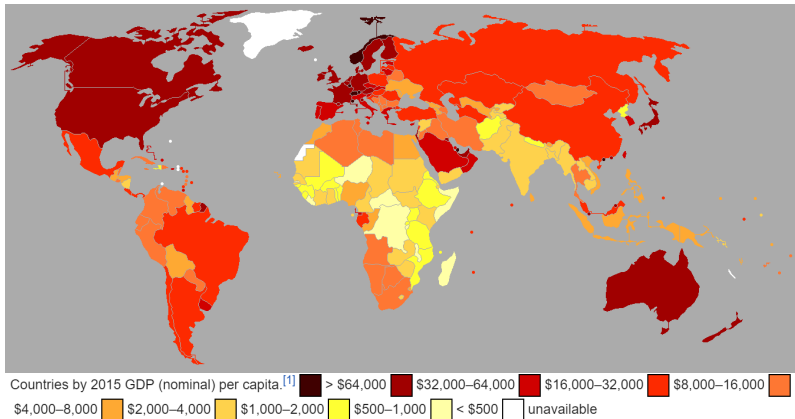
- Let's compare the GDP of a large populous country like Brazil, which has a GDP of \$1.8 trillion to Belgium's GDP of \$0.45 trillion.
- Brazil's economy is larger, but it does not mean that the average Brazilian is better off.

GDP per capita

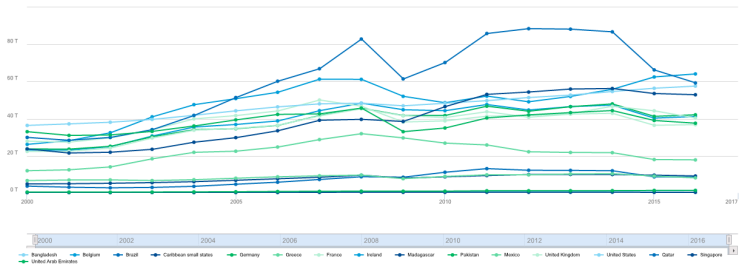
- Let's compare the GDP of a large populous country like Brazil, which has a GDP of \$1.8 trillion to Belgium's GDP of \$0.45 trillion.
- Brazil's economy is larger, but it does not mean that the average Brazilian is better off.
- We thus divide GDP by population to get GDP per capita

GDP per capita

- Let's compare the GDP of a large populous country like Brazil, which has a GDP of \$1.8 trillion to Belgium's GDP of \$0.45 trillion.
- Brazil's economy is larger, but it does not mean that the average Brazilian is better off.
- We thus divide GDP by population to get GDP per capita
- This essentially gives us the income of an "average" citizen in that country.



Source: Wikipedia



Series : GDP per capita (current US\$)

Source: World Development Indicators

Created on: 05/20/2018

You can make your own charts here at the World Bank website

Rank	Country	GDP per capita
1	Liechtenstein	\$139,100
2	Qatar	\$124,900
3	Monaco	\$115,700
4	Macau	\$114,400
5	Luxembourg	\$109,100
7	Singapore	\$90,500
11	Ireland	\$72,600
14	U.A.E.	\$68,200
20	United States	\$59,500
26	Sweden	\$51,300
27	Germany	\$50,200
28	Australia	\$49,900
34	Canada	\$48,100

Table: GDP per capita for select countries, CIA World Factbook

GDP as a measure of well-being

- Since GDP measures the production (and hence the consumption) of goods and services, it is used by economists as a proxy of well-being, or the standard of living.

GDP as a measure of well-being

- Since GDP measures the production (and hence the consumption) of goods and services, it is used by economists as a proxy of well-being, or the standard of living.
- There are of course several issues with this.

GDP as a measure of well-being

- Since GDP measures the production (and hence the consumption) of goods and services, it is used by economists as a proxy of well-being, or the standard of living.
- There are of course several issues with this.
- GDP cannot give a true measure of quality or well-being

GDP as a measure of well-being

- Since GDP measures the production (and hence the consumption) of goods and services, it is used by economists as a proxy of well-being, or the standard of living.
- There are of course several issues with this.
- GDP cannot give a true measure of quality or well-being
- Comparing the US GDP to Qatar's. Population must be taken into account.
So we use GDP per capita when making comparisons.

GDP as a measure of well-being

- Since GDP measures the production (and hence the consumption) of goods and services, it is used by economists as a proxy of well-being, or the standard of living.
- There are of course several issues with this.
- GDP cannot give a true measure of quality or well-being
- Comparing the US GDP to Qatar's. Population must be taken into account.
So we use GDP per capita when making comparisons.
- Real GDP per capita to make comparisons across time

But even real GDP per capita is not a perfect measure of welfare or well-being.

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources
- Life Expectancy and Health

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources
- Life Expectancy and Health
- Income Distribution

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources
- Life Expectancy and Health
- Income Distribution
- Crime, safety and security

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources
- Life Expectancy and Health
- Income Distribution
- Crime, safety and security
- Change in quality of goods

But even real GDP per capita is not a perfect measure of welfare or well-being.

Real GDP and thus real GDP per capita does not measure:

- Non-Market Activity
- Environmental quality and depletion of natural resources
- Life Expectancy and Health
- Income Distribution
- Crime, safety and security
- Change in quality of goods

When making comparisons across countries, one must also take into account the cost of living.

Explain how you think they affect GDP and well-being over time (Focus on where they diverge).

- The enormous success of Netflix, Spotify and other streaming services.

Explain how you think they affect GDP and well-being over time (Focus on where they diverge).

- The enormous success of Netflix, Spotify and other streaming services.
- Illegal streaming websites that allow you to watch TV shows, or live sports for free (with some advertisement)

Explain how you think they affect GDP and well-being over time (Focus on where they diverge).

- The enormous success of Netflix, Spotify and other streaming services.
- Illegal streaming websites that allow you to watch TV shows, or live sports for free (with some advertisement)
- In the 80s, 21-inch CRT televisions were big machines allowing you to watch up to ten channels at the most and were of relatively poor quality. They also cost \$200. These days you can get a cheap 32-inch HDTV for about the same price.

GDP is not a perfect measure of well-being; for example,

- a. GDP excludes the value of volunteer work.
- b. GDP does not address the distribution of income.
- c. GDP does not address environmental quality.
- d. All of the above are correct.

GDP is not a perfect measure of well-being; for example,

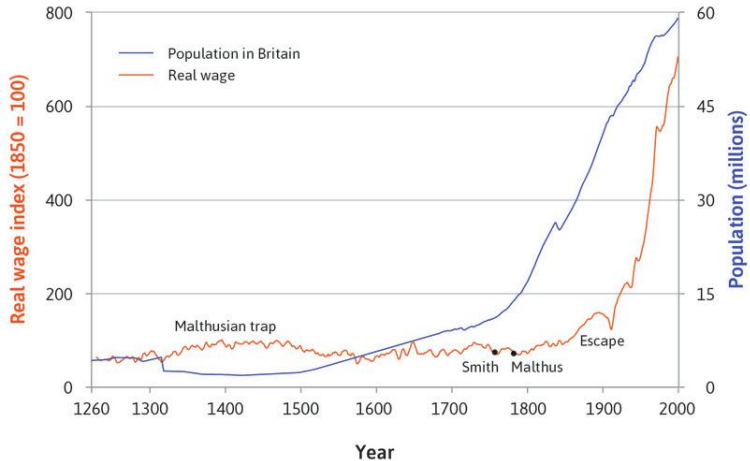
- a. GDP excludes the value of volunteer work.
- b. GDP does not address the distribution of income.
- c. GDP does not address environmental quality.
- d. All of the above are correct.

Answer: d

Economic Growth

Economic growth is an increase in the real GDP per capita.

- Adam Smith
- Malthus
- Keynes



Source: Core-econ



Growth Accounting

Keynes and Kuznets are two economists from the Great Depression era who redefined macroeconomics and GDP statistics.

Before them, no one really tracked macroeconomic statistics.

Growth Accounting

$$Y = A.F(K,N)$$

$$Y = AK^{\alpha}N^{\beta}$$

This is called the production function

$$\text{GDP Growth Rate} = \delta Y/Y$$

In fact for any variable x , growth rate of $x = \delta x/x$

Growth accounting equation:

$$\delta Y/Y = \delta A/A + \alpha \times \delta K/K + \beta \times \delta N/N$$

Thus output can grow if

- Growth in factor productivity or **technological change**
- Growth in capital stock
- Growth in labor force, participation rates, hours worked

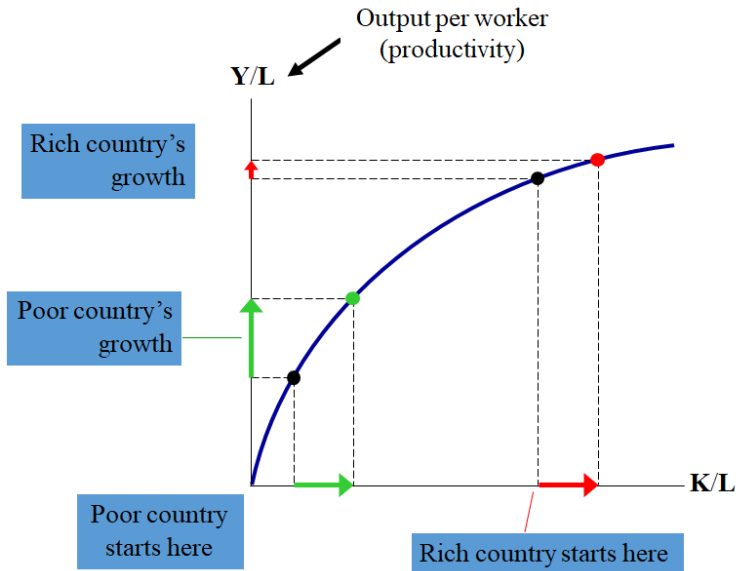
Convergence

What is convergence?

Growth theories suggest that the incomes for different countries will converge over time.

Absolute convergence vs. Conditional convergence

Thus growth rate should be inversely related to income levels.



Country	Period	Real GDP per Person		Growth Rate (per year)
		At Beginning of Period ^a	At End of Period ^a	
Brazil	1900–2014	\$ 828	\$15,590	2.61%
Japan	1890–2014	1,600	37,920	2.59
China	1900–2014	762	13,170	2.53
Mexico	1900–2014	1,233	16,640	2.31
Germany	1870–2014	2,324	46,850	2.11
Indonesia	1900–2014	948	10,190	2.10
Canada	1870–2014	2,527	43,360	1.99
India	1900–2014	718	5,630	1.82
United States	1870–2014	4,264	55,860	1.80
Pakistan	1900–2014	785	5,090	1.65
Argentina	1900–2014	2,440	12,510	1.44
Bangladesh	1900–2014	663	3,330	1.43
United Kingdom	1870–2014	5,117	39,040	1.42

^aReal GDP is measured in 2014 dollars.

Things to take away from all of this:

- Growth is very important

Things to take away from all of this:

- Growth is very important
- Because of differences in growth rates, ranking of countries by income changes substantially over time.

Things to take away from all of this:

- Growth is very important
- Because of differences in growth rates, ranking of countries by income changes substantially over time.
- Why do some countries grow quickly? There isn't just one answer.

Things to take away from all of this:

- Growth is very important
- Because of differences in growth rates, ranking of countries by income changes substantially over time.
- Why do some countries grow quickly? There isn't just one answer.
- Resources vs Market reforms vs Institutions

Countries that have lower levels of real GDP per person than the United States

- a. tend to have growth rates that are higher than that of the US.
- b. tend to have growth rates that are about the same as that of the US.
- c. tend to have growth rates that are lower than that of the US.
- d. in some cases have growth rates that are higher than that of the United States and in other cases lower than that of the US.

Countries that have lower levels of real GDP per person than the United States

- a. tend to have growth rates that are higher than that of the US.
- b. tend to have growth rates that are about the same as that of the US.
- c. tend to have growth rates that are lower than that of the US.
- d. in some cases have growth rates that are higher than that of the United States and in other cases lower than that of the US.

Answer: d

Rank	Corporation	Sales (millions)
1	Walmart	\$485,873
2	State Grid	\$315,199
3	Sinopec Group	\$267,518
4	China National	\$262,573
5	Toyota Motor	\$254,694
6	Volkswagen Group	\$240,264
7	Royal Dutch Shell	\$240,033
8	Berkshire Hathaway	\$223,604
9	Apple	\$215,639
10	Exxon Mobil	\$205,004

Table: Sales revenues for corporations

Rank	Country	GDP (millions)
20	Switzerland	\$702,736
21	Argentina	\$631,621
22	Sweden	\$578,742
23	Iran	\$570,039
24	Nigeria	\$568,496
25	Taiwan	\$566,757

Table: GDP of a few other countries

Suppose that over the last twenty-five years a country's nominal GDP grew to three times its former size. In the meantime, population grew by 40 percent and prices rose by 100 percent. What happened to real GDP per person?

- a. It more than doubled.
- b. It increased, but it less than doubled.
- c. It was unchanged.
- d. It decreased.

Answer: b

One can argue that the average American today is richer than the richest American 100 years ago, given that 100 years ago,

- a. peoples nominal incomes were, on average, much lower than they are today.
- b. personal fortunes were not accurately measured.
- c. many of the goods and services that we now take for granted were not available.
- d. international trade had not yet begun to flourish.

Answer: c

Outline

- 1 Assignment 1
- 2 Review, GDP and Standard of Living
- 3 Circular Flow

The Circular Flow of Income Model

- Is a very simple model of the economy

The Circular Flow of Income Model

- Is a very simple model of the economy
- But very useful

The Circular Flow of Income Model

- Is a very simple model of the economy
- But very useful
- Shows how economic activity can be measured as production, spending, factor income etc.

The Circular Flow of Income Model

Our first simple model only includes 2 sectors:

Households

- Own the factors of production, sell/rent them to firms for income
- buy and consume goods and services

The Circular Flow of Income Model

Our first simple model only includes 2 sectors:

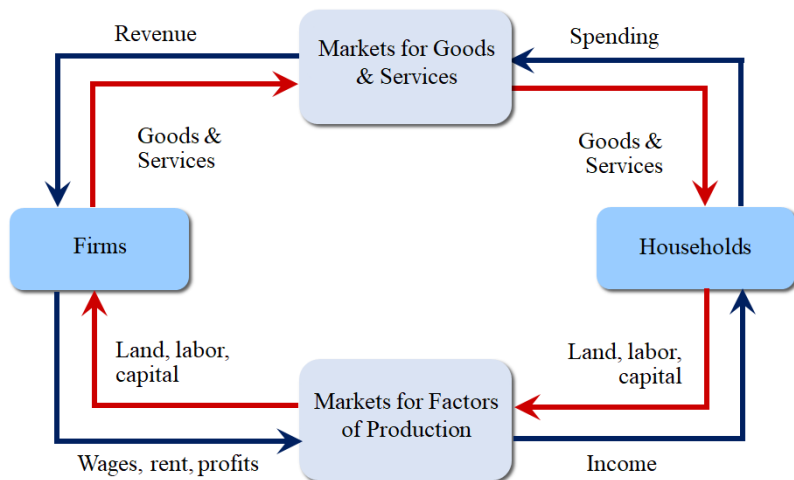
Households

- Own the factors of production, sell/rent them to firms for income
- buy and consume goods and services

Firms

- Buy/hire factors of production, use them to produce goods and services
- Sell goods and services

The Circular Flow Diagram



MPC and MPS

Consumption can be divided into two categories:

- Autonomous consumption
- Induced consumption
- Thus we can write the equation as such $C = c_0 + c_1(Y)$

MPC and MPS

Consumption can be divided into two categories:

- Autonomous consumption
- Induced consumption
- Thus we can write the equation as such $C = c_0 + c_1(Y)$

Marginal Propensity to Consume(MPC): How much of an additional dollar in income is spent on consumption.
This is c_1 from our earlier equation

MPC and MPS

Consumption can be divided into two categories:

- Autonomous consumption
- Induced consumption
- Thus we can write the equation as such $C = c_0 + c_1(Y)$

Marginal Propensity to Consume(MPC): How much of an additional dollar in income is spent on consumption.

This is c_1 from our earlier equation

Marginal Propensity to Save (MPS): How much of an additional dollar in income is saved.

$$MPC + MPS = 1$$

Multiplier effect

Keynesian Multiplier

An increase in income by households of \$1 will lead to a more than \$1 increase in total spending (GDP).

Multiplier effect

Keynesian Multiplier

An increase in income by households of \$1 will lead to a more than \$1 increase in total spending (GDP).

This is because that initial extra dollar spent on goods and services, will go to firms, who will then hire more factors, who will be then paid more in incomes and the cycle continues.

Multiplier effect

Keynesian Multiplier

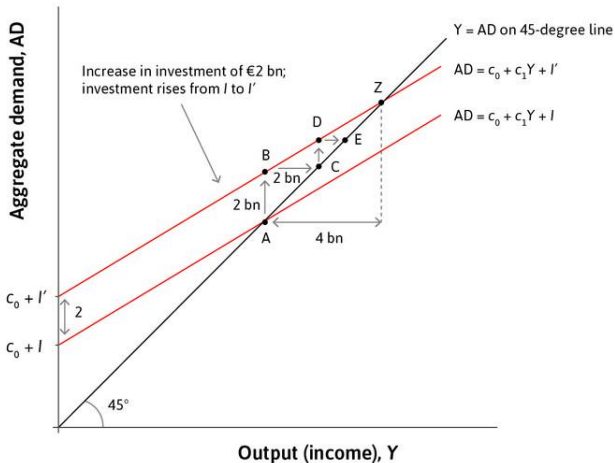
An increase in income by households of \$1 will lead to a more than \$1 increase in total spending (GDP).

This is because that initial extra dollar spent on goods and services, will go to firms, who will then hire more factors, who will be then paid more in incomes and the cycle continues.

This is the multiplier effect.

$$\text{Multiplier} = \frac{1}{1-MPC}$$

Deriving the multiplier and the Keynesian Cross.



Our first circular flow diagram excludes several important sectors of the economy.

Recall the GDP equation.

Our first circular flow diagram excludes several important sectors of the economy.

Recall the GDP equation.

- The government

Our first circular flow diagram excludes several important sectors of the economy.

Recall the GDP equation.

- The government
- The foreign sector

Our first circular flow diagram excludes several important sectors of the economy.

Recall the GDP equation.

- The government
- The foreign sector
- The financial sector

So let's add them to our Circular Flow model

Our expanded model now includes the additional sectors. Their activities either add or take away from our original circular flow.

Additions or inflows are known as injections.
Leakages are outflows.

Our expanded model now includes the additional sectors. Their activities either add or take away from our original circular flow.

Additions or inflows are known as injections.
Leakages are outflows.

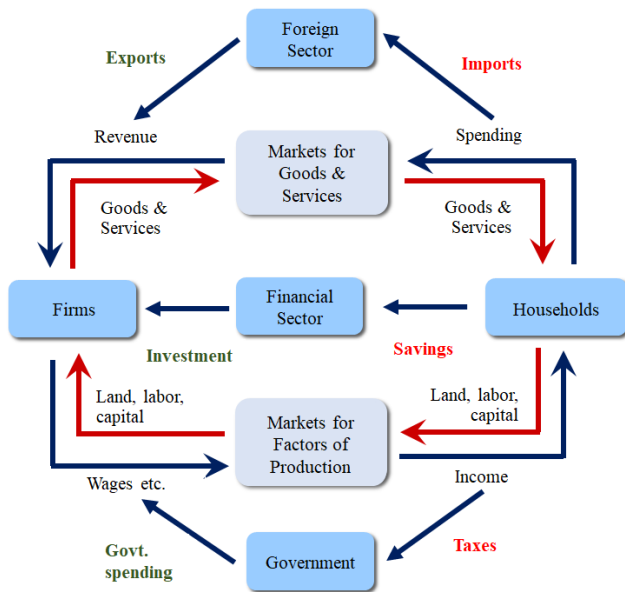
Injections

- Govt. Spending
- Exports
- Investment

Leakages

- Taxes
- Imports
- Savings

So let's add these to our earlier model



Multiplier effect revisited

What is the Keynesian multiplier in our more complex model?

We have to consider two leakages -

- 1 Taxes: Since taxes are cut from consumption, this disposable income is what determines induced consumption.

Thus we rewrite $C = c_0 + c_1(Y - t)$

Multiplier effect revisited

What is the Keynesian multiplier in our more complex model?

We have to consider two leakages -

- 1 Taxes: Since taxes are cut from consumption, this disposable income is what determines induced consumption.
Thus we rewrite $C = c_0 + c_1(Y - t)$
- 2 Net Exports: Imports like consumption depends on income, so $NX = X - mY$

Multiplier effect revisited

What is the Keynesian multiplier in our more complex model?

We have to consider two leakages -

- 1 Taxes: Since taxes are cut from consumption, this disposable income is what determines induced consumption.
Thus we rewrite $C = c_0 + c_1(Y - t)$
- 2 Net Exports: Imports like consumption depends on income, so $NX = X - mY$

$$Y = c_0 + c_1(1 - t)Y + I + G + X - mY$$

Thus the new multiplier is

$$k = \frac{1}{1 - c_1(1 - t) + m}$$

The derivation of the multiplier

$$Y = c_0 + c_1(1 - t)Y + I(r) + G + X - mY$$

bringing all of the elements related to Income (Y) to the L.H.S

$$Y - c_1(1 - t)Y + mY = c_0 + I(r) + G + X$$

$$\text{or } Y(1 - c_1(1 - t) + m) = c_0 + I(r) + G + X$$

Thus,

$$Y = \frac{1}{(1 - c_1(1 - t) + m)} \times (c_0 + I(r) + G + X)$$

	US	Euro	China
Consumption (C)	68%	55%	37%
Government spending (G)	15%	21%	14%
Investment (I)	19%	19%	47%
Exports (X)	14%	44%	26%
Imports (M)	16%	41%	24%

Table: Decomposition of the GDP, Source: core-econ