Goods Market - Part 2

EC 313, Macroeconomics

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Book Chapter 3

Review

Review

In the last lecture, we studied the goods market in the short-run.

- **Demand**
  - Linear Consumption Function
  - Disposable Income
- **Supply**
- **Equilibrium**
  - Multipliers for c_0, $\bar{I}$, G, NX
  - The multiplier for T
- Use **graphs** and **words** to describe the behavior of the goods market.

Overview

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Goals of this lecture

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- Derive the equation for **equilibrium consumption equation**.
- Derive the **Investment-Equal-Saving (IS) relation** from the goods market equilibrium
- Discuss the **Fiscal Policy**
- Analyze more **real-life** examples and applications using the **short-run goods market model**.

Equilibrium Consumption

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Let's derive the equilibrium consumption equation.

Equilibrium Consumption

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Also in equilibrium

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

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The equilibrium consumption is

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- When either $\bar{I}$, or G or NX goes up by \$1, **equilibrium consumption** goes up by $\frac{c_1}{1-c_1}$
- When T goes up by \$1, **equilibrium consumption** goes down by $\frac{c_1}{1-c_1}$

IS Relation

Why?

Investment Equal Savings is just another way to describe the goods market. Since our object of interest is still the same, the equilibrium should be the same as well.

In the end, we should get the same equilibrium equation:

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

The only difference is: instead of using **Goods Demand = Goods Supply**, we use **Investment = Savings**.

IS Relation

Why?

We already have a way to model the goods market equilibrium.

- Demand for Goods = Supply for Goods

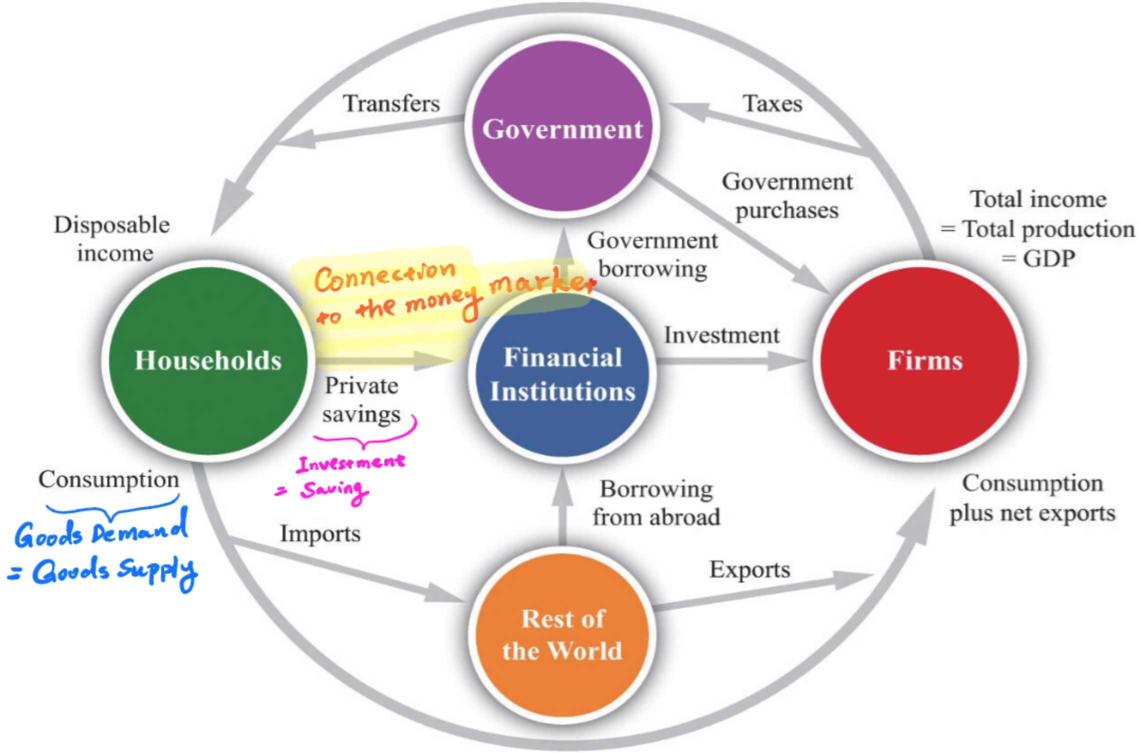
However, our ultimate goal is to describe the whole economy, which also contains the **money market**.

To establish the connection, we need to find **another perspective** to look at the goods market.

This alternative perspective is the **Investment-Equal-Saving (IS) relation**

IS Relation

Why?



Savings

Savings

Just like when we consider the components of consumption, we first consider the **components of saving**.

- Consumers: S_C
- Government: S_G
- Foreigners: S_F

Think about the question, who saves in the economy? The answer is **whoever consumes saves**

Savings - Consumers

The consumers has the disposable income Y_D and spends C, their saving would be $S_C = Y_D - C$, recall $Y_D = Y - T$. Hence we have the following **consumer saving equation**

$$S_C = Y - T - C$$

Also, note the consumption is endogenous in the model because C depends on Y, i.e. the **linear consumption funciton** $C = c_0 + c_1(Y - T)$, and thus we can further write

$$S_C = Y - T - (c_0 + c_1(Y - T))$$

Savings - Government

The government has a tax revenue of T and spends G. Hence we have the following **government saving equation**

$$S_G = T - G$$

Note that in macroeconomics government saving is also called **government surplus**

Savings - Foreigners

Foreigners also save, and some of their savings end up coming into our economy, and that is the part we are interested in when we study an economy. The part of foreign saving that flows into our economy is called **capital inflow (CI)**

Just like export and import, when there is capital inflow, there is also **capital outflow (CO)**, which is domestic saving that goes abroad.

The true saving from broad that flows into the economy is the difference between inflow and outflow, and thus we have the following condition:

$$S_F = NCI$$

Here NCI is the **net capital inflow** and $NCI = CI - CO$

Aggregate Savings

The aggregate saving available in the economy can be computed as follows.

$$
\begin{aligned}
S &= S_C + S_G + S_F \\
&= Y - T - (c_0 + c_1(Y - T)) + T - G + NCI \\
&= Y - (c_0 + c_1(Y - T)) - G + NCI
\end{aligned}
$$

Investment

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The aggregate investment is straightforward, and you have seen this already.

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$$I = \bar{I}$$

That is to say; investment is **exogeneous** to the model we are considering.

Equilibrium

Equilibrium

Solve for the equilibrium

The equilibrium is defined by **equating savings to investment**

$$
\begin{aligned}
I &= S \\
\bar{I} &= Y - (c_0 + c_1(Y - T)) - G + NCI
\end{aligned}
$$

Solving for Y, we get the following equation that characterizes the goods marker equilibrium

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

Does this look familiar? It does!

Equilibrium

Comparing Two Methods

Using **Goods Demand = Goods Supply**, we get (from the last lecture)

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

Using **Investment = Savings**, we get

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

Theoretically, these two equations should be the same. How would we make these two equations identical?

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$$NX = -NCI$$

Comparing Two Methods

What does this equation mean?

$$NX = -NCI$$

The amount of the **net export** one economy is equal to the amount of **net capital outflow**

The Lucas paradox: the observation that capital does not flow from developed countries to developing countries, although developing countries have lower levels of capital per worker.

Paradox of Saving

- "Those who save are promised a happy life."
- This saying does not apply to our **short-run** model.

Equilibrium

Paradox of Saving

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What happens if people choose to save more - c_0 decrease?

- What happens to the equilibrium output?
- What happens to equilibrium consumption?
- What happens to equilibrium consumer saving?

Equilibrium

Paradox of Saving - Output

Let's say c_0 goes down by one dollar.

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Recall the equilibrium output equation from the goods market.

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

Equilibrium Output Y would go down by $\frac{1}{1-c_1}$

Paradox of Saving - Consumption

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Let's say c_0 goes down by one dollar.

Recall the equilibrium consumption equation from the goods market.

$$C = \frac{1}{1-c_1}c_0 + \frac{c_1}{1-c_1}(\bar{I} + G + NX - T)$$

Equilibrium Consumption C would go down by $\frac{1}{1-c_1}$

Paradox of Saving - Consumer Saving

Let's say c_0 goes down by one dollar.

Equilibrium

Paradox of Saving - Consumer Saving

Let's say c_0 goes down by one dollar.

In equilibrium, the households/consumers' saving is

$$\begin{aligned}
S_C =& Y_D - C \\
=& Y - T - C \\
=& \left(\frac{1}{1-c_1}(c_0 + \bar{I} + G + NX) - \frac{c_1}{1-c_1}T\right) - T \\
& - \left(\frac{1}{1-c_1}c_0 + \frac{c_1}{1-c_1}(\bar{I} + G + NX - T)\right) \\
=& \bar{I} + G + NX - T
\end{aligned}$$

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$$S_C = \bar{I} + G + NX - T$$

The equilibrium S_C does not depend on c_0!!

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Paradox of Saving - Consumer Saving

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In equilibrium, the households/consumers' saving is

$$S_C = \bar{I} + G + NX - T$$

The equilibrium S_C does not depend on c_0!!

This means if c_0 goes down by one dollar, **consumer saving doesn't change**!!

Application - Computation

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Consider an economy that has the following setup:

$$\begin{aligned} c_0 &= 100 & c_1 &= 0.6 & \bar{I} &= 150 \\ G &= 140 & NX &= 10 & T &= 100 \end{aligned}$$

a) What is the net capital inflow (NCI)?

b) What is the equilibrium output?

c) What is disposable income

d) What is consumption

e) If c_0 decreases to 50, what is the change in equilibrium output?

f) What is demand when $c_0 = 100$? Does it equal output?

Application - Responsive Tax

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Responsive Tax

Consider a close economy with reponsive (fiscal) tax policy where tax T is a function of output Y.

$$Z = C + I + G$$
$$C = c_0 + c_1 Y_D$$
$$T = t_0 + t_1 Y$$

a) Solve for the equilibrium output interms of the exogeneous variables.

b) What is the multiplier for c_0

c) Is the multiplier for c_0 higher or lower when t_1 is 0 or when t_1 is positive?

Responsive Tax

Consider a closed economy (NX = 0) with reponsive (fiscal) tax policy where tax T is a function of output Y.

$$Z = C + I + G$$
$$C = c_0 + c_1 Y_D$$
$$T = t_0 + t_1 Y$$

d) What is your intuition for your answer to c)

e) Suppose c_0 increase by \$300. What is the change in equilibrium Y when

1) $t_1 = 0.2$ and $c_1 = 0.5$

2) $t_1 = 0$ and $c_1 = 0.5$

Application - Crowding Out

Crowding Out

Consider a closed economy (NX = 0) where government spending crowds out investment.

$$Z = C + I + G$$
$$C = c_0 + c_1 Y_d$$
$$I = i_0 - i_1 G$$

a) Solve for the equilibrium output interms of the exogeneous variables.

b) What is the multiplier for c_0

c) What is the multiplier for G

d) If i_1 increases (crowding out effect is more intense), how does the multiplier for c_0 changes? How does the multiplier for G change?

Crowding Out

Consider a closed economy (NX = 0) where government spending crowds out investment.

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$$I = i_0 - i_1 G$$

e) Suppose G increase by \$300. What is the change in equilibrium Y when

1) $i_1 = 0.2$ and $c_1 = 0.5$

2) $i_1 = 0$ and $c_1 = 0.5$